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Energy Storage: Key Insights from DTECH® 2026

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Track Debrief - Energy Storage

Summary

The session at Distributech 2026 provided an in-depth analysis of the transformative potential of behind-the-meter battery programs (BPPs) and virtual power plants (VPPs) as scalable solutions to modern grid challenges. Highlighting successful deployments such as the rapid expansion of Puerto Rico's battery aggregation program, which reliably dispatched 50 megawatts to prevent manual load shedding, the discussion underscored the critical role these distributed energy resources play in enhancing grid reliability and deferring costly infrastructure investments. The session also explored the strategic value drivers demonstrated by utilities like PG&E, emphasizing affordability, infrastructure deferral, and system growth facilitation. It stressed the importance of adaptable program designs that can evolve with grid needs, integrating diverse technologies and services to maximize impact. Furthermore, the session addressed the regulatory and operational complexities involved in integrating these resources, advocating for standardized metrics, collaborative stakeholder engagement, and education to unlock their full value within utility planning and operations.

A significant focus was placed on the shift toward third-party owned battery models, catalyzed by legislative changes that favor corporate ownership over individual homeowners. This shift enables more streamlined program management, flexible dispatch strategies, and enhanced customer experience, accelerating adoption and aggregation capacity critical for grid support. The session also highlighted the multifaceted challenges in benefit-cost analysis, emphasizing the need for transparent, adaptable frameworks that capture the multi-service benefits of BPPs. Recommendations centered on enhancing education and collaboration among utilities, regulators, aggregators, and customers, developing multi-service VPP programs with standardized valuation metrics, and addressing export valuation barriers to fully leverage behind-the-meter resources. Collectively, these insights chart a pragmatic path forward for scaling distributed energy resources to meet affordability, reliability, and capacity challenges across diverse markets.

Key takeaways

✅ Puerto Rico Battery Program Scale Impact

Transformative Scale of Battery Aggregation
The Puerto Rico Battery Program dramatically scaled virtual power plant deployment by expanding from 6,000 to 70,000 customers, delivering 50 megawatts of capacity to prevent manual load shedding during peak demand. This rapid growth highlights the potential of behind-the-meter battery aggregation to serve as a critical, marginal resource that stabilizes the grid and enhances reliability.

Strategic Impact on Grid Modernization
By providing essential backup power and deferring costly infrastructure investments, the program demonstrated the viability of distributed energy resources as scalable assets. Its success, driven by strong customer engagement, regulatory collaboration, and innovative design, sets a precedent for modernizing power systems and boosting grid resilience through behind-the-meter storage solutions at scale.

Key takeaways – Continued

✅ PG&E Flexible Resource Value Drivers

Flexible Distributed Energy Resources
Flexible distributed energy resources, such as behind-the-meter batteries and aggregated virtual power plants (VPPs), are revolutionizing utility operations by providing cost-effective and reliable grid support. These resources enable the deferral or elimination of costly infrastructure investments by delivering dispatchable capacity that enhances both distribution and transmission systems. Their ability to offer multiple grid services—including peak capacity support and integration of beneficial loads—while maintaining affordability is critical to reducing customer rates and expanding system capacity.

Strategic Integration and Regulatory Evolution
Maximizing the value of flexible resources requires standardized metrics, seamless integration into operational planning, and adaptive regulatory frameworks that support dynamic, multi-service dispatch. PG&E's strategic approach involves scaling pilot programs, incorporating diverse technologies, and fostering collaboration across operations, planning, and regulatory teams. This comprehensive strategy positions flexible resources as essential drivers of grid reliability, resilience, and cost containment, exemplifying innovation in the energy transition.

✅ Third-Party Owned Battery Shift

Legislative Impact on Battery Ownership
Recent legislative changes have shifted tax incentives away from individual homeowners to corporate entities, accelerating the adoption of third-party owned batteries. This regulatory evolution enables aggregators to take primary operational control, streamlining customer participation through opt-out programs and flexible dispatch strategies, thereby enhancing adoption rates and customer experience.

Scalable Grid Modernization through Third-Party Ownership
Consolidating battery capacity under third-party ownership facilitates reliable grid services, effective load management, and deferral of costly infrastructure investments at scale. This model aligns incentives among utilities, regulators, aggregators, and customers, fostering a collaborative ecosystem essential for advancing the energy transition and positioning third-party owned batteries as a cornerstone for scalable, cost-effective grid modernization.

Recommendations

✅ Enhance Education and Collaboration

Foster Cross-Sector Education
Promote comprehensive education initiatives among utilities, regulators, technology vendors, aggregators, and policymakers to build a shared understanding of behind-the-meter resources and virtual power plants. This education should clarify complex regulatory frameworks, benefit-cost analyses, and operational integration challenges, thereby building trust and facilitating smoother regulatory approvals. A well-informed ecosystem enables the design of tailored programs that meet regional grid needs and customer preferences effectively.

