HUAWEI

2025 TECHNOLOGY INNOVATION LEADER

Enhancing Customer Impact Through Powerful Technology Integration

RECOGNIZED FOR BEST PRACTICES IN THE GLOBAL TELECOM DC POWER INDUSTRY

FROST & SULLIVAN

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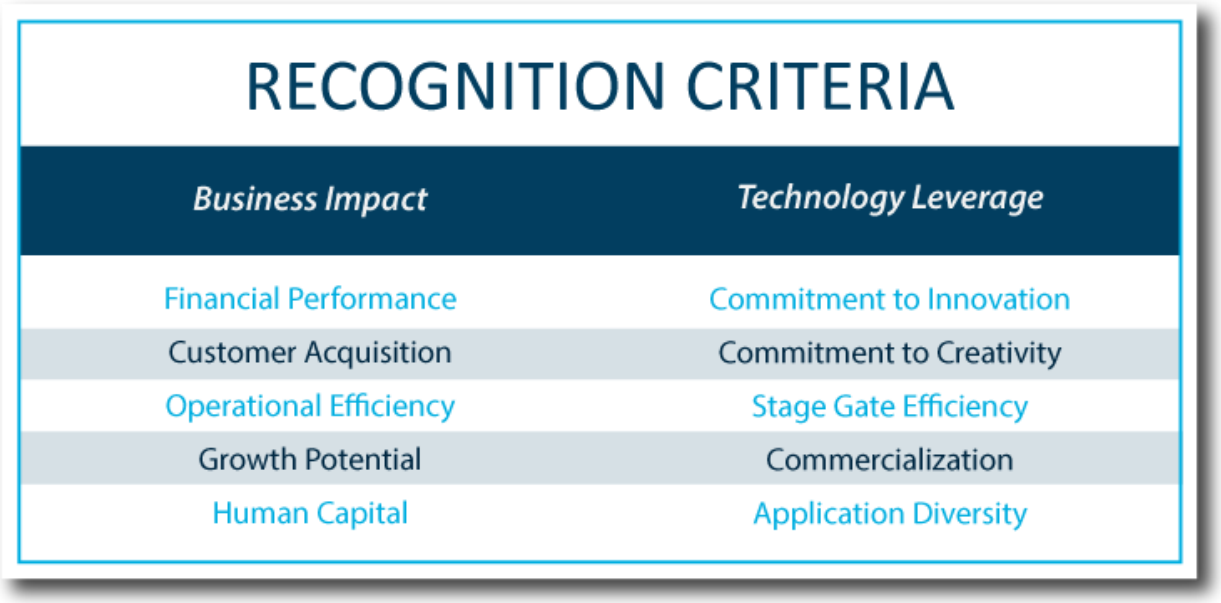
Best Practices Criteria for World-class Performance

Frost & Sullivan applies a rigorous analytical process to evaluate multiple nominees for each recognition category before determining the final recognition recipient. The process involves a detailed evaluation of best practices criteria across two dimensions for each nominated company. Huawei excels in many of the criteria in the Telecom DC Power space.



Huawei has demonstrated strong leadership in advancing the role of telecom power infrastructure within the global energy transformation landscape. The company has redefined the functional potential of distributed site energy assets, shifting them from passive backup systems to intelligent energy storage resources capable of participating in grid markets. This innovation aligns telecom operational reliability objectives with emerging needs for flexible grid support in high-renewable energy environments**.**

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> ***Senior Vice President***

Commitment to Innovation: with Purpose, Discipline, and Direction

Huawei advances telecom energy infrastructure through a structured, long-horizon innovation roadmap, ensuring technology breakthroughs are predictable, scalable, and grounded in operator needs.

The company demonstrates a clear and sustained commitment to innovation by transforming the role of telecom site energy assets within the wider power ecosystem. Traditionally, backup batteries at communication base stations have functioned as idle assets, delivering value only during power outages. Huawei identified this long-standing utilization gap and pioneered a cloud-based intelligent lithium battery cluster control architecture that enables these assets

to actively participate in power system regulation services. By coordinating distributed site batteries as a unified resource, Huawei allows telecom operators to evolve from being passive energy consumers to active contributors in maintaining grid stability.

