



2018 Global Energy Storage
Entrepreneurial Company of the Year Award



2018
BEST PRACTICES
AWARDS

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Background and Company Performance

Industry Challenges

Wireless telecom infrastructure growth drives demand for efficient batteries to be used as a power source and for backup in both wireless and wireline networks. Increasing bandwidth usage, broadband penetration, and connected devices are all increasing exponentially and it is estimated that there will be over 25 billion connected devices by 2020. Globally, there is a huge push to upgrade telecom infrastructure to deploy 4G and 5G networks. This will result in better voice quality, higher bandwidth for data transmission through mobile phones, and faster Internet services.

One of the key challenges for the telecom companies is to prevent outages due to either human error or natural disaster. The number of extreme weather events has increased dramatically over the past decade, resulting in over a billion dollars in lost revenues due to increase in weather-related power outages. Telecom companies have been using lead acid batteries for backup power systems and these batteries are aging in the field because their replacement cycles are longer as the companies do not want to invest in newer technologies or replacement batteries. These batteries are prone to failure and premature degradation due to neglect, heat and overcharging. As per IEEE standard 1187-2013, for every 8.3 degrees C (15 degrees F) increase in continuous operating temperature, a 50% reduction in service life for a valve regulated lead acid (VRLA) battery can be expected. The expected life for 12V VRLA batteries is just 7 years and this does not factor in environmental conditions at remote sites that are not climate controlled. Float charging (where a battery is in a constant state of charge) batteries in extreme heat can shorten battery life to 2 to 3 years. For example, in the telecom industry, VRLA batteries are used to protect telecom networks. As there are a large number of batteries commissioned, the majority of batteries are older than 7 years and telecom companies are not willing (or able) to invest in replacing these batteries due to high cost involved. These batteries no longer have sufficient capacity to provide adequate backup power as they are in constant state of charge, hence impacting their overall performance and life.

Servato Corporation (Servato) has introduced an active battery management solution that uses adaptive charging technology to improve the performance of VRLA batteries. This patented methodology gathers data and determines when the battery needs to be charged and for how long, thereby extending the battery life. The batteries are accurately tested in an isolated and rested state, which provides useful information about battery state of health. Servato has been servicing the telecom industry for over 5 years and has customers in 27 US states. The company manages over 500 sites, over 6,000 batteries with more than 100 million hours of battery data, and it adds 1 million new battery test data points per month.

Entrepreneurial Innovation and Customer Impact

Market Disruption

Servato has introduced its Smart Power System line of products that enable battery testing, extend battery life, ensure reliability, and monitor environmental alarms. Servato has a comprehensive product line that includes Smart Power Systems-148™ (SPS-148™), Smart Power Systems-248™ (SPS-248™), Smart Power Systems-48™ (SPS-48™), Smart Power System Rectifier (SPS-R™), and ActiView™ (a remote monitoring and management solution).

Servato focuses on providing power reliability and cost savings to wireline and wireless telecom carriers, as well as other applications that rely on VRLA batteries for backup power. The company provides the most comprehensive and complete remote battery management system available in the market today. Through its solutions, the company is able to double VRLA battery life, provide active management of batteries, and provide insight into remaining power during an outage using its patent pending battery fuel gauge. Servato's unique charging algorithm is capable of slowing the dangerous effects of overcharging and high temperatures, which doubles the life of a VRLA battery whether placed inside or outside of a plant. Its active management solution enables plant managers to solve problems (such as overcharging, temperature, bad cell, float charging, and equipment failure among others) before an outage strikes, helping them to keep batteries safe, ready, healthy, and reliable. Servato's charging approach virtually eliminates the risk of thermal runaway in VRLA batteries, as it eliminates the primary cause – overcharging. Finally, using the battery fuel gauge helps users understand how much power is available at their site and direct the technician team to sites that may have potential issues. These solutions provide the customer with complete knowledge and operational understanding about their systems.

