NYSERDA Case Study: Switched Source (2026)

Final Report

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Executive Summary

NYSERDA's Support for Switched Source

Switched Source is a technology developer specializing in dynamic, automated grid modernization solutions that help distribution system operators better utilize legacy grid infrastructure by re-balancing load between phases on distribution circuits. Switched Source's primary product is the Phase-EQ, an automated device capable of moving real and reactive load between the phases of a distribution grid. The Phase-EQ unlocks grid capacity by rebalancing load, reducing distribution system losses, and reducing thermal overloads.

NYSERDA funded two Switched Source demonstration projects:

- **Balancing Phases in Medium Voltage Systems:** The first demonstration project was a beta test of a single Phase-EQ device for the small municipal utility in the Village of Sherburne, New York. NYSERDA provided $1 million in funding for the project.
- **Scaling Up the Phase-EQ:** The second project was a larger demonstration in Clifton Park, a town in Upstate New York. NYSERDA provided approximately $1 million in funding and National Grid estimates that it provided between $250,000-$350,000 of in-kind support. National Grid examined 972 circuits out of the 2,000 circuits in its service territory and flagged 185 (19%) circuits as potential beneficiaries for the Phase-EQ device. National Grid then selected five sites for detailed analysis and ultimately chose one site for the pilot deployment.[1] Switched Source adapted its product for use on National Grid's distribution network and successfully installed the Phase-EQ device at the selected site. National Grid included 30 additional Phase-EQ devices in its rate case and has identified sites for 12 of the 30 devices.

Switched Source also benefited from New York State's cleantech innovation ecosystem, including the NYSERDA-backed Entrepreneurs in Residence program, RevConnect Hardware Scaleup Program, and Koffmann Incubator (which includes the NYSERDA-funded Southern Tier Clean Energy Incubator).

Successful Pilots, Replication, and Company Growth

NYSERDA's support was instrumental in the development trajectory of Switched Source and the Phase-EQ. The business assistance and demonstration funding provided by NYSERDA supported the company during a critical stage of development, and the success of the demonstration projects has created new deployment opportunities and resulted in significant growth for the company.

> **"I do not think that we would be a success, I don't think our company would still be around, if we hadn't gotten the support from NYSERDA in so many different areas of our business."**
>
> - ***Switched Source Founder***

[1] One Phase-EQ device can be installed per circuit.

Key outcomes of the NYSERDA-funded demonstration projects include:[2]

- **Projected reliability improvements** on circuits where the Phase-EQ is installed, with 500-2,500 kW of unlocked capacity recorded in the National Grid field tests.
- **Cost savings** from approximately $10,000 annual OPEX savings from reduced labor, deferred infrastructure investment ($562,000 per mile of deferred line extension), and reduced energy losses.
- **Increased hosting capacity for distributed generation (DG) and electric vehicle (EV) charging** with 313 kW of additional DG capacity and 50 additional EVs with each Phase-EQ device.
- **Avoided greenhouse gas emissions** of approximately 7,197 metric tons of CO_2e for one Phase-EQ device or approximately 86,369 metric tons of CO_2e for 12 devices.
- **Rate case inclusion** by National Grid, representing a direct path to full-scale deployment. As noted above, 30 additional Phase-EQ devices were approved through the rate case and 12 are currently being deployed.
- **Knowledge sharing** with other New York State utilities, National Grid Massachusetts, and at conferences including the CIGRE US National Committee, amplifying the impact of the demonstration beyond National Grid's New York service territory.
- **Company growth**: 60% growth in U.S. installations in 2025 as compared to 2024.[3] The company's national workforce grew by approximately 30% from 2024 to early 2026.
- **Additional customer base** with eight confirmed customers across 10 states.

Table 1 shows summary results for the deployment of 12 Phase-EQ devices by National Grid utility in New York State. The results show a benefit-cost **ratio of 5.9** with over **86,369 Total CO_2e savings** possible alongside **600 additional EVs** and **3,750 kW of additional DG capacity**.

Table 1: Summary Cost Benefit Modelling Results for 12 Phase-EQ Devices in New York (1,000 kW Increased Capacity Scenario)

Value	Results
NPV Benefits	$26,037,000
NPV Benefits Less Costs	$21,597,000
Benefit Cost Ratio	5.9
Total Carbon Dioxide Savings (TCO_2e)	86,369

[2] Results are based on 12 Phase-EQ devices (the number of devices for which National Grid has identified deployment sites) and assume conservatively that each device will result in 1,000 kW of increased load serving capacity. Switched Source's field data suggests that one Phase-EQ device increases load serving capacity by 1,200 kW, on average, and ranges from 500-2,500 kW. Results shown are for the 1,000 kW Increased Load Serving Capacity "All-in" scenario, which combines all benefits of the Phase-EQ into one value stack. A scenario analysis is presented in the main body of this case study.

[3] https://www.switchedsource.com/news/article/current/2026/01/20/100025/switched-source-u.s.-installations-grew-60-in-2025

Additional EVs	600
Additional DG Capacity	3,750 kW

Phase Balancing and Electric Grid Stability

The electric grid transmits and distributes power to end users using a three-phase system in which three alternating currents move across three wires, each phase offset from the others by 120 degrees, resulting in a continuous and stable power supply. For the system to function efficiently and safely, the electric load should be balanced evenly across the three phases. Challenges including extreme weather events, consumer electrification initiatives (such as electric heat pump programs), and the increasing popularity of electric vehicles (EVs) can all lead to spikes in energy demand – resulting in significant phase imbalances. Improper phase balancing can result in energy losses, overheating and increased strain on grid equipment (e.g., power lines, transformers), higher operating costs, and reduced capacity for distributed generation (DG).

Typically, electric utilities address phase imbalances by installing additional infrastructure and/or sending out crews to manually adjust circuits to bring the phases into balance, reduce grid strain, and increase available capacity. These solutions can be costly and time-consuming, taking days or even weeks to balance an entire electrical circuit.[4] Furthermore, dynamic variables like seasonal fluctuations in energy demand and new DG interconnections may require utilities to manually rebalance the same circuits repeatedly over time. As such, the traditional approach to phase balancing is a static solution to a dynamic problem.[5]

Switched Source Phase-EQ Technology

Utilities are under pressure from increasing electricity demand and additional DG, such as solar panels. One way for utilities to meet this demand is to build new capacity, such as new power lines and connections. However, building new capacity is very expensive. A more cost-effective way of meeting additional demand is to maximize the capacity available within the existing infrastructure. This is what Switched Source's Phase-EQ device delivers.

