



*GE Digital Recognized for*

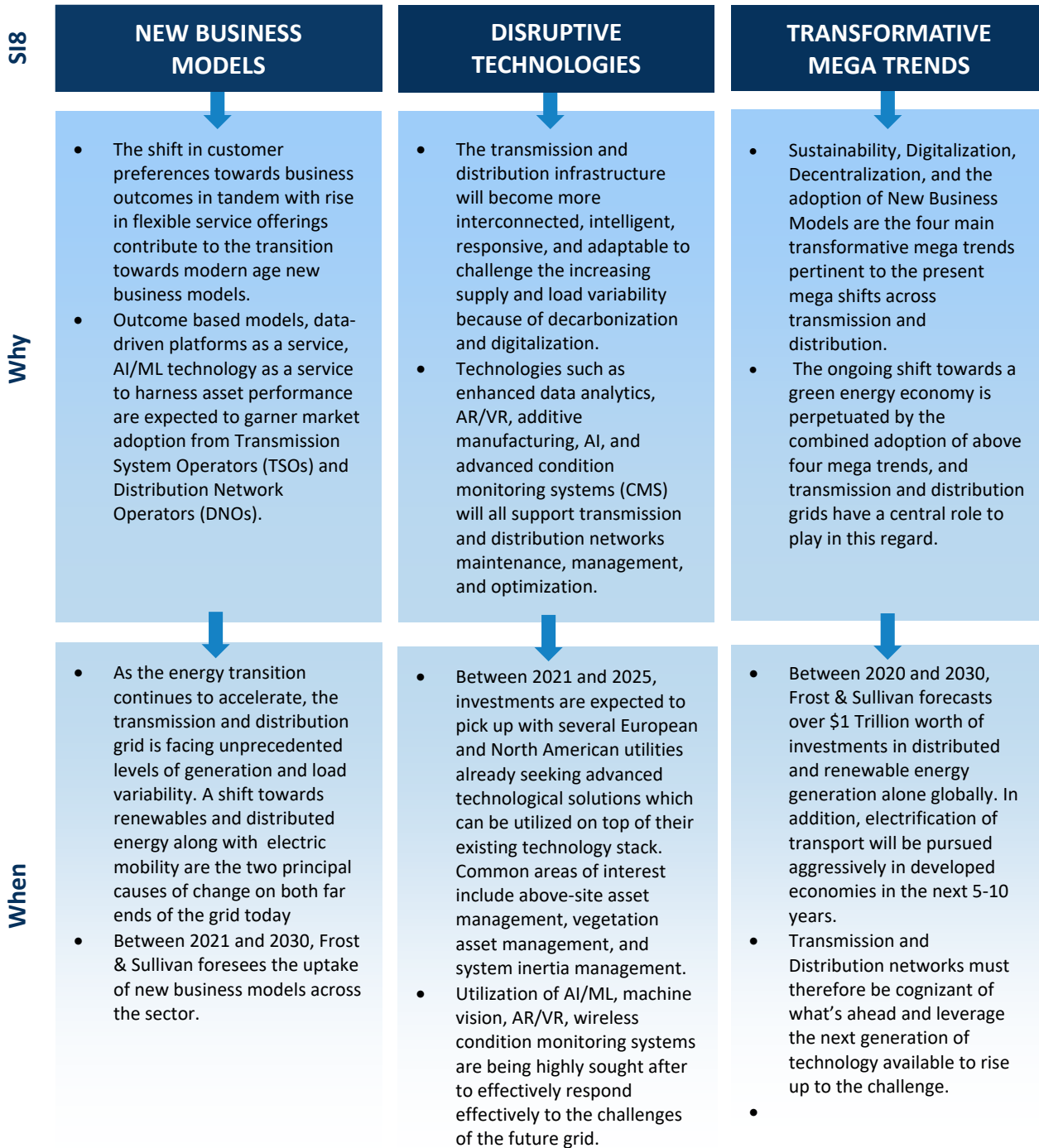
**2021**

**Product Leadership**

Global Transmission and  
Distribution Grid Analytics Industry  
*Excellence in Best Practices*

## Strategic Imperatives

Frost & Sullivan identifies three key strategic imperatives that impact the power industry: new business models, disruptive technologies, and transformative mega trends. Every company that is operating in the transmission and distribution 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 GE Digital reflects how well it is performing against the backdrop of these imperatives.



