



PXiSE Energy Solutions Recognized for

2021

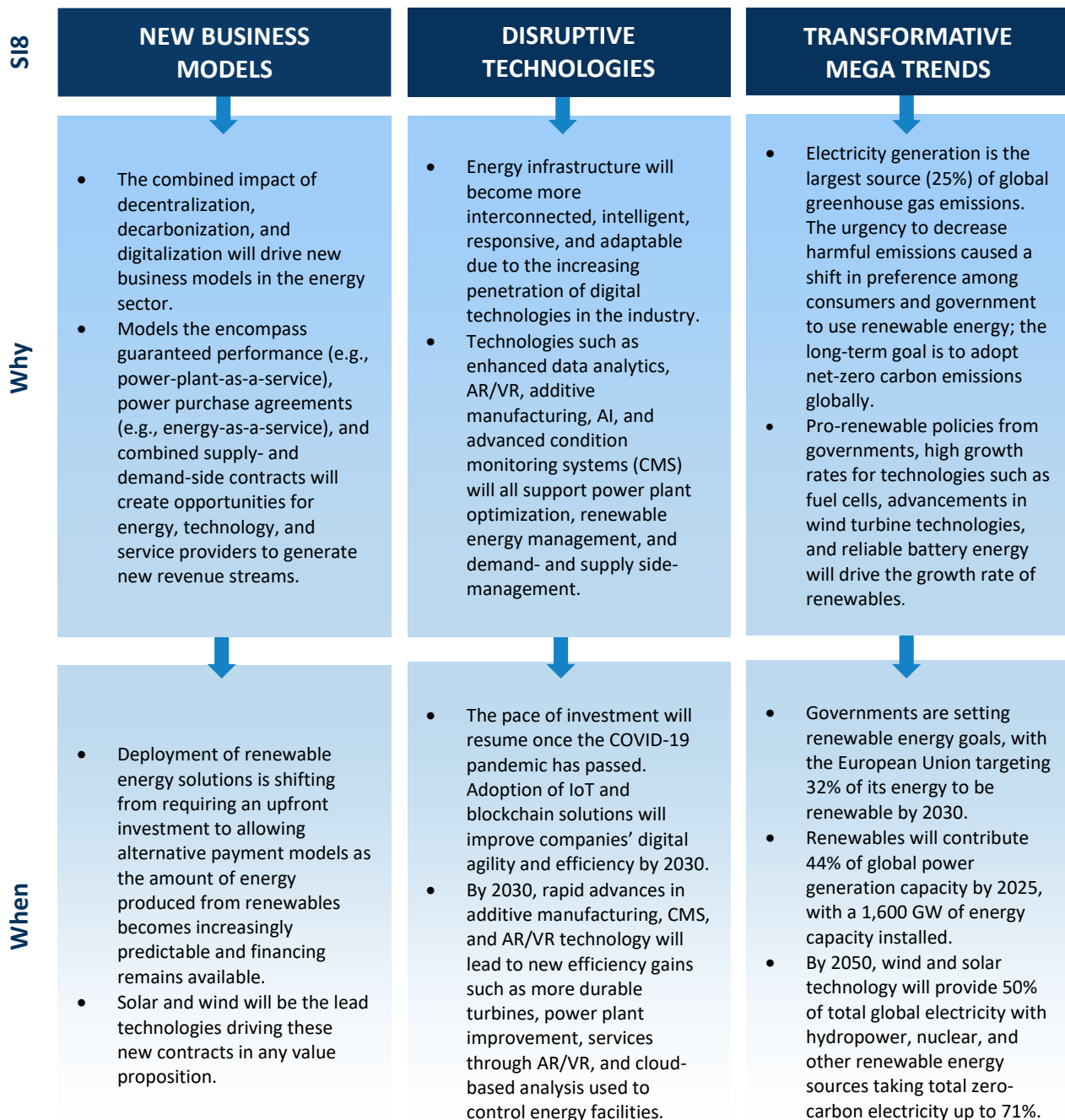
Customer Value Leadership

Global Microgrids and Distributed
Energy Resources Industry

Excellence in Best Practices

Strategic Imperatives

Frost & Sullivan identifies three key strategic imperatives that impact the power generation industry: new business models, disruptive technologies, and transformative mega trends. Every company that is competing in the power generation space is obligated to address these imperatives proactively; failing to do so will almost certainly lead to stagnation or decline. Successful companies overcome the challenges posed by these imperatives and leverage them to drive innovation and growth. Frost & Sullivan’s recognition of PXISE Energy Solutions is a reflection of how well it is performing against the backdrop of these imperatives.