Switched Source is a technology developer specializing in dynamic, automated grid modernization solutions that help distribution system operators better utilize legacy grid infrastructure by re-balancing load between phases and distribution circuits.[6] Switched

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[4] Murray, Charles, *Balancing Phases in Medium Voltage Systems: Final Report*, prepared for NYSERDA by Switched Source PB LLC. NYSERDA Contract 133528. December 2022.

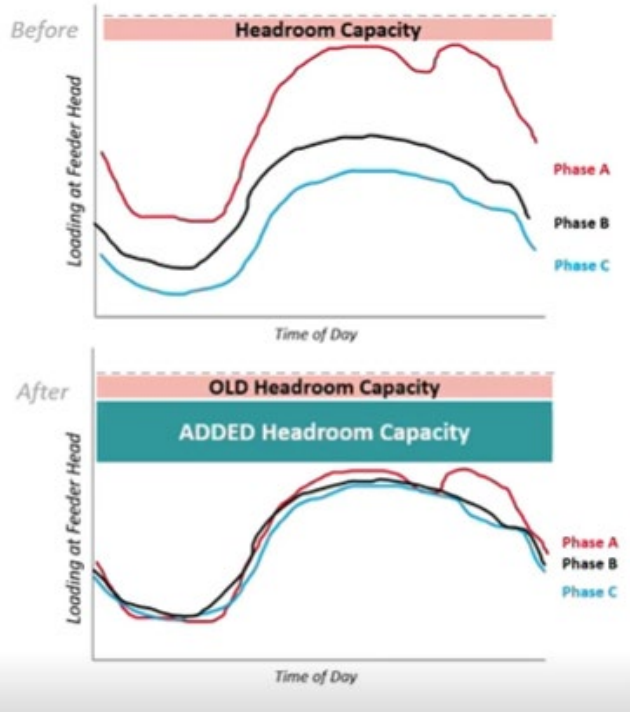
[5] Ibid.

[6] https://www.switchedsource.com/

Source's primary product is the Phase-EQ,[7] an automated, pad mounted power electronics device capable of moving real and reactive load between the phases of a distribution grid, with the goal of balancing load on the feeder,[8] reducing distribution system losses, and improving grid capacity (including solar hosting capacity and EV charging) without the need for manual adjustments.

Phase-EQ technology enables dynamic power flow control between phases in a three-phase circuit, helping balance load automatically and in real time (**Figure 1**). The "Before" and "After" charts in Figure 1 both show the same total load at each point in time, but the load is more "balanced" across the three phases in the "After" chart, providing added capacity. Whereas traditional approaches might require manual readjustments at regular intervals based on load changes or seasonal impacts, an automated platform can self-adjust in response to changing conditions, mitigating the need for manual rebalancing. An additional benefit of load balancing using the Phase-EQ device is reduced grid strain, which can delay (or eliminate entirely) the need for costly and time-consuming infrastructure upgrades.

Figure 1: Phase-EQ Adds Additional Headroom Capacity



Source: Switched Source

[7] https://www.switchedsource.com/Phase-EQ

[8] Electric utility feeders are electrical lines or wires that carry electricity from substations to distribution points, such as homes and businesses. Feeders carry a large amount of electrical current and are susceptible to faults such as short circuits and overloads.

Section 2 | NYSERDA's Support of Switched Source

Switched Source initially approached NYSERDA in 2019 for funding to develop a "tie controller" product, which eventually evolved into the company's patented Phase-EQ device. Switched Source explained that *"NYSERDA, we could tell, was cut from a very different cloth [than other agencies] when we reached out to them, and it was a big part of why we invested so heavily in being in New York and participating in all these programs*."

NYSERDA's responsiveness made an immediate impression: NYSERDA's Grid Modernization program manager personally connected with Switched Source's founder upon initial outreach, quickly linking the company to key business support services including: Entrepreneurs in Residence (EIR); the RevConnect Hardware Scaleup Program; and the Koffmann Incubator, which includes the NYSERDA-backed Southern Tier Clean Energy Incubator. The incubator provided Switched Source with office space and valuable resources and contacts with expertise in grid enhancing technologies. These contacts led to a joint research project with Binghamton University on electrical system-level impacts, which helped Switched Source determine how to arrange the sub-systems within the company's device.[9]

In addition, under the Grid Modernization program, NYSERDA provided Switched Source with funding for two Phase-EQ demonstration projects:

1. **Balancing Phases in Medium Voltage Systems**: NYSERDA provided $1 million for a beta test of a single Phase-EQ device for a small municipal utility in the Village of Sherburne.
2. **Scaling Up the Phase-EQ**: NYSERDA provided approximately $1 million in additional funding for the National Grid demonstration project, with 30 Phase-EQ devices subsequently written into National Grid's rate case and 12 actively in progress on deployment.

The first demonstration project was a beta test of a single Phase-EQ device for the small municipal utility in the Village of Sherburne. NYSERDA provided $1 million in funding to support the project. The project was implemented in three phases: Phase I identified product-market fit through customer outreach. Switched Source determined there was significant interest from utilities (especially rural municipal utilities) for automated phase balancing technology. In Phase II, Switched Source teamed with a municipal utility in the Village of Sherburne to identify the most suitable location to install the Phase-EQ device and model its potential grid impacts. Phase III focused on manufacturing, debugging, and field deployment, and resulted in Switched Source successfully commissioning the device at the identified location in Sherburne.

This project resulted in the first version of the Phase-EQ, which was more highly automated than the company's initial technology (the Tie Controller). The project field tested the technology and defined the value proposition. At the end of beta testing, the device could

[9] Switched Source is also exploring the possibility of manufacturing the power electronics assembly for its next gen Phase-EQ device in the Greater Rochester area. Switched Source connected with the manufacturer via the NYSERDA-funded Hardware Scale-Up Program at NextCorps in Rochester.

decrease load imbalances[10] by 10% (such as from 16% to 6%) and voltage imbalance[11] by half (up to 3%), which had an economic benefit of over $500,000. Load imbalance and voltage imbalance can both negatively impact power quality and equipment reliability if not addressed.