A central element of this innovation is its cloud-based cluster control technology, which enables precise and reliable scheduling of distributed energy storage resources across thousands of sites. Unlike traditional solutions that require extensive hardware reconstruction or power system upgrades, Huawei's approach is fully decoupled from the existing site power infrastructure. This lowers the barrier to adoption, preserves network availability, and avoids operational risks associated with modifying live telecom networks. Many competitor offerings have not yet overcome this integration challenge, leaving a significant gap in their ability to unlock the full value of distributed site energy storage.

Huawei also ensures that the solution is globally deployable through multi-platform aggregator integration, supporting diverse regulatory environments, grid operator requirements, and market models. This interoperability is reinforced by Huawei's broader innovation culture, including sustained investment in R&D, open collaboration with universities and industry partners, and internal platforms that encourage employees to surface creative ideas for commercialization.

Through this combination of technical leadership, deployment pragmatism, and organizational mechanisms that sustain innovation momentum, Huawei moves beyond incremental product updates and instead shifts the functional role of telecom infrastructure in national energy systems. This marks a meaningful technological contribution that unlocks new economic and environmental value for operators, power markets, and society.

Commitment to Creativity: Reframing What Telecom Power Can Be

Huawei reimagines site backup batteries as intelligent, revenue-generating distributed energy assets, transforming long-standing assumptions across both telecom and power system domains.

Huawei's commitment to creativity is demonstrated through its ability to rethink the purpose and value of long-established infrastructure elements within telecommunications networks. Rather than treating site backup batteries as passive emergency assets, Huawei reframed them as distributed energy resources capable of supporting grid flexibility and generating new economic value. This shift represents a creative redefinition of a legacy asset class that has historically been viewed purely as cost and operational redundancy, rather than as a strategic contributor to energy resilience and financial returns.

A central creative breakthrough lies in the decoupling of Virtual Power Plant (VPP) intelligence from the live telecom power system. By designing a control architecture that does not require reconstruction of the existing power configuration, Huawei avoided one of the industry's most persistent barriers to modernization: the risk and operational disruption associated with altering live network environments. This approach is both technically creative and strategically elegant, enabling widespread adoption without compromising network continuity.

Creativity is also embedded in Huawei's cloud-based lithium battery management platform, which coordinates distributed battery clusters as if they were a single coherent asset. This applies digital

intelligence to a domain that previously lacked dynamic coordination, effectively allowing telecom operators to act as flexible grid participants while maintaining their core service priorities.

Beyond product innovation, Huawei supports creativity through structured co-innovation mechanisms, including collaborative engagement with customers, technology partners, and grid aggregators. Through these mechanisms, new ideas are sourced, validated, and refined against live operational needs, ensuring that creativity remains grounded, purposeful, and commercially relevant.

Frost & Sullivan research reveals that Huawei's creativity is not expressed through isolated inventions, but through a system-level reframing of how telecom energy infrastructure can operate. This creativity reshapes industry assumptions, expands operator business models, and opens the door to new forms of value creation across energy, network reliability, and sustainability objectives.

Stage Gate Efficiency: From Concept to Deployment with Precision

Coordinated technology planning, co-development with operators, and disciplined validation cycles enable Huawei to move innovations from incubation to commercial rollout quickly, reliably, and at scale.

Huawei displays strong stage gate efficiency through a disciplined, end-to-end innovation process that consistently moves new concepts from foundational research to market-ready solutions. This process begins with Huawei's three-generation technology planning mechanism, which defines long-term strategic breakthrough directions while simultaneously preparing successor and next-wave technologies. This approach ensures that innovation is not reactive or one-off but instead guided by a structured roadmap that balances future vision with near-term execution.

From there, Huawei employs a systematic incubation flow, beginning with dedicated pre-research to establish core technical feasibility. Once the foundational capabilities are validated, full-scale solution development follows, with Huawei having demonstrated the ability to move from incubation to commercial-grade offerings in defined and predictable timeframes. For example, key capabilities underpinning the Site Power VPP solution were incubated approximately one year in advance, followed by a focused 6 to 8month productization cycle that rapidly progressed to operator validation.

A central strength in Huawei's stage gate model is the role of the Customer Joint Innovation Center (JIC). Through the JIC, Huawei co-develops solutions together with leading operators in real-world deployment environments. This ensures early alignment between market needs and product functionality, while also accelerating refinement cycles based on operational feedback. The result is that solutions are not only technically advanced but also shaped directly by customer priorities and real network conditions.