Competitive Differentiation

While the current focus of the industry is on battery monitoring and how to keep batteries working safely and reliably. Servato has brought a new dimension to the market with a shift from passive battery monitoring to proactive battery management. The company uses a unique, patented methodology (Adaptive Charging) for measuring and charging batteries compared to older technology of float charging batteries. Adaptive charging extends battery life by only charging the battery when it needs to be charged and otherwise resting it. Continuous charging for batteries to keep them at a 100% state of charge has negative consequences, as it accelerates battery failure due to increased temperature, grid corrosion, plate degradation, and dry out. This leads to high replacement costs. Servato introduced Adaptive Charging to remove these harmful mechanisms and charges batteries only when necessary and for as long as necessary to maintain a full charge. Introduced by Servato, adaptive charging "virtually disconnects" standby batteries from continuous charging using a proprietary switch design that allows

the batteries to rest yet still be immediately available for discharge when needed.

Some of the benefits of adaptive charging include:

- Battery isolation
- Highly accurate “rested” state of health measurements
- Improved useful battery life
- Reduced energy consumption
- Reduced gassing, grid corrosion, and positive plate softening
- Daily battery maintenance
- Remote monitoring
- Daily monitoring
- Web-based dashboard and alerting
- Proactive trend analysis
- Scalable monitoring program
- Safety and community relations
- Service reliability and availability
- Environmental stewardship
- Reduced cost

Servato has entered into a commercial relationship with ABB (formerly GE Power) to introduce the first unified rectifier and battery management solutions. It integrates the functionality of Servato’s SPS-248 battery management system with ABB’s rectifier modules. This solution is targeted towards fixed and wireless carriers as it gives them the rectifier that they need to power their telecom equipment with a remote battery management system as added value. This is the first of its kind unified rectifier power and battery management solution.

Servato is taking remote power management to the next level to offer the combined value of battery management systems with a highly power efficient rectifier solution from ABB. Servato believes this solution will allow customers to more easily and economically upgrade backup power management infrastructure that is continuing to decay as it is ignored and not enhanced.

As per Chris Mangum, CEO of Servato, this is the next evolution in smart rectifiers. The company's battery management solutions have always been IoT-enabled, giving carriers the ability to monitor and maintain not only batteries and rectifiers but other systems (generators, hard contact alarms) remotely to save on costly manual intervention. This is the future now and demonstrates how two important components of a carriers' power infrastructure have been combined to offer unprecedented value.

Market Gaps

Servato has addressed a major gap in the battery charging market—how to effectively automate and remotely manage the processes around battery charging and management. The company is focused on shifting the customer mindset from just battery monitoring to overall battery management, and while its solution is currently focused on telecom industry it can be tailored to a diverse range of industries. Frost & Sullivan's independent analysis confirms that Servato differentiates itself by offering the most comprehensive, competitive, and wide range of battery management solutions to fully address client needs in the market.

Servato does this because it identified and addressed gaps in the battery monitoring and management market. For example, one of the gaps addressed was to remove batteries from continuous state of charge to charge on demand. This charge on demand would mean that when the battery required charging, Servato's battery management solution would enable charging and once the battery is fully charged, "virtually" disconnect it from the charging source using the company's proprietary switch design. This helps improve battery life, reliability, safety and proper functioning of batteries.

Servato addressed these gaps by providing the following solutions:

- Daily battery maintenance and monitoring—The adaptive charge schedule automates the operations and maintenance of batteries installed. It conducts testing and charging routine to test the state of health of batteries and identifies batteries that do not meet the required standard. It takes the defective battery out of service to protect the remaining batteries from either undercharge or overcharge. This process allows defective batteries to be identified and replaced by new ones before they can cause further damage.
- Web-based dashboard and alerting—It provides detailed, real-time views available via an easy-to-use Web-based system with a dashboard feel to identify developing trouble spots. It also enables email alerts to provide real-time information. Users can choose which device to receive information from and can configure the types of alerts, such as daily summaries, alarms, recovery notifications as well as more in-depth reporting on power outages by frequency and duration.
- Proactive trend analysis—The adaptive charge monitoring tools can show trends in battery health and provide early warnings of potential battery failure so

replacement visits by field technicians can be planned well in advance.

- Battery isolation—Batteries are isolated from the DC power system in an off-float manner that preserves battery life while maintaining their availability to deliver immediate backup power when needed.
- Improved battery life—Adaptive charging maintains batteries off constant float charge and charges them only when necessary and only for as long as necessary, increasing their useful life and reducing energy consumption by over 85%.
- Scalable monitoring program—Managers can monitor a single battery, a complete installation, a network of systems within a network, or entire corporate networks that contain thousands of sites.