## Best Practices Criteria for World-Class Performance

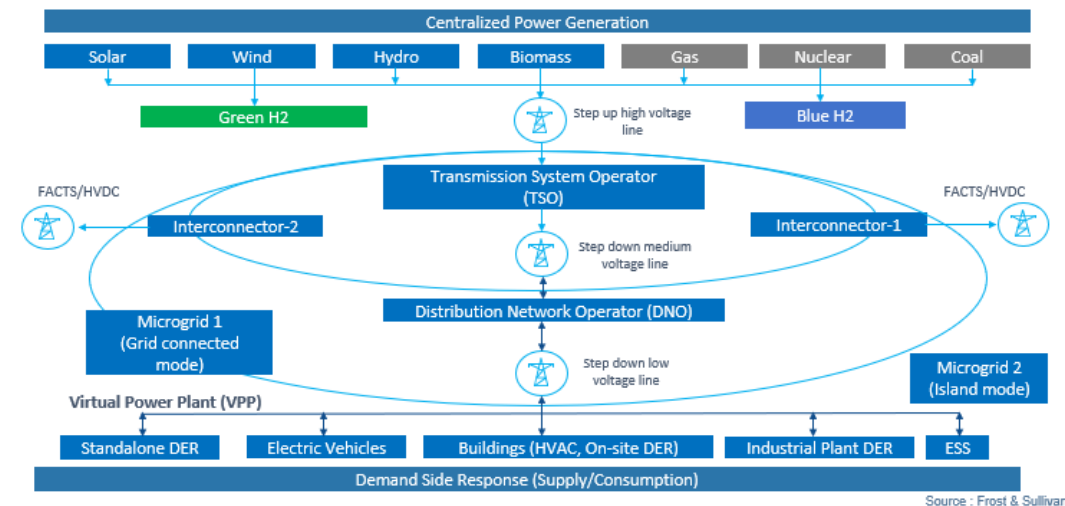
Frost & Sullivan applies a rigorous analytical process to evaluate multiple nominees for each award category before determining the final award recipient. The process involves a detailed evaluation of best practices criteria across two dimensions for each nominated company. GE Digital excels in many of the criteria in the transmission and distribution grid analytics space.

AWARD CRITERIA	
<i>Product Portfolio Attributes</i>	<i>Business Impact</i>
Match to Needs	Financial Performance
Reliability and Quality	Customer Acquisition
Product/Service Value	Operational Efficiency
Positioning	Growth Potential
Design	Human Capital

### Providing Unmatched Value to Needs

Frost & Sullivan’s analysis of long-term energy market fundamentals finds incumbents face four major challenges: the shift toward decentralization, digitalization, decarbonization, and implementation of new business models. Together, these challenges are causing an influx of changes to the electric grid. Highlighted in exhibit 1, Frost & Sullivan observes three transformations that are taking place in today’s electrical power grid.

Exhibit 1 : Current Electrical Power Grid Ecosystem



1. The shift from unidirectional power flow to bi-directional power flow caused by demand-side power generation
2. The emergence of distributed energy resource technologies (transmission/distribution connected)
3. The rise of electric vehicles and hydrogen-based power generation (centralized/distributed)