This model has already proven successful in the commercialization of Site Power VPP. After laboratory and controlled deployment validation, Huawei partnered with operators to conduct technical and business proofing, including large-scale validation with Elisa in Finland. This demonstrates the solution's maturity, replicability, and readiness for broader market deployment.

Collectively, Huawei's structured planning, pre-research discipline, co-innovation mechanisms, and iterative validation cycles enable innovation to move consistently, quickly, and with a high confidence of commercial adoption. This reflects not only operational efficiency, but a deeply embedded organizational capability to convert forward-looking ideas into impactful market-ready outcomes.

Commercialization Success: Proven in the Market, Not Just in Theory

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Large-scale deployment with leading operators demonstrates the solution's operational maturity, replicability, and value realization in live network and grid environments.

Huawei's commercialization success is demonstrated through a clear progression from early pilot validation to scaled deployment across multiple operators and regions. The Site Power VPP solution was first proven through joint innovation and technical validation with Vodafone (VDF) and subsequently through commercial feasibility testing with A1 in Bulgaria, where the solution confirmed its capability to aggregate distributed battery assets and participate in grid-level regulation services under real operating conditions. These pilots validated both the technical control model and the business value logic.

Following these early-stage deployments, Huawei achieved large-scale commercial rollout with Elisa in Finland, representing a pivotal milestone where the solution was not only technically functional, but also replicable and operationally integrated at scale. This deployment confirms the solution's readiness for broader adoption and demonstrates how telecom sites can reliably act as flexible distributed energy resources while maintaining their core network reliability functions.

The commercial momentum continues to accelerate. During interactions across European, Chinese, and Japanese markets, the solution has received strong recognition from operators, energy service providers, and virtual power plant aggregators. This interest reflects the solution's alignment with growing demand for flexible grid balancing resources as renewable energy penetration increases. It also directly supports telecom operators in transitioning from pure energy consumers to hybrid consumer-producers, unlocking new revenue models while improving asset utilization and contributing to wider grid stability.

A key commercial advantage lies in Huawei's decoupled deployment architecture, which enables operators to adopt VPP capabilities without reconstructing existing power systems or interrupting live network environments. This markedly reduces operational risk, accelerates deployment timelines, and improves the return on existing infrastructure.

The result is a solution that is technically validated, commercially proven, and positioned for scalable replication. Huawei's commercial progress demonstrates not only successful market entry, but the establishment of a viable and repeatable business model capable of reshaping the role of telecom site energy assets in national power systems.

Application Diversity: Broad Use Cases, One Coherent Platform

Huawei's architecture supports distributed telecom networks and centralized energy systems alike, delivering unified coordination and value creation across diverse deployment contexts.

The company exhibits notable application diversity by enabling its Site Power VPP solution to operate effectively across both distributed telecom site environments and centralized energy storage scenarios. At its core, the solution unlocks new functional value from distributed telecom site batteries, allowing them to participate in Virtual Power Plant (VPP) markets while maintaining their original role in network power assurance. This establishes the primary and most mature use case, where the solution is already validated in live operator networks and integrated into real-world grid balancing activities.

Beyond distributed deployments, Huawei also supports container- and cabinet-based centralized energy storage solutions, enabling the company to address the needs of power plants, industrial facilities, and commercial energy consumers. This dual capability demonstrates flexibility across different infrastructure densities, site configurations, and operational objectives. It also positions Huawei to support both telecom operators seeking to optimize existing assets and energy sector customers requiring scalable, centralized storage capacity.

This breadth reflects a broader industry evolution in which telecom site batteries are transitioning from single-purpose backup systems to intelligent, networked energy storage assets capable of delivering grid services and supporting sustainability objectives. Huawei's solution aligns with this shift by enabling batteries to provide both telecom power assurance and grid ancillary services, significantly expanding their functional and economic value.

As distributed VPP market mechanisms mature globally, the applicability of Huawei's approach is expected to expand further, particularly in regions where flexible grid balancing and distributed energy participation are strategic priorities. While telecom remains the leading entry point for adoption today, the underlying platform architecture and product portfolio are already designed to extend into broader commercial and energy system contexts.

Overall, Huawei's application diversity reflects not only a wide range of deployment configurations, but also a meaningful shift in the functional role of energy storage infrastructure, positioning the company to support both telecom network evolution and emerging distributed energy system models.