Best Practices Criteria for World-Class Performance

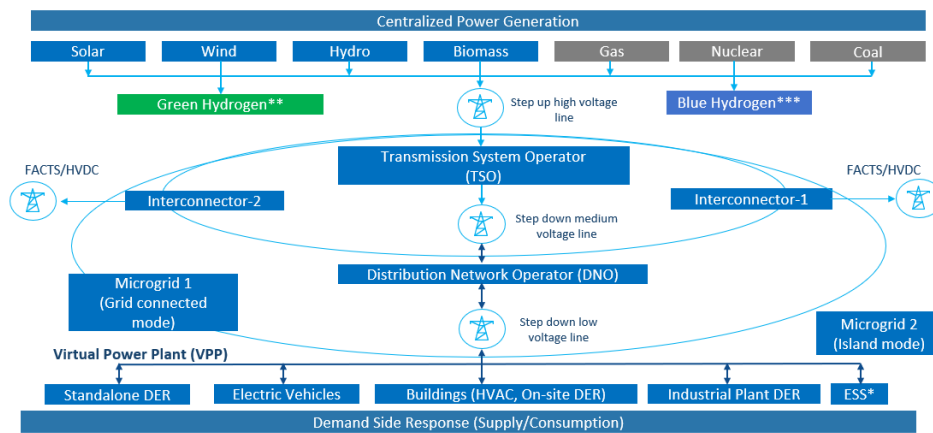
Frost & Sullivan applies a rigorous analytical process to evaluate multiple nominees for each award category before determining the final award recipient. The process involves a detailed evaluation of best practices criteria across two dimensions for each nominated company. PXiSE Energy Solutions excels in many of the criteria in the global microgrids and distributed energy resources space.

AWARD CRITERIA	
Business Impact	Customer Impact
Financial Performance	Price/Performance Value
Customer Acquisition	Customer Purchase Experience
Operational Efficiency	Customer Ownership Experience
Growth Potential	Customer Service Experience
Human Capital	Brand Equity

Delivering Unmatched Business Value

Frost & Sullivan’s energy market fundamentals research foresees transmission and distribution grids facing record levels of capacity additions from distributed energy sources between 2021 and 2030. Mega Trends such as decarbonization, decentralization, and the adoption of new business models is spurring more than \$1 trillion in investment¹.

Exhibit 1: Current Electrical Power Grid Ecosystem



*** Refers to hydrogen produced from fossil fuels, nuclear power and its applications which includes power generation, district heating and transportation fuel
 ** Refers to hydrogen produced from renewables and its applications which includes power generation, district heating and transportation fuel
 * Refers to energy storage systems which includes batteries, flow batteries and fuel cells

¹ Growth Opportunities in Distributed Energy, Forecast to 2030, Published May 2020

Understanding the magnitude of change that faces market incumbents, Frost & Sullivan, upon conversation with various industry stakeholders, recognizes four major challenges, namely:

1. **Power Quality:** Ensuring optimal power generation asset management while maintaining stable levels of grid power quality
2. **Asset Performance Management:** Accurately implementing digitalization solutions that improve overall asset control and grid performance
3. **Reducing Ownership Risk:** Launching new business models that encourage capital investments while considering supply/demand shortfalls
4. **Support of Digital Asset Stacking:** Developing a strong technology platform that supports solution scaling as generation capacity continues to be added incrementally