> ***"There are probably 10 or 15 important things that we learned along the way from that initial [Sherburne] pilot and being able to develop the technology, that afforded us the ability to actually get commercial traction and fine tune the device." -Switched Source Interviewee***

The following large-scale National Grid demonstration project built on the learning from the Sherburne pilot project. Performance data collected during the Sherburne pilot demonstrated Phase-EQ's reliability in the field, which helped Switched Source convince National Grid to conduct a larger-scale demonstration in Upstate New York (Clifton Park). With support from NYSERDA, Switched Source adapted its product for use on National Grid's distribution network and made improvements to reduce the amount of maintenance required. NYSERDA provided approximately $1 million in funding, and National Grid estimates that it provided between $250,000-$350,000 of in-kind support (including modeling, engineering, risk and cybersecurity, and physical construction). A connection through the U.S. Department of Energy's Advanced Research Projects Agency (ARPA-E) – which provided $8,560,000 to Switched Source – linked the company to National Grid Partners, the "venture" arm of National Grid. National Grid Partners connected Switched Source with the utility's engineering groups who signed a letter of support that was required for the pilot to proceed.

The National Grid pilot aimed to evaluate the effectiveness of Switched Source's Phase-EQ device at enhancing power quality, reliability, and distribution system capacity. Another ambition was to build a benefit-cost analysis model which could be used to evaluate other projects. The primary motivation for National Grid was to reduce encroachment on its ground relaying and to better balance feeders to increase efficiency.[12] National Grid's circuits are at risk of being overloaded (**Figure 2**), with 50% of circuits having less than 2MW of capacity for new load, and 23% having less than 1MW of available capacity. The Phase-EQ reduces phase imbalances and increases load-serving capacity. These benefits reduce the need for annual or biannual manual rebalancing – reducing costs – and can also defer capital upgrades like feeder extensions, resulting in substantially reduced capital expenses. The increased load

[10] Load imbalance occurs when the current drawn by the three phases of an electrical system is not equal (i.e., one or more phases carry more current than the others).

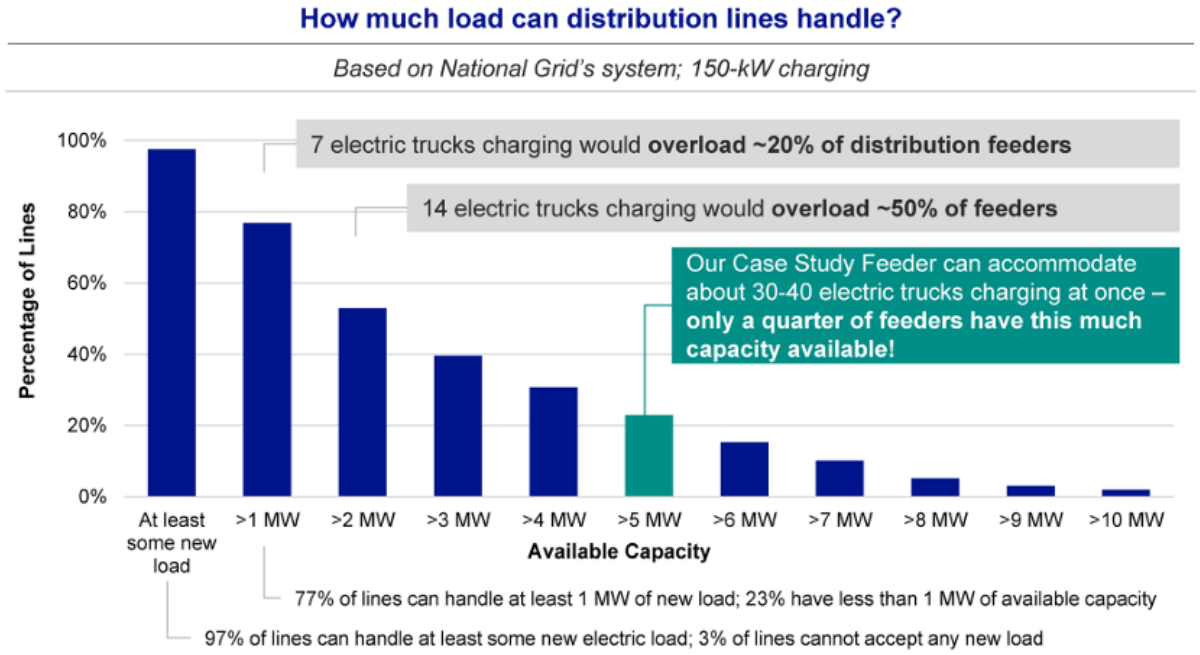
[11] Voltage imbalance occurs in a three-phase system when the phase voltages are not equal in magnitude or are not exactly 120 degrees apart in phase angle.

[12] Encroachment on ground relaying occurs when load impedance due to heavy load conditions falls within a relay's ground fault zone, causing the relay to incorrectly detect a fault and "trip." If this is not addressed, it can potentially cause power outages and compromise system security.

serving capacity also allows more DG, such as solar panels, to be connected to the circuit without requiring larger upgrades.

> ***"NYSERDA covering the cost of the [Phase-EQ] unit enabled National Grid to complete the pilot in the first place by minimizing risk to customers and enabling it to be more cost competitive as an alternative to traditional solutions." -National Grid Interviewee***

Figure 2: National Grid Circuits at Risk of Overload

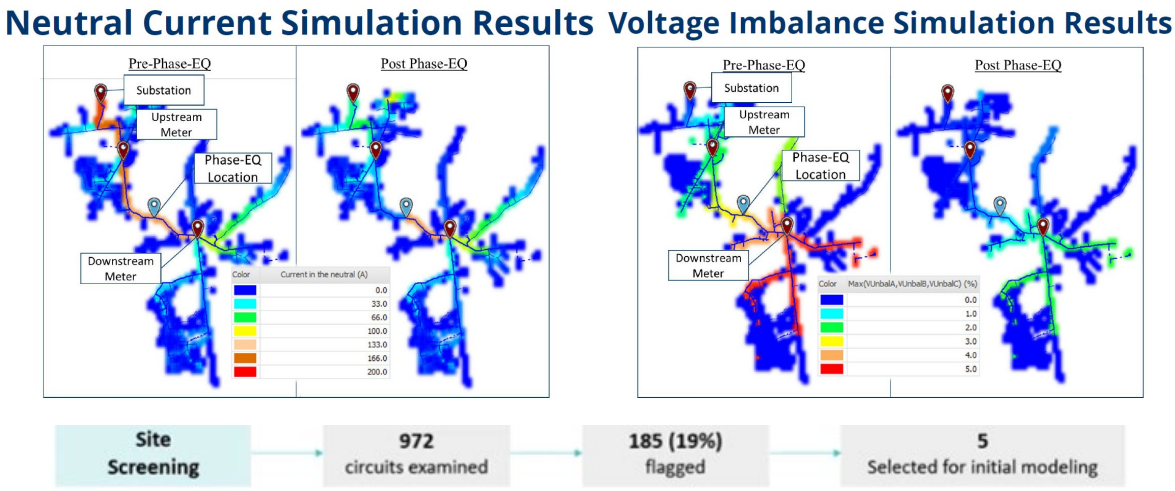


Source: National Grid[13]

Phase-EQ devices are typically installed one device per circuit, as this is usually sufficient to achieve the maximum device benefits. Initially, National Grid examined 972 circuits out of the 2,000 circuits in its service territory. National Grid flagged 185 (19%) circuits as potential beneficiaries for the Phase-EQ device (**Figure 3**). Of these, National Grid selected five sites for detailed analysis and then narrowed it down to one site for the actual pilot deployment.