The aforementioned changes have caused several operational challenges for grid operators, such as the maintenance of grid parameters (technical and commercial) within specific limits, the presence of power quality and reliability equipment to ensure grid operations, and the consistent maintenance of grid assets for optimized performance. In addition, grid operators must maintain sufficient tools and personnel to manage weather disruptions, vegetation growth near infrastructure, the influx of renewable energy and data integrity from multiple network models. To tackle this set of challenges, GE Digital has leveraged its long-standing industry knowledge, vast global customer engagement and breadth depth of industrial software expertise to carefully plan and design a digital software portfolio called 'Grid Analytics' for transmission and distribution (T&D) utilities. With Grid Analytics, grid operators are supported by predictive and prescriptive intelligence that is derived from GE Digital's analytics library, which sources data from existing hardware and software infrastructure. Whereas competitors focus on providing on-site operational intelligence, GE Digital's Grid Analytics Leverages analytics on top of a utility's current operational software, and helps move the needle on hyper-critical goals for electric utilities, moving from a reactive state to a proactive state through advanced analytics. This empowers utilities to derive unmatched operational value from their assets and assists in precise maintenance planning, thus enabling cost savings.

### **Holistic Value Proposition**

Grid Analytics delivers four key analytical sub-value propositions that add practical business value for T&D utilities:

1. **Combatting Weather:** Weather is often the major cause of electric grid disruption. In response, GE Digital's Grid Analytics features a pro-active value proposition called **Storm Readiness**. This analytic branch works by utilizing high-resolution weather forecasts, outage history data, crew response

*"Whereas competitors focus on providing on-site operational intelligence, GE Digital's Grid Analytics has been designed to provide above-site operational intelligence, complementing existing software solutions utilized by utilities."*

**- Vasanth Krishnan,  
Senior Analyst**

data, and geographic information system (GIS) data to predict storm weather forecasts ahead of storm impact. Moreover, the predictive nature of solution design helps clients to muster response crews well ahead of the storm event, thus supporting the prevention of network outages and related costs. This consequently leads safety risks being minimized, smarter field personnel deployment and reduced crew labor costs. Grid Analytics achieves this outcome by employing a continual neural network-based model that considers outage and weather events to predict the likelihood of future outages in each area of the grid network.

2. **Combatting Data Inaccuracies:** As the volume of data created by and for operational systems is exponentially increasing, the data integrity of those numerous grid models is often unreliable. Grid Analytics addresses data quality errors, such as GIS data errors, by leveraging tailored algorithms that can detect the quality of data and its source in tandem with any observed phase errors. Called *Network Connectivity*, once detected, the analytic is configured to take the recommendations forward into business outcomes. This tool results not only in operational and maintenance cost savings for the client but also in tangible outcomes from existing grid software, such as an advanced distribution management system (ADMS), with high accuracy that improves customer satisfaction by preventing incorrect outage and restoration notifications. Similarly, the analytic also enables better identification of hidden load and reduction of technical losses in the energy distribution system.
3. **Combatting System Inertia:** Given the increasing amount of utility-scale renewable energy generation capacity and commercial- and industrial-scale distributed energy, transmission grids are witnessing unforeseen levels of supply and demand variability, thus causing a massive amount of system inertia displacement. To tackle this issue, Grid Analytics provides an analytic known as *Effective Inertia*, which measures system inertia in each region arising from rotating machines, passive loads, and active generator controls. This reduces unforeseen disruptions by eliminating excess reserves and enabling a more stable transmission grid, resulting in an accurate inertia forecasting tool that gives the transmission system operator confidence in a secure level of renewable penetration and the appropriate amount of reserve services. Effective Inertia also delivers benefits such as increased network resilience, reduced curtailment fees and penalties, and lower frequency response services.
4. **Managing Vegetation Encroachment:** To ensure a T&D grid is devoid of issues associated with nearby vegetation growth, utilities spend about 30% to 50% of their yearly operations and maintenance costs on vegetation management and asset inspection. These necessary activities yield undisturbed and reliable grid operations. To reduce the expense of managing vegetation, GE Digital has introduced a game-changing analytic known as *Visual Intelligence* within Grid Analytics. Visual Intelligence utilizes Artificial Intelligence and Machine Learning to provide holistic intelligence on vegetation management and asset inspection, offering up to 20% reduction in vegetation trimming O&M, up to 90% improved data processing productivity, and up to 30% reduction in tree-caused outages. Visual Intelligence also reduces the risk from wildfire, improves safety and reliability, and utilizes data-driven decision making to reduce inspection costs, and increased efficiency of workflow. Moreover, the Visual Intelligence platform is designed so both vegetation management and asset inspection operate on the same platform, providing better co-ordination for utilities.