Addressing the aforementioned challenges requires industry incumbents to adopt a cohesive technical, economic, and policy-driven approach in tandem with appropriate business models. As a result, sustained long-term asset performance can be ensured. Predicting the roadblocks ahead of time, PXiSE Energy Solutions (PXiSE), leverages its technology know-how, collaborative partnerships, and robust industry expertise to bring three unique solution value propositions to the market. Specifically:

5. **Power Plant Control-**Providing hybrid solar/wind power plant asset management, plus storage or standalone storage systems
6. **Microgrid+DER Control-**Enabling hardware-agnostic control of microgrid and distributed energy resource (DER) assets with proven economic cost savings
7. **DERMS Control-**Providing distributed energy resource management (DERMS) control for utility-scale DER assets and DERMS+Microgrids software control for project developers and end users

PXiSE's stellar offerings are driven by a single common technology platform modeling. The platform combines synchrophasor and digital technologies to deliver unmatched business value to clients (i.e., asset performance management, digital asset stacking, and control objectives), empowering them to efficiently scale up asset base, resulting in incremental revenue while saving operational and maintenance costs with predictive asset maintenance.

Providing an Exceptional Customer Experience

Delivering an unrivaled client experience is critical in the energy market due to the large capital investment undertaken. Moreover, it builds trust and commitment. To that end, PXiSE outshines its competition by providing holistic solutions that can manage diverse asset types simultaneously. For example, PXiSE's real-time site controller (i.e., the underlying microgrid control hardware) provides renewables and thermal energy asset system optimization, seamless islanding in case of a grid outage and continuous monitoring of the grid status to expedite reconnection, and the autonomous, real-time forecasting of environmental and operational conditions, thus encouraging the shift towards asset autonomy. Similarly, PXiSE's DERMS and renewable power plant controller provide world-class DER management and renewable power plant grid integration capabilities (Exhibit 2).

Exhibit 2: Current Electrical Power Grid Ecosystem

Serial No.	PXiSE Real-time Site Controller for Microgrids and DERs	PXiSE DERMS	PXiSE Power Plant Controller
1	<i>Holistic structure that can support any microgrid network (e.g., local area, isolated, utility-controlled DERs, front-of-the-meter, and behind-the-meter microgrids)</i>	<i>Supports the integration of virtual power plants and microgrids, irrespective of asset type</i>	<i>Customizable for wind or Solar PV with storage assets, without any size limitations</i>
2	<i>System optimization along with islanding in the case of a grid outage, with continuous monitoring of reconnect opportunities</i>	<i>Secure remote, distributed control of DER assets</i>	<i>Completely hardware-agnostic</i>
3	<i>Environmental and operational conditions monitoring and forecasting</i>	<i>Mitigates intermittency issues by automatically optimizing energy mix while ensuring cost-effective power is delivered, regardless of DER mix or system distribution architecture</i>	<i>Remote or on-site control, with support for any type of asset configuration (i.e., AC/DC)</i>

In a short span of 3 to 4 years, Frost & Sullivan notes that PXiSE’s operational portfolio has risen to 1 gigawatt (GW) globally. The rise demonstrates PXiSE’s efficacy in providing an exceptional customer ownership experience driven by its proprietary synchrophasor technology and world-class expertise.

Demonstrated Value for Customers

“PXiSE stands out in a highly competitive market for its unique synchrophasor technology and digital data-driven approach. As a result, it can manage and optimize a host of renewable energy and distributed energy resources, including large-scale projects and microgrids, with high efficiency.”

- Vasanth Krishnan, Senior Consultant

The present power market is in a phase of transition due to four major Mega Trends: distributed energy, the electrification of transport, asset digitalization, and the adoption of emerging technologies. Amidst this shift, diverse stakeholders are establishing their respective presence in the distributed energy sector. Hence, creating demonstrated value for customers is no easy task. Frost & Sullivan notes that PXiSE’s offerings simplify an otherwise-complex undertaking through its holistic and technology-driven approach to customer pain points (e.g., microgrids, DERs, and renewable energy grid integration). Examples of PXiSE’s industry best practices have been highlighted below.