Financial Performance & Growth Potential: Turning Power Systems into Economic Assets

By enabling operators to participate in energy markets with minimal incremental investment, Huawei unlocks new revenue streams while aligning the solution with global demand for flexible grid resources.

Huawei's Site Power VPP solution directly enhances the financial performance of telecom operators by enabling a structural shift in how energy assets are utilized. Instead of functioning solely as a cost center for network backup, distributed site batteries become active participants in energy markets, allowing operators to generate revenue through grid balancing and ancillary services while maintaining their core power assurance role. This transition from energy consumer to hybrid energy prosumer represents a meaningful new source of financial value creation within the operator business model.

A key contributor to the solution's financial attractiveness is its low incremental capital requirement. The control and coordination intelligence layer is deployed without the need to reconstruct existing power systems, meaning operators can capture new revenue streams using the batteries they already own. This

significantly improves the return on assets and lowers the barrier to adoption, making the business case compelling across a broad set of network footprints.

Huawei's ability to support both distributed telecom sites and centralized energy storage deployments further strengthens the growth runway. This dual configuration approach allows the solution to scale across operators with varied network topologies, as well as into adjacent sectors such as commercial and industrial energy users. The flexibility of the architecture ensures that growth is not constrained to a single deployment model or customer segment.

Broader market dynamics reinforce this trajectory. As renewable energy penetration increases globally, grid operators require more flexible resources to stabilize supply and demand. Telecom sites, which are inherently widespread, fixed, and continuously powered, are well-positioned to provide this flexibility. Huawei's solution is aligned with this long-term structural trend, positioning it to benefit from rising demand for distributed energy resources.

The combination of strong operator-level economics, low incremental investment, cross-segment applicability, and alignment with global energy transformation drivers provides Huawei with a clear and credible foundation for continued financial growth. The solution is not only generating value today but is positioned to scale as energy markets and grid flexibility requirements evolve.

Customer Acquisition & Operational Efficiency: Designed for Replication, Built for Efficiency

Standardized system architecture, cloud-based orchestration, and co-innovation engagement models enable rapid onboarding, low-friction deployment, and scalable operational execution.

Huawei's customer acquisition and operational efficiency are rooted in a structured co-creation approach that accelerates both adoption and deployment. The Customer Joint Innovation Center (JIC) plays a central role by enabling Huawei to collaborate directly with operators in real network conditions, aligning solution capabilities with operational needs from the earliest stages. This approach builds trust, reduces decision-making friction, and shortens the time required to move from evaluation to deployment.

Once adopted, the solution is designed for rapid replication across new operator footprints due to its standardized and modular system architecture. The underlying Site Power VPP control intelligence layer integrates with existing power systems without requiring reconstruction of live network environments. This significantly reduces implementation risk and operational disruption, which are key considerations for telecom operators managing mission-critical infrastructure.

Operational scalability is further supported by Huawei's cloud-based control and coordination platform, which enables centralized management of distributed battery resources across multiple regions and site types. This ensures that large-scale deployments do not introduce proportional increases in operational workload, preserving efficiency even as the customer base grows.

Huawei also incorporates a multi-stakeholder alignment framework that facilitates collaboration between telecom operators, grid aggregators, and system operators. This structured approach simplifies entry into energy market participation programs and ensures that deployments progress through clear, repeatable operational stages.

Together, these capabilities create a customer acquisition and deployment model that is scalable, low-friction, and operationally resilient. Huawei not only brings a differentiated solution, but also a proven approach for integrating it efficiently into complex network environments, enabling customers to realize value quickly and sustainably.

Conclusion

Huawei's innovation in Site Power VPP represents a meaningful step change in how telecom energy infrastructure can create value. By reimagining distributed site batteries as intelligent, revenue-generating grid assets, Huawei has shifted the role of power systems from cost centers to strategic contributors to both network reliability and national energy flexibility. This reframing is backed by a disciplined, multi-generation innovation roadmap, co-creation with leading operators through the Joint Innovation Center model, and a proven incubation-to-commercialization pathway demonstrated through successful deployments across pilot and scaled markets. The result is not a concept under exploration, but a validated, market-ready solution operating within live telecom networks today.