Overall, these four sub-value propositions make Grid Analytics a comprehensive digital solution that provides operational intelligence powered by AI and ML-based data-driven foresight. Frost & Sullivan's industrial and energy team notes the holistic value proposition provided by Grid Analytics cements GE Digital as the frontrunner of accelerating digitalization in transmission and distribution.

### ***Future-focused Positioning***

According to Frost & Sullivan's industrial and energy practice, upwards of \$1 trillion in capital is forecast to be invested in new distributed energy capacity by 2030. Frost & Sullivan observes increasing variability in grid power generation sources from both supply and demand sides because of this transition towards accommodating distributed energy resources. For T&D utilities, this shift represents a mammoth operational challenge for ensuring grid reliability and stability over the course of the next decade. GE Digital, envisioning this scenario, has uniquely designed and positioned Grid Analytics as an additive solution that can be deployed on top of a utility's existing operational software. By assisting grid operators to gather mission-critical, above-site analytical insights and leverage advanced AI/ML techniques to proactively address the grid's operational performance and solve their critical challenges in a closed loop ecosystem, GE Digital accelerates their route to optimization. As a result, T&D operators can utilize Grid Analytics with existing, established advanced distribution management system (ADMS) and Renewable + DER Orchestration software that is commonly deployed by distribution utilities for real-time monitoring + control of both the grid and distributed energy resources. Ultimately, GE Digital's Grid Analytics assists utilities in tackling present as well as future operational challenges that may arise during the accommodation of distributed energy resources, moving from operating the grid reactively to orchestrating the grid with foresight.

### ***Proven Reliability and Quality***

Frost & Sullivan observes that today only a handful of digital solution providers deliver proven and reliable digital solutions for power T&D that carry the potential to progressively transform the way grid operations and maintenance activities are deployed. At the helm of leadership, GE Digital brings more than a century of industry-leading know-how, making it an unmatched leader in this space. Testament to this positioning is the company's long-standing partnerships with leading T&D utilities across the

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**- Ram Ramasamy,  
Global Client Leader**

world. For example, in a recent development, National Grid, the United Kingdom's transmission system operator (TSO), has chosen to utilize GE Digital's Effective Inertia analytic, which is part of Grid Analytics, for measuring and monitoring grid inertia. Observed in a statement released by National Grid, Frost & Sullivan found Effective Inertia measures system inertia non-intrusively by utilizing measurements of grid frequency and power flows taken 50 times per second, thus providing a real-time reading of inertia at a regional and national level. Moreover, Effective Inertia provides predictive inertia level forecasts based on demand levels and generation mix, thus

helping National Grid plan system operations effectively. This example highlights GE Digital's capability to meet the critical needs of T&D utilities with agile and reliable grid analytics software.

### ***Ensuring Operational Efficiency***

During the past five years, Frost & Sullivan's industrial and energy research team has conducted various surveys with T&D utilities to understand power market trends and movements. A common touchpoint in these surveys related to T&D grid operations and maintenance is the reference to GE Digital's superior solution efficiency, maintenance, and staff training support compared to the company's peers. In addition, T&D utilities relayed that GE Digital stands out in the market for digital solutions owing to its ability to distinctly deliver value by addressing the industry's critical needs. Frost & Sullivan echoes the opinion that GE Digital remains distinguished from its peers. For example, GE Digital differentiates itself by delivering a single platform for grid analytics, where each analytic delivers a unique value proposition; therefore, Grid Analytics can be offered both holistically and individually based on each client's needs. This flexibility provides immense space for operational efficiency to be realized by utilities without making any changes to their existing software portfolio.