Key differentiators for Servato from competitors include:

- Providing customer adaptive charging and resting batteries—This is something unique to Servato, as it has worked toward building this solution that offers better battery life, continuous monitoring capabilities, and making charge available on demand. This helps make batteries efficient, safe, and reliable. Competitors currently provide solutions that keep batteries in constant state of charge and this can reduce battery life and overall device efficiency.
- Highly informative data and measurements—The data generated provides additional value beyond just providing information on battery operating data. The data analytics includes:
 - Site attributes—assets located at site through site survey applications
 - Site alarming—solution provides additional alarming/IoT capabilities
 - New modules—create incremental revenue opportunities
 - Data mart—facilitates third-party use of data for market research, network and capacity planning, and integration with enterprise asset management systems

These features set it apart from its competitors as the data generated by competing solutions is limited to just monitoring and reporting, and without Servato's virtual disconnect capability the state of health measurements taken from the monitored batteries are often corrupted by the charging process itself.

- Advanced software for analytics, alarms, and reporting—The company manages over 500 sites, over 6,000 batteries with more than 100 million hours of battery data, and it adds 1 million data points per month. This is enabled via ActiView, its advanced analytical software. ActiView has unique trend and data analytics that

detects signatures of battery failure months before failure. It identifies backup power capacity and when a generator is needed, and provides in-depth trending graphics for all measurements. These capabilities make it superior software compared to competitors.

Passionate Persistence

Servato has had tremendous success by creating demand for its solutions in the telecom industry. This is a result of how Servato's solution can improve the life span and operating capabilities of old batteries installed in telecom environment. This solution helps telecom companies reduce the overall cost of replacing these old batteries.

Servato has a strong track record of demonstrating the first mover advantage by offering the first—

- Integrated rectifier and remote battery management solution
- Smart power system product line that is the most advanced way to remotely manage and monitor backup batteries
- ActiView, a cloud-based software for remotely monitoring and managing batteries

Servato's strategy is to increase market penetration of its battery management product line, thereby reducing the overall cost of ownership and increasing the value for its customers. The company is focused on improving its customers' return on investment (ROI) by reducing their operating expenditure (OPEX) and capital expenditure (CAPEX). OPEX savings are enabled because its automated solutions replace manual testing, tracking, and wasteful truck rolls with analytics-optimized maintenance, and the solution lowers electricity costs. CAPEX savings result from doubled battery life, which enables the user to buy fewer batteries, and improved inventory and capital management by buying batteries "just in time".

Servato also leverages a technology agnostic strategy to retain its competitive advantage. It has worked meticulously on future proofing the active battery management architecture design, which can enable it to potentially incorporate a wide range of battery chemistries.

Frost & Sullivan strongly believes that Servato's strategy of providing a comprehensive active battery management solution, which includes hardware (smart power system product line) and software (ActiView), strong energy storage knowledge, and expertise of consumer perception and telecom markets, is a best practice.

Customer Ownership and Service Experience

Servato has established itself as one of the leading players in the battery management market. Its brand has become synonymous with technology excellence, innovation, and most importantly customer focus. The company places a tremendous level of emphasis on product innovation, resulting in a value offering that creates a sense of value among its customers. The key differentiating factor that provides an outstanding customer ownership experience is the comprehensive end-to-end solution that the company offers. The hardware part of the solution connects to batteries and both controls and monitors its charge. The software, which is the brain of the system, is cloud based. It has an online dashboard that provides a high degree of analytics through which customers can obtain insight into the current and historical data, detect signatures, predict issues, and provide alerts for battery management. This solution enables Servato to be a one-stop-shop for its customers. Additionally, the customers do not have to buy the hardware and the software separately and then work on integrating the two, reducing the overall cost of ownership. This is a best practice adopted by Servato to serve its customers effectively and offer a better service experience.

Servato places a high level of importance on customer feedback and incorporates customer suggestions into its product development. Frost & Sullivan finds Servato's ActiView online software and customer centric approach a unique method of offering customers value-added services, and it is expected to increase its growth potential.

