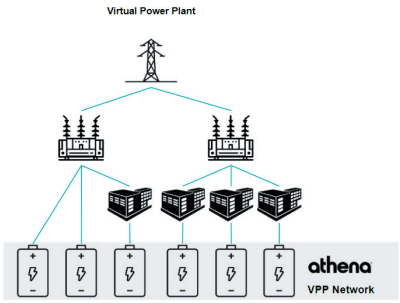
Virtual Power Plants for Electric Cooperatives

Behind-the-Meter (BTM), Front-of-the-Meter (FTM), and Utility-scale Opportunities with Stem

How AI and Software Are Transforming Virtual Power Plants

With the rapid adoption of renewable energy and battery storage - including commercial systems, residential systems, electric vehicles (EVs), and EV charging stations - virtual power plants (VPPs) will be far more prominent and dynamic than in the recent past. The only way for cooperative utilities to capitalize on the aggregate power of these sites and build a fast, flexible grid is with software and artificial intelligence (AI) that can rapidly adapt to the needs of the grid and its customers.



How diversifying customer-sited energy resources make VPPs more intelligent

The difference between a VPP and a more traditional, point-to-point demand response (DR) program is key. A VPP is where the aggregator is responsible for delivering the total amount of energy or service to the grid. It's the aggregator's job to choose which resource will be activated and how much to ask from each. The off-taker or utility wants to know which resources gave how much, putting the onus on the aggregator to both deliver and report.

In comparison, previous DR program technology is not equivalent to VPPs because they were made of simpler agreements between end customers and utilities. When the DR signal was dispatched, the end user responded; it was a one-to-one relationship between participating customers and the utility. VPPs, however, provide more sophisticated control between the utility and customers' Distributed Energy Resources (DERs), deciphering which customer doesn't have any energy to give from its on-site resources and which customers do when events are called. VPPs deliver the amount of resources to the utility that it needs, having solved for the complexity of all those disparate customer situations with an extra layer of intelligence.

Top 6 Use Cases Why Co-ops Choose Stem

- All C&I customers
- Peak shaving to lower energy costs
- Resilience and backup power
- Renewable energy integration
- Grid stabilization
- Transmission and distribution (T&D) deferral
- Wholesale market participation

Co-op Benefits

- Single interface to manage distributed assets
- More efficient and economical use of distribution system against grid peaks
- Allows for optionality with ownership structures
- Enables proactive solution offering to members, especially large energy users
- VPP performance is guaranteed
- Less GHG emissions than peaker plants

Member Benefits

- New, automated revenue streams from VPP participation
- Lower energy costs overall
- No disruption to operations –"set and forget"
- Better value from onsite solar
- Enhanced energy resilience if battery provides backup power

Software Optimized for Peak Demand Charge Reduction

AI-driven VPPs are the next step in the evolution of DR programs. Customers are the ones that have the most at stake in terms of potential financial gain from careful selection of participation in a VPP. The overall big picture of transitioning our grid to be “fast & flexible” means we cannot afford the inefficiency to not use AI. Pick your target: utilities, regulators, or incumbent fossil fuel providers – there’s efficiency to be gained at every level when adding AI to the mix of DERs.

Why Partner with Stem?

Stem works with our developer and off-taker partners to size energy storage project, register the systems with independent system operators (ISO), and develop and submit optimized bids into day-ahead and real-time energy markets as well as ancillary services markets. We’re playing a key role in helping developers get these projects to the finish line through our extensive experience in storage development efforts, our supply chain strength, analytical support around technical and economic analysis, construction and permitting support, and ultimately operating the projects in the market to achieve optimized revenues.

Our best-in-class Athena® platform drives smart energy software drives success under this framework by optimizing the economic and operational trade-offs necessary for successful market participation.

Entire Lifecycle Support for Co-ops

Stem’s VPP Solution

Stem’s expertise, networks, and dedicated support makes energy storage easy.

Design

- **Strategy & Professional Services Consulting**
- **System Design & Engineering**

Deploy

- **Stem Partner Network**
- **Deep Supplier Relationships**

Operate

- **Athena® Revenue Optimization**
- **Dedicated 24/7 Support Team**

Project Highlights

Smart storage enables savings & flexibility for co-op

Arkansas

Solar PV System Size: 2.7MW

ESS Size: 7MW / 14MWh

Commercial Operation Date: Summer 2021

Benefits to Co-op Members: Lower costs, renewable energy integration

ESS Use Cases: Wholesale Demand Charge Management, Solar Charging

To learn more about Stem’s solutions for Electric Cooperatives, visit www.stem.com/customers/co-ops.

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