[13] National Grid, September 2023. The Road to Transportation Decarbonization: Readying the Grid for Electric Fleets. https://www.nationalgrid.com/news/national-grid-and-hitachi-energy-transportation-decarbonization-study-highlights-path-readying-grid Accessed: 6/22/2026.

Figure 3: Switched Source National Grid Simulation Results



Source: Switched Source

Following the selection of the site, the device was installed in about one month. National Grid requested some changes be made to the initial Phase-EQ device during installation (e.g., neutral connection, grounding rod). Switched Source recognized the broader applicability of these modifications and has since incorporated them into its standard product design.

Based on the success of the pilot, National Grid determined that the Phase-EQ technology was scalable and that broader deployment could improve system reliability and reduce costs. As a result, National Grid included $14,250,000 to deploy the Phase-EQ on 30 additional circuits in its May 2024 rate case for FY 2025 through FY 2029. Specifically, National Grid included $4,750,000 for each of three regions in its New York State service area under the "system capacity blanket" within its rate case (**Table 2**), which was approved by the Public Service Commission. So far, National Grid has identified sites for 12 Phase-EQ devices based on circuits with an existing neutral current above 60 amps. These 12 devices will soon be deployed, with the first three scheduled for delivery by the end of July 2026.

Table 2: Phase-EQ Program Budgets in National Grid's Rate Case, by Region by Fiscal Year ($ Thousands)

Region	FY 25	FY 26	FY 27	FY 28	FY 29	Total
Central (Syracuse & surrounding counties)	$0	$950	$950	$1,266	$1,584	**$4,750**
East (Capital District & Hudson Valley)	$0	$950	$950	$1,266	$1,584	**$4,750**
West (Buffalo & Niagara Frontier)	$0	$950	$950	$1,266	$1,584	**$4,750**

Section 3 | Modeled Results at Scale

The quantitative results are based on a cost-benefit model developed by Switched Source using National Grid's BCA Handbook to project the benefits of the Phase-EQ for utilities including National Grid.[14] The Evaluation Team used information provided by interview respondents to amend the model to calculate the scope of potential benefits provided by the Phase-EQ device if it is deployed at scale. The Evaluation Team carried out a detailed review of the underlying structure, logic, and assumptions of Switched Source's model.

A key benefit of the Phase-EQ – and a key input for the cost-benefit model – is the increased load serving capacity provided by a Phase-EQ device. This input is uncertain as the exact increase in load serving capacity depends on many factors related to the specific circuit and location of the Phase-EQ device. Switched Source developed the original model assuming one device would increase load serving capacity by 1,200 kW, an approximately 10-15% capacity increase.[15] The Evaluation Team conducted a sensitivity analysis on the increased load serving capacity using three values: **500 kW**, **1,000 kW**, and **1,500 kW**.[16]

In addition to the capacity unlocked per device, another key driver of benefits and costs is the total number of devices installed. To understand the magnitude of potential benefits, the Evaluation Team analyzed four deployment scenarios:

- **1** device
- **12** devices – number of devices National Grid New York currently plans to install based on specific circuits the utility has identified.
- **30** devices – number of devices approved in National Grid's rate case.[17]
- **120** devices - number of locations identified as potential locations for a Phase-EQ in Switched Source's modelling analysis for National Grid.

The model includes nine scenarios – eight individual benefit scenarios, plus an "all-in" scenario that combines all benefits into a single value stack:

1. **All-In**: Combination of all scenarios, correcting for any double counting. This represents the potential total value stream if utilities get full use of all the use cases. Utilities often value the Phase-EQ for a given use case or a subset of use cases.
2. **Capacity Only**: Benefits from balancing phase currents to increase load-carrying capacity in the system. This is the core benefit of the Phase-EQ—using capacity that already exists in the distribution system but has not been tapped before. This core capacity benefit is valued as ***capacity unlocked* times *the value of capacity***.[18]

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[14] CIGRE US National Committee 2024 Grid of the Future Symposium, National Grid Pilot of Phase-EQ Technology.

[15] Switched Source's initial 1,200 kW additional load serving capacity assumption was based on the expected average from the field data.

[16] Note that Switched Source modelled up to 2,500 kW of unlocked capacity as a "blue sky" assumption in its modelling.

[17] https://www.ngpartners.com/stories/increasing-capacity-and-balancing-the-electrical-grid-with-switched-source

[18] Capacity, upgrade deferral, and/or the integration of EVs and DGs are typical use cases for investor-owned utilities (IOUs).

- ***Capacity unlocked:*** As part of the utility's distribution system planning process, Switched Source models the amount of capacity that can be unlocked on different parts of the system by installing a Phase-EQ. This modeling simulation results in the heat maps (shown above in **Figure 3**) that show much additional load the circuit could handle by installing a Phase-EQ. How much capacity the Phase-EQ could unlock is based on circuit characteristics, including geography, layout, loading, and imbalance, among others..
- ***Value of capacity:*** This represents the marginal cost of capacity at different parts of the distribution system. National Grid's Cost-Benefit Handbook (link) provides these values for National Grid's service territory.

3. **Upgrade Deferral Only**: The benefits derived from deferring capital upgrade projects due to the additional load-carry capacity. Although not accounted for in this scenario, the Phased-EQ is also expected to reduce degradation on existing equipment due to high neutral currents and reducing the temperature of wires.
4. **High Seasonal Imbalance**: Mitigating seasonal load imbalances, particularly those caused by heating or cooling. In Switched Source's experience, High Seasonal Imbalance and Power Quality Issues are typical use cases for more rural utilities or ones with significant seasonal population differences.
5. **Power Quality Issues**: Improvements to power quality issues traditionally managed by slower or less flexible equipment.
6. **Volt-Var Optimization (VVO) Application**: Assuming Phase-EQ enhances VVO efficacy by 15 kW.
7. **FLISR Benefit**: Fault location, isolation, and service restoration benefits. Although still relevant to the Northeastern U.S., this is a typical use case for IOUs in Southeastern U.S. due to the focus on storm preparedness and grid hardening.
8. **EV Integration**: This BCA uses 10 kW chargers, one EV per charger. For example, 1200 kW unlocked / 10 kW L2 charger = 120 EVs.
9. **DG Integration**: For solar panels, assume a 20% capacity factor[19] and assume that 750 kW (out of 1200 kW) can go to that, based on studies completed with RLC Engineering, which conducts power studies for Switched Source.