Best Practices Example: To improve resilience at a critical operations facility and provide grid services for voltage and frequency, Portland General Electric (Portland) integrated PXiSE’s microgrid control offering. PXiSE’s microgrid technology paved the way for two major outcomes for Portland. First, PXiSE enabled islanding for 21 days when required, thus providing uninterrupted customer service. Second, PXiSE ensured Portland could maximize renewable power generation while reducing operating costs. Overall, PXiSE’s solution offered long-term sustainability without compromising outcomes. As a result of its proven value, Portland is planning to roll out additional critical infrastructure microgrids.

Best Practices Example: Horizon Power (Horizon) required a proven technology solution to integrate customer DERs and manage an 11 MW microgrid in Australia. Horizon partnered with PXiSE to implement the company's DERMS and microgrid control solutions. PXiSE executed a one-stop integrated DERMS and microgrid solution to simultaneously manage the customer's DER assets and 11 MW microgrid in real time. The path-breaking approach led to increased reliability and stability across service territory, an increase of renewable capacity hosting by four times, and a rise in renewable production by more than 90%. PXiSE's proven efficacy positions it as a leading technology solution provider to meet Horizon's future requirements in the DER and microgrid space, ahead of its competition.

Superior Operational Efficiency

PXiSE is deeply committed to enabling DERs and microgrids to reach the highest levels of autonomy. The company's offerings provide much-needed flexibility for clients, allowing them to seize competitive energy market opportunities while building energy resiliency and remaining profitable. PXiSE's proprietary and advanced capabilities differentiate it from the competition. For example:

1. **Power Flow Analysis:** The company enables continuous analysis of the grid power flow with respect to client assets
2. **Integrated Planning:** Integrated multiple assets can be planned in advance to meet load schedules in accordance with prevailing conditions
3. **Mixed Asset Optimization:** Multiple asset types can be optimized simultaneously in real time to meet demand
4. **Systems of Systems Orchestration:** PXiSE can manage multiple DER or microgrid pools by enabling systems orchestration
5. **High-speed, coordinated, and real-time control:** Real-time coordinated control of asset operations and performance, up to 60 hertz (Hz)
6. **DER Monitoring:** Continuous DER asset monitoring based on client-specific requirements

Unlike its competition, which focuses on a single purview of asset management within microgrids and DER optimization, PXiSE's breadth of offerings lends an X factor to the company. Furthermore, PXiSE is in the process of adding increased renewable capacity optimization and scalable nested microgrid management to its capabilities.

Frost & Sullivan also notes that PXiSE is leveraging its partnership with OSISOFT's PI data platform to produce high-speed asset control and digital data outputs in tandem with machine learning and system optimization techniques. When combined with PXiSE's proprietary real-time data management algorithms, the offering can monitor load performance, including renewable energy resources. The approach also spurs superior operational efficiency, turning a long-foreseen industry vision into a reality.

Driving the Growth Pipeline

PXiSE's business model is ideally positioned to address scalability and global growth challenges as it can simultaneously harness ongoing commercialization efforts and product development. PXiSE is partnering with leading industry incumbents to strengthen its value proposition further and drive incremental growth. Specifically, the company is bidding for projects in partnership with project developers and engineering, procurement, and construction companies providing turnkey solutions. PXiSE's key partners

include the GTS group, MKI, TOSHIBA, Mitsui & Co., OSIsoft, and Sempra Energy. The approach has resulted in PXiSE's memorandum of understanding with Toshiba to develop renewable energy and microgrid projects in Japan and globally, backed by Mitsui & Co. Frost & Sullivan understands that PXiSE and Toshiba have already completed two microgrid simulation projects and will start deploying actual microgrid projects in 2021. PXiSE's growing international success contributes to a strong growth pipeline, enabling the resilience to tackle future global challenges, notes Frost & Sullivan.