Servato is well aware that the overall customer experience is not defined by a one-time sales transaction, but it is instead an evolving process that offers continuous opportunities for improvement that can fulfill and exceed customers' changing expectations. Servato delivers excellence in two ways—by working with customers and their needs, and developing/improving its cutting-edge solution. The process of continuous innovation is the mantra of Servato, and it continues to evolve and brings new solutions to market that are customer centric and cost competitive. Continuing with its tradition of introducing new solutions, in August 2018 alone the company released the following solutions:

- DC Power with optimized battery management
- Complete power system with intelligent battery management
- Complete managed power system with IoT controller

All these products have been well received by its existing customers and the company has aggressively started marketing its solutions to potential customers in the telecom industry.

Frost & Sullivan expects Servato to grow by double digits over the next two years, largely driven by its continued collaborative efforts to engage with telecom companies, ISPs, utilities, and partners.

Conclusion

Converging trends are driving the communication industry towards potentially catastrophic network outages. Telecom companies have been using lead acid batteries for backup power and these batteries are aging in the field because their replacement cycles are longer, and telecom companies do not want to invest in newer technologies or replacement batteries. These batteries cannot provide adequate backup power as they are in constant state of charge, impacting their overall performance and life and making them prone to failure and premature degradation.

Servato has introduced an active battery management solution that uses adaptive charging technology to improve the performance of these VRLA batteries. This patented methodology gathers data and determines when the battery needs to be charged and for how long, thereby extending the battery life. The batteries are accurately tested in an isolated and rested state, which provides more accurate and useful information about battery state of health. Servato has been servicing the telecom industry for over 5 years and has customers in 27 US states. The company manages over 500 sites, over 6,000 batteries with more than 100 million hours of battery data, and it adds 1 million data points per month.

The company's passionate persistence and entrepreneurial excellence clearly demonstrates Servato's work to achieve a strong market position in the battery monitoring and management market. With its strong overall performance, Servato Corp. has earned Frost & Sullivan's 2018 Entrepreneurial Company of the Year Award.

Significance of Entrepreneurial Leadership

Ultimately, growth in any organization depends upon customers purchasing from a company and then making the decision to return time and again. In a sense, then, everything is truly about the customer—and making those customers happy is the cornerstone of any long-term successful innovation or growth strategy. To achieve these dual goals (customer engagement and growth), an organization must be best-in-class in three key areas: understanding demand, nurturing the brand, and differentiating from the competition.



Understanding Entrepreneurial Leadership

Demand forecasting, branding, and differentiation underpin an entrepreneurial company's journey toward forming deep relationships with customers and permanently altering the market with their actions. These two concepts—Entrepreneurial Innovation and Customer Impact—are the cornerstones of this Award, as discussed further in the next section.

Key Benchmarking Criteria

For the Entrepreneurial Company of the Year Award, Frost & Sullivan analysts independently evaluated two key factors—Entrepreneurial Innovation and Customer Impact—according to the criteria identified below.

Entrepreneurial Innovation

Criterion 1: Market Disruption

Requirement: Innovative solutions that have genuine potential to disrupt the market, obsoleting current solutions and shaking up competition

Criterion 2: Competitive Differentiation

Requirement: Deep understanding of both current and emerging competition to create and communicate strong competitive differentiators in the market

Criterion 3: Market Gaps

Requirement: A clear understanding of customers' desired outcomes, the products that currently help them achieve those outcomes, and where key gaps may exist

Criterion 4: Blue Ocean Strategy

Requirement: Strategic focus on creating a leadership position in a potentially "uncontested" market space, manifested by stiff barriers to entry for competitors

Criterion 5: Passionate Persistence

Requirement: A deep belief in the "rightness" of an idea and a commitment to pursuing it despite seemingly insurmountable obstacles

Customer Impact

Criterion 1: Price/Performance Value

Requirement: Products or services offer the best value for the price, compared to similar offerings in the market.

Criterion 2: Customer Purchase Experience

Requirement: Customers feel they are buying the most optimal solution that addresses both their unique needs and their unique constraints.

Criterion 3: Customer Ownership Experience

Requirement: Customers are proud to own the company's product or service and have a positive experience throughout the life of the product or service.

Criterion 4: Customer Service Experience

Requirement: Customer service is accessible, fast, stress-free, and of high quality.

Criterion 5: Brand Equity

Requirement: Customers have a positive view of the brand and exhibit high brand loyalty.