Table 3 shows the results for the "all-in" scenario for all three increased load serving capability scenarios (**500 kW**, **1,000 kW**, and **1,500 kW**) and four devices-deployed scenarios (**1**, **12**, **30**, and **120 devices**). The all-in scenario represents the full potential value stack that can be derived from installing the Phase-EQ device. The scenario combines all individual scenarios, correcting for any double counting, to calculate the outcome if all potential benefits are accessed. While some sites may realize the full value stack, others may capture only a subset of benefits. Therefore, the results of the all-in scenario should be viewed as the 'best case' scenario for Phase-EQ deployment. To get a more accurate picture of benefits at a particular set of sites, site-specific modelling would be required.

As expected, the results show that benefits increase when greater load serving capability is unlocked and when more devices are deployed. When one device is deployed, the net

[19] New York State's capacity factor is currently 15% or lower depending on system size, application and other factors.

benefits range from $1,247,000 to $2,352,000, when increased load serving capacity ranges from 500 to 1,500 kW. The benefits increase linearly with the number of devices deployed, as the circuits where the devices are deployed are assumed to be far enough apart that the Phase-EQ devices do not interact with one another.

Table 3. All-in Scenario Results for National Grid New York (NPV Benefits Less Costs, $000)

Number of Devices		Unlocked Capacity		
No.	**Description**	**500 kW**	**1,000 kW**	**1,500 kW**
1	Single Phase-EQ device	$ 1,247	$ 1,800	$ 2,352
12	NGrid's current deployment plan	$ 14,966	$ 21,597	$ 28,228
30	No. of devices in NGrid's rate case	$ 37,415	$ 53,993	$ 70,571
120	All eligible circuits (per NGrid)	$ 149,662	$ 215,972	$ 282,283

Table 4 shows the detailed results for the central increased load serving capacity scenario, **1,000 kW**. As expected, the results clearly show that the all-in scenario provides the greatest benefits, with a benefit-cost ratio of 5.9. The individual scenario with the greatest benefit-cost ratio is the EV integration scenario at 3.4, followed by DG integration, FLISR benefits, and power quality issues scenarios at 3.1, 2.7, and 2.3, respectively. The capacity only, upgrade deferral only, high seasonal imbalance and VVO application scenarios have the lowest benefit-cost ratios, at 1.4, 1.7, 1.5, and 1.2, respectively. All individual scenarios have cost-benefit ratios above one and therefore the Phase-EQ provides benefits whether only one or multiple of the benefits are unlocked.

Two of the scenarios, EV integration and DG integration, also provide carbon reduction benefits as they offset fossil fuel combustion and associated emissions. The EV integration scenario models the expansion of EVs, which are assumed to replace conventional vehicles, and the DG scenario models the expansion of distributed solar, which is assumed to replace the equivalent electricity generation from the NYS electricity grid. The EV integration and DG integration scenarios mitigate 96,000 MT CO_2e, and approximately 77,000 MT CO_2e, respectively. The dollar value of avoided carbon dioxide, or the Social Cost of Carbon benefits, are included in the NPV Benefits and NPV Benefits Less Costs.

Due to lack of available data, the cost benefit analysis does not consider embodied carbon emissions from deferred line extensions. Embodied carbon refers to all the emissions produced across the supply chain to make something. In the context of line extensions, this includes raw materials, manufacturing, transportation of materials and parts, and construction activities. These emissions are also called upstream, or cradle-to-gate emissions. Deployment of a Phase-EQ means that a circuit no longer needs capital investment to extend lines. With the assumption that the embodied carbon of line extension will be higher than building the Phase-EQ device, deploying the Phase-EQ will result in embodied carbon saving. Therefore, given embodied carbon savings have not been included in the results, the Total Carbon Dioxide Savings and NPV Benefits of Phase-EQ deployment are likely underestimates.

Table 4. Detailed Modelling Results for National Grid New York, 1,000 kW Capacity Scenario, 12 Phase-EQ Devices

Value	Scenario								
	(1) All-In BCA	(2) Capacity Only	(3) Upgrade Deferral Only	(4) High Seasonal Imbalance	(5) Power Quality Issues	(6) VVO Appli-cation	(7) FLISR Benefit	(8) EV Integration	(9) DG Integration
NPV Benefits ($000)	$26,037	$6,251	$7,379	$6,531	$10,159	$5,259	$12,057	$15,289	$13,951
NPV Costs ($000)	$(4,439)	$(4,439)	$(4,439)	$(4,439)	$(4,439)	$(4,439)	$(4,439)	$(4,439)	$(4,439)
NPV Benefits Less Costs ($000)	$21,597	$1,812	$2,940	$2,091	$5,720	$820	$7,618	$10,849	$9,512
Benefit Cost Ratio	5.9	1.4	1.7	1.5	2.3	1.2	2.7	3.4	3.1
Total Carbon Dioxide Savings (TCO_2e)	86,369	0	0	0	0	0	0	96,000 (1,200 additional EVs)	76,738 (7,500 kW additional DG capacity)

Section 4 | Knowledge Sharing, Replication, and Company Growth

Switched Source has shared its learnings from both NYSERDA-funded projects publicly. The company shared the results of the National Grid pilot at the CIGRE US National Committee 2024 Grid of the Future Symposium in a presentation titled "National Grid Pilot of Phase-EQ Technology."[20] In addition, Darcy Partners, a technology scouting and innovation advisory firm serving the energy industry, published a segment on the Phase-EQ, further promoting the device.[21]

In addition, National Grid New York shared the pilot results with National Grid Massachusetts, which has subsequently deployed a Switched Source device.

> ***"It was much easier to get traction in nearby states like Massachusetts with the New York State pilot." -Switched Source Interviewee***

Beyond New York and Massachusetts, the Phase-EQ is being deployed in numerous other states and utilities. Switched Source recently won a Connecticut Innovative Energy Solutions prize with Eversource to fund a four-device limited roll-out which, if successful, will allow the utility to purchase the Phase-EQ at scale. Switched Source's application emphasized the success of the NYSERDA pilot.