Rising Global Brand Equity

PXiSE's origination resulted from a strategic alliance between Sempra Energy, PXiSE's parent company, and OSIsoft. The combined synergistic experience in the power and utilities sector has resulted in a cohesive and dedicated team of experts in utility management, power engineering, controls design, and software design. As a result, PXiSE is ideally positioned to address DER asset performance, microgrid integration, and renewable power plant control challenges. Within a year of its formation in 2017, PXiSE had already completed the execution of DER and renewable power plant control of asset capacity totaling 201 MW. Such a feat attracted investment from Mitsui & Co., a global conglomerate. Soon thereafter, PXiSE won Horizon's DERMS contract, successfully delivering it within the agreed completion timeframe. Recognizing the merits of PXiSE, the company was certified by the IEEE 2030.5 protocol, the standard for secure integration between smart grids and end users. Frost & Sullivan research reveals that PXiSE is also the only technology platform that can support zero-inertia operating capabilities, thus leading the charge in realizing a 100% renewable energy-driven grid.

Utility, commercial, and industrial end consumers partnering with PXiSE to deploy microgrid control, DERMS, or renewable power plant control to support asset optimization and management have exhibited exceptional performance improvements leading to cost savings and increased profitability. With its proven abilities and superior client support, PXiSE stands out from competitors.

Frost & Sullivan emphasizes that, due to its breadth of energy management solutions comprising real-time site control for DERs and microgrids, DERMS, and renewable power plant control, PXiSE is the right partner to meet energy market incumbents' DER asset optimization needs. Overall, Frost & Sullivan rates PXiSE's capability to deliver optimal digitalization outcomes and business value far higher than its nearest competition, making PXiSE's technology solution a best-in-class digital solution for utilities, commercial, and industrial end users.

Conclusion

With more than \$1 trillion of capital investment forecast to advance the distributed energy space during the decade, utilities, commercial and industrial end users face the mammoth challenge of ensuring stable and reliable asset performance. PXiSE's holistic and full-stack solutions offer a proven, reliable, and customizable value proposition for end users, ensuring superior operational efficacy and asset performance while maintaining power quality and reliability. Further, PXiSE's unique synchrophasor technology combined with its digital data-driven approach powered by machine learning algorithms offers a breadth of fresh air in an otherwise highly competitive market.

For its stellar value proposition, best-in-class product features, close relationships with global customers, and strong overall performance, PXiSE is recognized with Frost & Sullivan's 2021 Customer Value Leadership Award in the global microgrids and distributed energy resources industry.

What You Need to Know about the Customer Value Leadership Recognition

Frost & Sullivan's Customer Value Leadership Award recognizes the company that offers products or services customers find superior for the overall price, performance, and quality.

Best Practices Award Analysis

For the Customer Value Leadership Award, Frost & Sullivan analysts independently evaluated the criteria listed below.

Business Impact

Financial Performance: Strong overall financial performance is achieved in terms of revenues, 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: Commitment to quality and to customers characterize the company culture, which in turn enhances employee morale and retention

Customer Impact

Price/Performance Value: Products or services provide the best value for the price compared to similar market offerings

Customer Purchase Experience: Quality of the purchase experience assures customers that they are buying the optimal solution for addressing their unique needs and constraints

Customer Ownership Experience: Customers proudly own the company's product or service and have a positive experience throughout the life of the product or service

Customer Service Experience: Customer service is accessible, fast, stress-free, and high quality

Brand Equity: Customers perceive the brand positively and exhibit high brand loyalty

About Frost & Sullivan

Frost & Sullivan is the Growth Pipeline Company™. We power our clients to a future shaped by growth. Our Growth Pipeline as a Service™ provides the CEO and the CEO's growth team with a continuous and rigorous platform of growth opportunities, ensuring long-term success. To achieve positive outcomes, our team leverages over 60 years of experience, coaching organizations of all types and sizes across 6 continents with our proven best practices. To power your Growth Pipeline future, visit Frost & Sullivan at <http://www.frost.com>.

The Growth Pipeline Engine™

Frost & Sullivan's proprietary model to systematically create on-going 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 six 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:

- **Mega Trend (MT)**
- **Business Model (BM)**
- **Technology (TE)**
- **Industries (IN)**
- **Customer (CU)**
- **Geographies (GE)**