Moreover, Huawei's architecture is purpose-built for scalable adoption: standardized, modular, and deployable without reconstruction of live power systems. This reduces operational disruption and accelerates customer onboarding while enabling the solution to extend across distributed telecom sites and centralized storage scenarios. Combined with growing industry demand for flexible grid services and a global shift toward distributed energy participation, Huawei is positioned not only as a technology innovator but as a systems-level shaper of future telecom-energy convergence. The company's approach demonstrates vision, practicality, and commercial maturity, embodying the qualities recognized by Frost & Sullivan's Technology Innovation Leadership Award.

With its strong overall performance, Huawei earns Frost & Sullivan's 2025 Global Technology Innovation Leadership Recognition in the Telecom DC Power industry.

What You Need to Know about the Technology Innovation Leadership Recognition

Frost & Sullivan's Technology Innovation Leadership Recognition is its top honor and recognizes the market participant that exemplifies visionary innovation, market-leading performance, and unmatched customer care.

Best Practices Recognition Analysis

For the Technology Innovation Leadership Recognition, Frost & Sullivan analysts independently evaluated the criteria listed below.

Technology Leverage

Commitment to Innovation: Continuous emerging technology adoption and creation enables new product development and enhances product performance

Commitment to Creativity: Company leverages technology advancements to push the limits of form and function in the pursuit of white space innovation

Stage Gate Efficiency: Technology adoption enhances the stage gate process for launching new products and solutions

Commercialization: Company displays a proven track record of taking new technologies to market with a high success rate

Application Diversity: Company develops and/or integrates technology that serves multiple applications and multiple environments

Business Impact

Financial Performance: Strong overall business performance is achieved in terms of revenue, revenue growth, operating margin, and other key financial metrics

Customer Acquisition: Customer-facing processes support efficient and consistent new customer acquisition while enhancing customer retention

Operational Efficiency: Company staff performs assigned tasks productively, quickly, and to a high-quality standard

Growth Potential: Growth is fostered by a strong customer focus that strengthens the brand and reinforces customer loyalty

Human Capital: Leveraging innovative technology characterizes the company culture, which enhances employee morale and retention

Best Practices Recognition Analytics Methodology

Inspire the World to Support True Leaders

This long-term process spans 12 months, beginning with the prioritization of the sector. It involves a rigorous approach that includes comprehensive scanning and analytics to identify key best practice trends. A dedicated team of analysts, advisors, coaches, and experts collaborates closely, ensuring thorough review and input. The goal is to maximize the company's long-term value by leveraging unique perspectives to support each Best Practice Recognition and identify meaningful transformation and impact.

		VALUE IMPACT	
STEP		WHAT	WHY
1	**Opportunity Universe**	Identify Sectors with the Greatest Impact on the Global Economy	Value to Economic Development
2	**Transformational Model**	Analyze Strategic Imperatives That Drive Transformation	Understand and Create a Winning Strategy
3	**Ecosystem**	Map Critical Value Chains	Comprehensive Community that Shapes the Sector
4	**Growth Generator**	Data Foundation That Provides Decision Support System	Spark Opportunities and Accelerate Decision-making
5	**Growth Opportunities**	Identify Opportunities Generated by Companies	Drive the Transformation of the Industry
6	**Frost Radar**	Benchmark Companies on Future Growth Potential	Identify Most Powerful Companies to Action
7	**Best Practices**	Identify Companies Achieving Best Practices in All Critical Perspectives	Inspire the World
8	**Companies to Action**	Tell Your Story to the World (BICEP*)	Ecosystem Community Supporting Future Success

*Board of Directors, Investors, Customers, Employees, Partners

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The Growth Pipeline Generator™

Frost & Sullivan's proprietary model to systematically create ongoing growth opportunities and strategies for our clients is fuelled by the Innovation Generator™.

Learn more.

Key Impacts:

- **Growth Pipeline:** *Continuous Flow of Growth Opportunities*
- **Growth Strategies:** *Proven Best Practices*
- **Innovation Culture:** *Optimized Customer Experience*
- **ROI & Margin:** *Implementation Excellence*
- **Transformational Growth:** *Industry Leadership*

The Innovation Generator™

Our 6 analytical perspectives are crucial in capturing the broadest range of innovative growth opportunities, most of which occur at the points of these perspectives.

Analytical Perspectives:

- Megatrend (MT)
- Business Model (BM)
- Technology (TE)
- Industries (IN)
- Customer (CU)
- Geographies (GE)