Switched Source has grown significantly since the start of its engagement with NYSERDA, including expanding to new customers and increasing its business with its existing customer base. Switched Source attributes much of its growth to NYSERDA's support. Switched Source's U.S. installations grew 60% in 2025;[22] it now has eight customers and operates across more than 10 utility service areas nationwide with operational devices across New York, Alaska, Florida, Georgia, Iowa, Massachusetts, Texas, and Washington state (**Figure 4**). One of the largest utilities in Florida recently purchased four Phase-EQ devices and recently won a Grid Resilience and Innovation Partnerships (GRIP) grant to deploy over 200 devices over the next few years.[23] Other utilities, including several in the Northeast and one in the Southeast are also in the scoping stages for Phase-EQ deployment.

> ***"NYSERDA is willing to look at timelines that the venture capital community is not, because they [NYSERDA] want to have big impacts and they realize that it takes time to do that. I just don't think our technology would have ever existed [without NYSERDA]." - Switched Source Interviewee***

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[20] https://cigre-usnc.org/future-meetings/grid-of-the-future-2024/

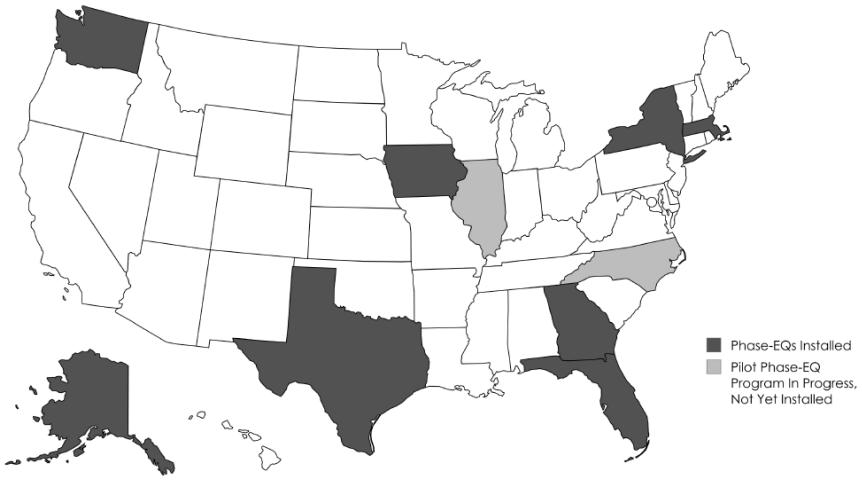
[21] https://connect.darcypartners.com/research/cigre-national-grid-pilot-of-Phase-EQ-technology

[22] https://www.switchedsource.com/news/article/current/2026/01/20/100025/switched-source-u.s.-installations-grew-60-in-2025

[23] At the time of writing, federal GRIP grant funding has been frozen.

Switched Source struggled to find private sources for funding for the development of the Phase-EQ technology due to the perception by private capital firms that utilities are slow to take up new technologies. However, after the NYSERDA pilot, Switched Source has attracted increased interest from private capital investors, with announcements forthcoming.

Figure 4: Switched Source Deployment Map as of November 2025



Source: Switched Source

Continuing challenges for further replication and scale-up of the Phase-EQ technology include the physical requirements of siting the devices, which can rule out certain circuits, and slow adoption by utilities. Switched Source has found that every utility (in New York and other states) prefers to conduct its own pilot rather than base its decision to adopt the technology on the results of other utilities' pilots. There is also the threat from "next-best alternative" technologies, such as advanced distribution management systems (ADMS), voltage optimization schemes, and parametric equalization technologies, which may provide workable solutions from the utilities' perspective even if they do not provide the long-term benefits as the Phase-EQ. Although each competitor has downsides in comparison to the Phase-EQ such as the requirement to work with third-party software developers for voltage optimization schemes or the lack of reliability improvements with parametric equalization technologies.

"Without the Sherburne deployment, none of this would be possible. If you really get into the guts of our business, I don't know how we would have survived without NYSERDA's support. I think we would have had a hard time getting through Covid. During Covid is when we really picked up the Phase-EQ. NYSERDA has been a really strong partner for us, and it was not just in one particular area, it was across a whole bunch of different things. […] **Every time I talk to a startup that's in our space… I tell them to get their butts to New York, because I think that it is the best place for support for anything tied to grid technologies."**

- ***Switched Source Founder***

Section 5 | Conclusions

This case study documents the significant grid modernization benefits associated with NYSERDA's support of Switched Source and its Phase-EQ technology. NYSERDA's funding and facilitation enabled Switched Source to demonstrate the Phase-EQ with the Village of Sherburne and then with National Grid, generating the operational experience and performance data needed to support broader deployment. Key outcomes of the NYSERDA-supported demonstration include:[24]

- **Projected reliability improvements** on circuits where the Phase-EQ is installed, with 500-2,500 kW of unlocked capacity recorded in the National Grid field tests.
- **Cost savings** from approximately $10,000 annual OPEX savings from reduced labor, deferred infrastructure investment such as $562,000 per mile of deferred line extension, and reduced energy losses.
- **Increased hosting capacity for DG and EV charging** with 313 kW of additional DG capability and 50 additional EVs with each Phase-EQ device.
- **Avoided greenhouse gas emissions** up to 7,197 metric tons of CO_2e for one Phase-EQ device or 86,369 metric tons of CO_2e for 12 devices.
- **Rate case inclusion** by National Grid, representing a direct path to full-scale deployment. Thirty additional Phase-EQ devices were approved by the rate case and 12 are currently being deployed, with the first three scheduled to be delivered by the end of July 2026.
- **Knowledge sharing** with other New York utilities, National Grid Massachusetts, and at conferences including CIGRE US National Committee, amplifying the impact of the demonstration beyond National Grid's New York service territory.
- **Company growth** since NYSERDA engagement, with the company growing 60% in 2025 as compared to 2024.[25] In addition, the company's workforce grew by approximately 30% from 2024 to early 2026.
- **Additional customer base** with eight confirmed customers across ten states.

NYSERDA's support was instrumental in enabling these outcomes. By reducing the financial and technical risks associated with demonstrating a novel grid technology, NYSERDA helped Switched Source and National Grid move from concept to demonstrated solution — and from demonstrated solution to committed full-scale deployment. Switched Source provides a compelling example of how NYSERDA's Grid Modernization program can accelerate the adoption of innovative technologies that advance New York State's clean energy goals.

[24] For 1,000 kW increased load serving capacity scenario.