Streamline Collaboration and Customer Engagement
Enhance collaboration by aligning messaging and simplifying customer engagement strategies, especially as ownership models evolve towards third-party aggregators. This alignment improves participation rates and customer experience, accelerating the deployment of scalable, reliable, and cost-effective grid-supporting programs. Continuous cooperation among stakeholders fosters affordability, reliability, and capacity improvements across diverse markets, unlocking the full potential of distributed energy resources.

✅ Develop Multi-Service VPP Programs

Integrated Multi-Service VPP Design
Utilities should develop multi-service Virtual Power Plant (VPP) programs that integrate a diverse array of distributed energy resources—including batteries, electric vehicles, and demand response assets—to deliver flexible, scalable grid support. These programs must be adaptable to evolving grid needs, enabling dispatch for peak capacity, distribution system support, voltage regulation, and ancillary services. Establishing standardized metrics to quantify resource value and embedding these into utility planning and operations is essential to realize cost savings and defer infrastructure investments.

Collaborative Customer-Centric Implementation
Successful multi-service VPP programs require collaboration among utilities, regulators, aggregators, and technology providers to streamline customer participation, align incentives, and overcome regulatory barriers such as export capabilities and market participation. Emphasizing customer-centric program design with simple enrollment processes and clear value propositions will enhance adoption and ensure positive customer experiences. This comprehensive approach unlocks the full potential of VPPs to provide reliable, affordable, and scalable grid support, advancing grid resilience and affordability goals across diverse regions.

Trends

Scaling Behind-the-Meter Battery Programs

Scaling and Impact of BPPs
Behind-the-meter battery programs (BPPs) have demonstrated transformative potential in grid management, exemplified by Puerto Rico's rapid scale-up from 6,000 to 70,000 customers, enabling reliable dispatch of 50 megawatts to avoid manual load shedding. These programs aggregate distributed energy resources into virtual power plants (VPPs), providing critical grid capacity support, enhancing reliability, and deferring costly infrastructure investments. Utilities leverage BPPs not only for demand response but also for multi-service capabilities that reduce rates and facilitate system growth, underscoring their strategic value in modern energy systems.

Enablers and Challenges for Scaling BPPs
The scalability of behind-the-meter battery programs hinges on innovative ownership models, regulatory evolution, and stakeholder collaboration. Third-party ownership simplifies customer participation and supports flexible, opt-out program designs, accelerating adoption. However, scaling requires overcoming regulatory and operational hurdles such as standardizing benefit-cost analyses, resolving export valuation barriers, and fostering collaborative education among stakeholders. Prioritizing customer-centric program design, regulatory innovation, and multi-service integration is essential to effectively expand BPPs, driving a resilient, affordable, and efficient energy future.

Evolving Regulatory Frameworks for Distributed Energy

Regulatory Innovation for DER Integration
Unlocking the full potential of distributed energy resources (DERs) demands a transformative approach to regulatory frameworks. Legacy regulations often undervalue the multi-service capabilities of DERs, especially in export valuation and capacity market participation. Embracing standardized metrics, transparent benefit-cost analyses, and flexible dispatch rules is essential to seamlessly integrate DERs into utility planning and operations. Legislative shifts toward third-party ownership models further necessitate adaptable regulations that support scalable program designs and customer-centric participation, enabling DERs to deliver reliable and affordable grid support.

Collaborative Frameworks and Stakeholder Alignment
Effective integration of DERs hinges on collaborative education and alignment among utilities, regulators, aggregators, and policymakers. Demystifying complex regulatory frameworks builds trust and harmonizes incentives across stakeholders. This cooperative approach is critical to overcoming regulatory challenges, facilitating scalable DER programs, and deferring costly infrastructure investments. By fostering transparent and flexible regulatory environments, stakeholders can collectively advance energy transition goals while ensuring DERs provide scalable and dependable grid support.

Conclusion

The session conclusively demonstrated that behind-the-meter battery programs and virtual power plants have matured into proven, scalable assets essential for modern grid management. While pilot programs have validated their reliability and operational value, the future success of these resources hinges on overcoming regulatory, market, and customer engagement barriers through sustained education, collaboration, and innovative program design. Emphasizing customer-centric approaches and affordability, the session highlighted the urgency of scaling these resources to address pressing grid capacity and reliability challenges. By refining valuation methodologies and regulatory frameworks, and fostering a cooperative ecosystem among utilities, regulators, aggregators, and customers, the energy sector can unlock the full potential of distributed energy resources. This integration promises a transformative shift toward a more resilient, efficient, and equitable energy future, positioning these technologies as foundational elements in the ongoing energy transition.

Top Topics

- Grid Capacity Support
- Battery Dispatch
- Program Scalability
- Regulatory Education
- Customer Affordability
- Third-Party Ownership
- Resource Reliability
- Pilot Programs
- Multi-Service VPPs
- Distribution Challenges