

Software Applications for Integrating Large Amounts of Distributed Energy Resources



Dr. Sunil Cherian
Founder & CEO
Spirae, LLC.

CEOCFO: Dr. Cherian, would you tell us the concept at Spirae?

Mr. Cherian: The concept behind Spirae is to develop software applications for integrating and monetizing large amounts of distributed energy resources. Distributed generation, storage, and demand response assets constitute various types of energy resources. Since these resources tend to be geographically dispersed, owned by different parties, and spread across multiple Utility service areas, sophisticated software applications and wide area control systems are needed to integrate them and make them work together in a seamless fashion. Spirae develops solutions for these types distributed energy management applications. We provide a configurable platform called Wave™ that allows our customers to implement their unique distributed energy based business models.

CEOCFO: Who would be using your services?

Mr. Cherian: Our customers include electric distribution companies, energy service providers, microgrid project developers, and OEMs offering integrated energy solutions. Electric utilities use our Wave platform for incorporating distributed energy resources within their system thereby augmenting existing grid operations systems. Energy services companies directly serving the needs of end users including project developers, systems integrators and facilities operations companies use our systems to leverage distributed resources for optimizing their energy production, procurement and consumption while meeting corporate sustainability and green energy goals.

CEOCFO: What were the challenges technologically in putting your offering together?

Mr. Cherian: The biggest technological challenge is the fact that most of the resources we are talking about vary widely in their capabilities, performance, type, make, model, etc. A photovoltaic generator is very different from a battery energy storage system. Demand management that is implemented at a commercial or industrial site is very different from aggregated demand response with residential customers. Installed equipment and systems also vary by manufacturer and vintage. Along with that diversity, new technologies are continuously coming to market. Developing a scalable and cost effective system that integrates these types of disparate resources and seamlessly makes them available for different applications was a significant technical challenge for us to overcome. Think of it as the operating system that makes distributed resources available to different energy and grid management applications much as a computer operating system makes peripheral devices such as printers available to different applications. There is no one else in the market, to the best of our knowledge, with a commercial product with this capability.

CEOCFO: Were you sure it could be done and you just needed to find the way or were you doubtful in the beginning?

Mr. Cherian: On the technical side, we had a very high degree of confidence that we could make this work, but we were uncertain about the amount of work it would take to bring such a product to market. The experience, expertise and passion of many of the people in the company lay at the intersection of complex control systems, scalable software, and energy applications. So we did not have any serious doubts that we would be able to pull it off technically. However, building a viable business while developing a complex product platform in an evolving market has been quite challenging. We had our share of doubts along the way, but we were fortunate to have incredible customers and partners that allowed us to ride through challenging times.

CEOCFO: Is the industry aware that Spirae exists?

Mr. Cherian: Our recognition within the industry has substantially gone up in the past few years. This may be attributable to the fact that the industry as a whole has come to the conclusion that distributed energy is here to stay and these types

of solutions are essential for the future of energy related businesses. In the past, we focused more on serving early adopters and trendsetters pushing the envelope with distributed energy solutions. That situation has changed. Now our customers are scaling up commercial operations and our track record of innovative, successful projects gives us significant credibility in the market compared to our competition. Even so, we still have a long way to go to ensure that potential customers are aware of us!

CEOFCO: *How do you work with Colorado State University?*

Mr. Cherian: We have a very strong relationship with Colorado State University. I am a CSU graduate; I did my M.S. and PhD there. Around 2006, when we were working with a large Danish customer, the Danish Transmission System Operator, we needed a power generation lab where we could test control systems that we were building for field deployment in Denmark. At that time, we entered into an agreement with Colorado State University to collaborate on building the InteGrid Laboratory. It has different types of configurable generation, loads, simulators and grid elements for testing various operational scenarios. It is a comprehensive physical testbed to validate distributed control solutions at scale that we continue to operate at the CSU Powerhouse Energy Campus. Our employees include many CSU graduates as well.