Best Practices Recognition: 10 Steps to Researching, Identifying, and Recognizing Best Practices

Frost & Sullivan analysts follow a 10-step process to evaluate Award candidates and assess their fit with select best practice criteria. The reputation and integrity of the Awards are based on close adherence to this process.

STEP	OBJECTIVE	KEY ACTIVITIES	OUTPUT
1 Monitor, target, and screen	Identify Award recipient candidates from around the globe	<ul style="list-style-type: none"> • Conduct in-depth industry research • Identify emerging sectors • Scan multiple geographies 	Pipeline of candidates who potentially meet all best-practice criteria
2 Perform 360-degree research	Perform comprehensive, 360-degree research on all candidates in the pipeline	<ul style="list-style-type: none"> • Interview thought leaders and industry practitioners • Assess candidates' fit with best-practice criteria • Rank all candidates 	Matrix positioning of all candidates' performance relative to one another
3 Invite thought leadership in best practices	Perform in-depth examination of all candidates	<ul style="list-style-type: none"> • Confirm best-practice criteria • Examine eligibility of all candidates • Identify any information gaps 	Detailed profiles of all ranked candidates
4 Initiate research director review	Conduct an unbiased evaluation of all candidate profiles	<ul style="list-style-type: none"> • Brainstorm ranking options • Invite multiple perspectives on candidates' performance • Update candidate profiles 	Final prioritization of all eligible candidates and companion best-practice positioning paper
5 Assemble panel of industry experts	Present findings to an expert panel of industry thought leaders	<ul style="list-style-type: none"> • Share findings • Strengthen cases for candidate eligibility • Prioritize candidates 	Refined list of prioritized Award candidates
6 Conduct global industry review	Build consensus on Award candidates' eligibility	<ul style="list-style-type: none"> • Hold global team meeting to review all candidates • Pressure-test fit with criteria • Confirm inclusion of all eligible candidates 	Final list of eligible Award candidates, representing success stories worldwide
7 Perform quality check	Develop official Award consideration materials	<ul style="list-style-type: none"> • Perform final performance benchmarking activities • Write nominations • Perform quality review 	High-quality, accurate, and creative presentation of nominees' successes
8 Reconnect with panel of industry experts	Finalize the selection of the best-practice Award recipient	<ul style="list-style-type: none"> • Review analysis with panel • Build consensus • Select recipient 	Decision on which company performs best against all best-practice criteria
9 Communicate recognition	Inform Award recipient of Award recognition	<ul style="list-style-type: none"> • Present Award to the CEO • Inspire the organization for continued success • Celebrate the recipient's performance 	Announcement of Award and plan for how recipient can use the Award to enhance the brand
10 Take strategic action	Upon licensing, company is able to share Award news with stakeholders and customers	<ul style="list-style-type: none"> • Coordinate media outreach • Design a marketing plan • Assess Award's role in future strategic planning 	Widespread awareness of recipient's Award status among investors, media personnel, and employees

The Intersection between 360-Degree Research and Best Practices Awards

Research Methodology

Frost & Sullivan's 360-degree research methodology represents the analytical rigor of our research process. It offers a 360-degree-view of industry challenges, trends, and issues by integrating all 7 of Frost & Sullivan's research methodologies. Too often companies make important growth decisions based on a narrow understanding of their environment, leading to errors of both omission and commission. Successful growth strategies are founded on a thorough understanding of market, technical, economic, financial, customer, best practices, and demographic analyses. The integration of these research disciplines into the 360-degree research methodology provides an evaluation platform for benchmarking industry participants and for identifying those performing at best-in-class levels.

360-DEGREE RESEARCH: SEEING ORDER IN THE CHAOS



About Frost & Sullivan

Frost & Sullivan, the Growth Partnership Company, enables clients to accelerate growth and achieve best-in-class positions in growth, innovation and leadership. The company's Growth Partnership Service provides the CEO and the CEO's Growth Team with disciplined research and best practice models to drive the generation, evaluation and implementation of powerful growth strategies. Frost & Sullivan leverages more than 50 years of experience in partnering with Global 1000 companies, emerging businesses, and the investment community from 45 offices on six continents. To join our Growth Partnership, please visit <http://www.frost.com>.