### ***Offering Robust Growth Potential***

A subsidiary of General Electric (GE), GE Digital is a global industrial and energy market digital software and services solutions provider with operational technology and infrastructure to accelerated and scale clients' digital transformation activities. GE Digital was formed in September 2015 for the purpose of spurring GE's digital capabilities in industrial and energy markets from one all-digital organization focused on helping customers to better operate, analyze and optimize their assets and improve their business processes.

GE Digital serves end users as a holistic end-to-end digital solution provider with an enterprising digital approach supported by technical know-how. GE Digital's service breadth includes several key industries such as power (centralized generation, T&D, and distributed generation), manufacturing (process, hybrids, and discrete industries), oil and gas, and aviation and differentiates itself through its rich domain experience. Presently about 40% of the world's electricity portfolio is managed by GE Digital, with 1.2 million digital twins being deployed and 92,000 energy assets under management. As one of the largest industrial software companies in the market (reporting more than \$1 billion in annual revenues), this software provider is an essential catalyst for growth for its parent company.

As a leading digital solution innovator provider operating across global industrial and energy markets, GE Digital's Grid Analytics guarantees T&D clients performance reliability that accelerates business outcomes. Committed to the vision of enabling the shift to autonomous T&D grid operations, GE Digital's Grid Analytics helps utilities take a step towards autonomy with its four distinct sub-value propositions, each providing a marquee feature highlighted in the sections above. Moreover, Frost & Sullivan considers GE Digital an energy industry visionary and pioneer powered by a unique digital solutions portfolio that serves across power generation (digital twins, operations and asset performance management, remote operations) and T&D grids (advanced distribution management solutions, renewables and DER orchestration, grid analytics, transmission and geospatial and asset management software solutions), covering more than 40% of the world's global installed base in power.

T&D utilities that have partnered with GE Digital to deploy Grid Analytics for their operations and maintenance management needs have exhibited exceptional improvements in performance, leading to

cost savings and increased profitability. With its proven ability to stand out and support T&D utilities on top of their existing software, Grid Analytics provides a significant value addition in helping advance toward the long-term shift to autonomy.

Frost & Sullivan asserts that industrial and energy market incumbents with T&D grid optimization needs will move in the right direction by partnering with GE Digital to leverage its Grid Analytics solution, which comprises storm readiness, network connectivity, effective inertia, and visual intelligence. Overall, Frost & Sullivan rates GE Digital's capability to deliver optimal digitalization outcomes and business value far higher than its nearest competition, which makes Grid Analytics a best-in-class digital solution for T&D utilities.

## Conclusion

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With more than \$1 trillion of capital investment forecast to advance the distributed energy space during the decade, T&D utilities face the mammoth challenge of ensuring grid operational performance and reliability remain uncompromised.

Grid Analytics, GE Digital's holistic full-stack digital solution, offers a proven, reliable, and customizable value proposition for T&D utilities that assures superior operational efficacy in handling grid performance while accommodating distributed energy resources. Further, Grid Analytics adds value with its visual optimization tool for vegetation management and asset inspection that is powered by artificial intelligence and machine learning algorithms.

With its iron-clad holistic value proposition, world-class product features, close relationships with global customers, and strong overall performance, GE Digital has earned Frost & Sullivan's 2021 Product Leadership Award in the Global Transmission and Distribution Grid Analytics industry.



## What You Need to Know about the Product Leadership Recognition

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Frost & Sullivan's Product Leadership Award recognizes the company that offers a product or solution with attributes that deliver the best quality, reliability, and performance in the industry.

### Best Practices Award Analysis

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

#### *Product Portfolio Attributes*

**Match to Needs:** Customer needs directly influence and inspire the product portfolio's design and positioning

**Reliability and Quality:** Products consistently meet or exceed customer expectations for performance and length of service

**Product/Service Value:** Products or services offer the best value for the price compared to similar market offerings

**Positioning:** Products serve a unique, unmet need that competitors cannot easily replicate

**Design:** Products feature innovative designs, enhancing both visual appeal and ease of use

#### *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

## 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™.

### 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)**