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CEOFCO: *What is involved in an implementation?*

Mr. Cherian: In the electric company case, they are typically looking for a Distributed Energy Resources Management System or DERMS platform. Electric Utilities typically have well-established grid operations technologies in place such as DMS, SCADA, and OMS systems. At the same time, they are seeing large amounts of solar energy, storage, flexible loads and electric vehicles coming online. Managing the grid as these types of resources increase is challenging with legacy systems. A DERMS platform is designed to bridge to legacy systems and control those distributed resources while maintaining grid reliability. Most utilities we work with start with a specific region, or regions, where they want to initially deploy, test and then scale from there. Once a utility has made that decision, there are typically three stages we work through with them. The first stage is to define the specific system and associated assets that need to be managed. The second stage is the design phase where we model the entire area to be managed and incorporate that model into the Spirae platform. The third stage is the deployment phase, which is where the Spirae platform automatically creates the software components needed and they are rolled out to the physical system. Once deployment completes, the customer will validate that the system is operational, operators are trained and the system is handed over for daily operations.

CEOFCO: *You mentioned a project in Denmark. What is your global reach today and what areas are showing interest?*

Mr. Cherian: Our focus is primarily in North America and it has become a fast-moving market. We have a great deal of activity going on in California and the northeast US. We also work in the Caribbean and have some customers in Alaska and Hawaii. We do serve customers in Europe and continue to see strong interest from that market. We manage international opportunities on a case-by-case basis from the US. That said, the need for these types of solutions is found everywhere in the world. We will continue to assess the markets on an ongoing basis to determine where we want to pursue channel partners and service customers remotely or have a direct footprint.

CEOFCO: *How is business?*

Mr. Cherian: It is actually doing very well. The level of activity in the market has been ramping up very fast and we are growing rapidly. Our challenge is actually finding the technical talent who understand the space well enough so we can meet the demand during this prime window of opportunity.

CEOFCO: *How do you find people?*

Mr. Cherian: We use multiple ways. What works well for us is putting the word out through our current employee base and through our personal networks. We also leverage social media channels. A more personal touch seems to work better for us than blind advertising and public postings. We very occasionally use recruiting firms.

CEOFCO: *What is the competitive landscape?*

Mr. Cherian: Control systems for distributed energy resources is a burgeoning field and there are some interesting incoming players. When you consider the big power companies, they all have initiated activity in DER controls systems that may overlap with our solutions. Much of the market need today is being met with custom-built solutions where

systems integrators or engineering companies are putting together one-off solutions for customers. That is a fragmented but pervasive class of solutions that we run into quite often. We also are beginning to see many more new companies coming into play with various technical platforms designed to solve different pieces of the puzzle. We see companies coming at it from a big data perspective or other specialized areas like storage management or inverter controls. For Spirae, we focus solely on the software that can bind all of this together. To do that, we have to be technology agnostic enabling our customers to integrate our platform with other systems and technologies. We are the leading provider of scalable and configurable platforms for managing distributed energy solutions that leaves the choice of equipment and specific business models to our customers.

CEOCFO: *Why choose Spirae?*

Mr. Cherian: As we look at the transformation of the energy industry that is occurring today, we see a clear transition towards business models that leverage distributed energy. This transition is fundamentally changing the way in which energy is generated, stored, transacted and consumed. The primary challenge to enabling this transformation is having a flexible platform that brings together power engineering fundamentals, modeling and analytical capabilities, and scalable software technologies to deliver a system that generates many new value streams. Traditional models where renewables are sold under a long term PPA or where a storage system is installed using government subsidies are giving way to integrated energy solutions that add value to energy consumers. We are now entering a phase where the primary challenge is the integration of disparate technologies and systems to deliver seamless energy solutions to customers at scale. As I look at the competitive landscape and consider who can actually bring all these pieces together, I can confidently say that Spirae stands out as one of very few that can deliver. With more than ten years of experience, exceptional talent, and a proven platform, Spirae should be the first stop for those in the market for a distributed energy or microgrid management platform.

Interview conducted by: Lynn Fosse, Senior Editor, CEOCFO Magazine



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