[25] https://www.switchedsource.com/news/article/current/2026/01/20/100025/switched-source-u.s.-installations-grew-60-in-2025

Appendix A: Measured Benefits

Table 5 outlines the benefits evaluated in this case study.

Table 5: Measured Benefits and Associated Data Sources

Category	Benefit	Beneficiaries
Energy	Energy savings made possible by phase balancing	Utility, ratepayers
	Energy cost savings	
	Improved power quality	
	Improved grid reliability	
Environmental	Increased DG hosting capacity	Society
	Increased renewable generation	
	Avoided GHG emissions	
	Value of avoided emissions	
Economic	Reduced capital and operating expenditures	Utility
	Follow-on investment	Switched Source
Market	New customers	Switched Source
	Increased sales	
	Increased employment in NYS	New York State

Appendix B: Interviewees

The Evaluation Team conducted interviews with individuals from the NYSERDA Power Grid Innovation Team, Switched Source, and National Grid. Interviews included:

- NYSERDA Power Grid Innovation Team: Interview gathered additional details on the process and outcomes of NYSERDA's two projects with Switched Source.
- Switched Source: Interview covered Switched Source's experience using NYSERDA funding for product development and deployment, along with the company's work in other utility service areas and plans for future market expansion. Switched Source also shared its benefit-cost analysis referenced in its NYSERDA project reports. The Evaluation Team had several conversations with Switched Source focused on the benefit-cost analysis.
- National Grid: Interview covered National Grid's experience with the Switched Source pilot demonstration, plans for the additional devices included in the most recent rate case, and other plans for scale-up.

Appendix C: Detailed Modelling Scenarios

The Evaluation Team modelled the cost and benefits for nine scenarios, made up of eight individual scenarios, plus an all-in scenario.

Capacity Only: The benefits derived from the Phase-EQ balancing phase currents to increase load-carrying capacity in the system. The additional load-carrying capacity eliminates the need for re-tapping ten times over 20 years. Re-tapping is the process of modifying or replacing a connection point on an electrical system to ensure safe, reliable, and efficient electricity distribution. The marginal cost of capacity is derived from National Grid's cost of capacity value for 2021 with an assumed 2% inflation for subsequent years[26].

Upgrade Deferral Only: The benefits derived from deferring capital upgrade projects due to the additional load-carry capacity provided by the Phase-EQ negating the need. For example, feeder extensions or system voltage upgrades may no longer be required. It is assumed that the Phase-EQ will result in $560,000 in capital expense reductions with immediate payback. The capital expense reductions are calculated based on the assumption that the Phase-EQ will result in 1 mile less line extension and the costs of line extensions are $562,000/mile[27].

High Seasonal Imbalance: Mitigating seasonal load imbalances, particularly those caused by heating or cooling, leading to operational cost savings and improved system reliability, with increased load-serving capacity similar to the capacity-only scenario. The model assumes that the standard assumption of $10,000 annual OPEX reduction is doubled to total $20,000 each year.

Power Quality Issues: Phase-EQ addresses power quality issues traditionally managed by slower or less flexible equipment, providing immediate payback while enhancing load-serving capacity. The scenario assumes that with the Phase-EQ a $521,000 LK/3-phase voltage regulator is no longer required.[28]

Volt-Var Optimization (VVO) Application: Assuming Phase-EQ enhances VVO efficacy by 15 kW[29]. The monetary savings are calculated based on total projected energy savings and the $/MWh weighted rate. The calculation methodology is based on the EPRIs report 'Distribution System Losses Evaluation.'[30]

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[26] https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7B801AC697-0000-C61D-9731-9F243D24E871%7D&DocTitle=National%20Grid%20Version%205.0%20BCA%20Handbook

[27] https://dps.ny.gov/ju-technical-guidance-cost-matrix-june-2024

[28] https://www.nationalgridus.com/media/pdfs/bus-partners/non-wires-alternatives/ny_bca_handbook_v2.0.pdf

[29] https://www.epri.com/research/products/1016097

[30] Ibid.

FLISR Benefit: Fault location, isolation, and service restoration (FLISR) benefits. Monetized benefits calculated as $33,816 in 2026 using the ICE calculator[31] and the assumption that the Customer Average Interruption Duration Index (CAIDI) will reduce from 182.02 to 5.

EV Integration: Phase-EQ supports electric vehicle (EV) integration by balancing phases and managing voltage and thermal limits. The model assumes that the Phase-EQ device will allow for 100 more EVs on the circuit where the device is installed (in 1,000 kW scenario), with each vehicle reducing 4 metric tons of CO_2e per year.

DG Integration: Phase-EQ supports distributed generation (DG) integration, such as onsite solar, by balancing phases and managing voltage and thermal limits. Phase-EQ assumed to increase DG hosting capability by 625kW (in 1,000 kW scenario), based on studies completed by Switched Source and RLC Engineering. Assuming a 20% capacity factor and 3.84 metric tons of CO_2e per 10 MWh[32] this translates to 319.74 metric tons of CO_2e per device.

All-In: Combination of all scenarios, correcting for any double counting by ensuring that total benefits, when summed across individual use cases, do not exceed the total capacity unlocked by the Phase-EQ device. For example, if the individual use case for EVs assumes that 100% of unlocked capacity is used for EVs, and the individual use case for DGs assumes that 100% of unlocked capacity is used for DGs, these use cases cannot simply be added together for the "all-in" use case because total benefits would require double the capacity unlocked by the device. The "all-in" use case adjusts to ensure that total benefits, when summed, do not exceed the total capacity unlocked by the Phase-EQ device. For example, the EV and DG benefits are each modified to 50% of the total benefits modelled in the individual EV and DG integration scenarios.

Many of the model's inputs are publicly available, and in these cases, the Evaluation Team verified the key assumptions and inputs using the publicly available source. Some of the inputs derive from Switched Source's field data or expert opinion, and these assumptions were verified through meetings with Switched Source.

[31] https://icecalculator.com/

[32] https://www.epa.gov/egrid/power-profiler#/NYUP

Appendix D: Full Modelling Results

The costs and benefits are calculated from 2026 to 2045.[33] In addition, the New York State specific social cost of carbon value, $135.46 per metric tons of CO_2e, is used to estimate the societal benefits of avoiding one metric tons of CO_2e in New York State in 2026.[34] Lastly, for several scenarios the benefits attributed to the Phase-EQ device have been reduced using modifiers as either all of increased load serving capability benefit is not expected to be unlocked, or all the benefits cannot be attributed wholly to the Phase-EQ device. The high seasonal imbalance, power quality issues, and Volt-Var Optimization Application scenarios are modified to 62.5% of the total increased load serving capability benefits modelled. These modification factors were developed by Switched Source and National Grid for the National Grid case study.

Table 6, **Table 8**, and **Table 10** show the detailed modelling results for the 500, 1,000 and 1,500 kW scenarios. **Table 7**, **Table 9**, and **Table 11** show the NPV Benefits less Costs for the four different Phase-EQ deployment quantity scenarios.

Table 6: Detailed Cost Benefit Modelling Results for 500 kW Increased Load Serving Capacity for one Phase-EQ device

Value	Scenario								
	All-In BCA	**Capacity Only**	**Upgrade Deferral Only**	**High Seasonal Imbalance**	**Power Quality Issues**	**VVO Application**	**FLISR Benefit**	**EV Integration**	**DG Integration**
NPV Benefits	$1,617,132	$260,473	$614,912	$381,426	$683,796	$275,449	$744,275	$663,488	$622,284
NPV Costs	$(369,951)	(369,951)	$(369,951)	$(369,951)	$(369,951)	$(369,951)	$(369,951)	$(369,951)	$(369,951)
NPV Benefits Less Costs	$1,247,181	$(109,478)	$244,961	$11,475	$313,845	$(94,501)	$374,324	$293,537	$252,333
Benefit Cost Ratio	4.4	0.7	1.7	1.0	1.8	0.7	2.0	1.8	1.7

[33] The analysis assumes a 20-year lifespan for the Phase-EQ device.

[34] https://extapps.dec.ny.gov/docs/administration_pdf/vocguide23final.pdf

Total Carbon Dioxide Savings (TCO2e)	3599	0	0	0	0	0	0	4000 (50 additional EVs)	3,197 (312.5 kW additional DG capacity)

Table 7: Full Cost Benefit Modelling Results for 500 kW Increased Load Serving Capacity Scenario

Number of Phase-EQ Devices	NPV Benefits Less Costs ($1,000)								
	All-In BCA	**Capacity Only**	**Upgrade Deferral Only**	**High Seasonal Imbalance**	**Power Quality Issues**	**VVO Application**	**FLISR Benefit**	**EV Integration**	**DG Integration**
1	$1,247	-$109	$245	$11	$314	-$95	$374	$294	$252
12	$14,966	-$1,314	$2,940	$138	$3,766	-$1,134	$4,492	$3,522	$3,028
30	$37,415	-$3,284	$7,349	$344	$9,415	-$2,835	$11,230	$8,806	$7,570
120	$149,662	-$13,137	$29,395	$1,377	$37,661	-$11,340	$44,919	$35,224	$30,280

Table 8. Detailed Cost Benefit Modelling Results for 1,000 kW Increased Load Serving Capacity for one Phase-EQ device

Value	Scenario								
	All-In BCA	**Capacity Only**	**Upgrade Deferral Only**	**High Seasonal Imbalance**	**Power Quality Issues**	**VVO Application**	**FLISR Benefit**	**EV Integration**	**DG Integration**
NPV Benefits	$2,169,719	$520,946	$614,912	$544,222	$846,591	$438,245	1,004,748	$1,274,065	$1,162,612
NPV Costs	$(369,951)	$(369,951)	(369,951)	(369,951)	$(369,951)	$(369,951)	$(369,951)	$(369,951)	$(369,951)
NPV Benefits Less Costs	$1,799,769	$150,996	$244,961	$174,271	$476,641	$68,294	$634,798	$904,114	$792,662
Benefit Cost Ratio	5.9	1.4	1.7	1.5	2.3	1.2	2.7	3.4	3.1
Total Carbon Dioxide Savings (TCO2e)	7,197	0	0	0	0	0	0	8,000 (100 additional EVs	6,395 (625kW additional DG capacity)

Table 9: Full Cost Benefit Modelling Results for 1,000 kW Increased Load Serving Capacity Scenario

Number of Phase-EQ Devices	NPV Benefits Less Costs ($1,000)								
	All-In BCA	Capacity Only	Upgrade Deferral Only	High Seasonal Imbalance	Power Quality Issues	VVO Application	FLISR Benefit	EV Integration	DG Integration
1	$1,800	$151	$245	$174	$477	$68	$635	$904	$793
12	$21,597	$1,812	$2,940	$2,091	$5,720	$820	$7,618	$10,849	$9,512
30	$53,993	$4,530	$7,349	$5,228	$14,299	$2,049	$19,044	$27,123	$23,780
120	$215,972	$18,119	$29,395	$20,913	$57,197	$8,195	$76,176	$108,494	$95,119

Table 10: Detailed Cost Benefit Modelling Results for 1,500 kW Increased Load Serving Capacity for one Phase-EQ device

Value	Scenario								
	All-In BCA	**Capacity Only**	**Upgrade Deferral Only**	**High Seasonal Imbalance**	**Power Quality Issues**	**VVO Application**	**FLISR Benefit**	**EV Integration**	**DG Integration**
NPV Benefits	$2,722,307	$781,419	$614,912	$707,018	$1,009,387	$601,041	$1,265,221	$1,884,641	$1,702,941
NPV Costs	$(369,951)	$(369,951)	$(369,951)	$ (369,951)	$(369,951)	$(369,951)	$(369,951)	$(369,951)	$(369,951)
NPV Benefits Less Costs	$2,352,356	$411,469	$244,961	$337,067	$639,436	$231,090	$895,271	$1,514,691	$1,332,990
Benefit Cost Ratio	7.4	2.1	1.7	1.9	2.7	1.6	3.4	5.1	4.6
Total Carbon Dioxide Savings (TCO2e)	10,796	0	0	0	0	0	0	12,000 (150 additional EVs)	9,529 (938kW additional DG capacity)

Table 11: Full Cost Benefit Modelling Results for 1,500 kW Increased Load Serving Capacity Scenario

Number of Phase-EQ Devices	NPV Benefits Less Costs ($1,000)								
	All-In BCA	Capacity Only	Upgrade Deferral Only	High Seasonal Imbalance	Power Quality Issues	VVO Application	FLISR Benefit	EV Integration	DG Integration
1	$2,352	$411	$245	$337	$639	$231	$895	$1,515	$1,333
12	$28,228	$4,938	$2,940	$4,045	$7,673	$2,773	$10,743	$18,176	$15,996
30	$70,571	$12,344	$7,349	$10,112	$19,183	$6,933	$26,858	$45,441	$39,990
120	$282,283	$49,376	$29,395	$40,448	$76,732	$27,731	$107,432	$181,763	$159,959

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