

# TMEIC RECEIVES THE 2023 COMPANY OF THE YEAR AWARD

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*Identified as best in class in the global power  
electronics industry*

## 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. TMEIC excels in many of the criteria in the power electronics space.

AWARD CRITERIA	
<i>Visionary Innovation &amp; Performance</i>	<i>Customer Impact</i>
Addressing Unmet Needs	Price/Performance Value
Visionary Scenarios Through Mega Trends	Customer Purchase Experience
Implementation of Best Practices	Customer Ownership Experience
Leadership Focus	Customer Service Experience
Financial Performance	Brand Equity

### ***TMEIC: Trailblazing, Sustainable, and Future-focused***

Accentuating a solid commitment to cutting-edge technologies, TMEIC integrates excellent research and development (R&D) capabilities into its business framework. With two decades of industry expertise and an emphasis on implementing constructive approaches, the company has developed a robust global presence. TMEIC’s worldwide manufacturing capabilities empower it to facilitate local support with global technology, meet the highest industry standards and local certifications, and fortify its market-leading position.<sup>1</sup>

TMEIC boosts customers’ equipment’s performance, quality, safety, and reliability while condensing environmental footprint through its integrated system solutions. Additionally, the company actively employs automation technology to digitize specialized skills and knowledge and streamline processes, increasing productivity for customers.<sup>2</sup> TMEIC’s commitment to research and development is evident in its incorporation of the Internet of Things and artificial intelligence in its exceptional product offerings. As a contribution to the R&D in power electronics technology, TMEIC supports the Center for Power Electronics Systems, operating in Virginia Tech. It is one of the leading research institutes in North America.

<sup>1</sup> <https://www.tmeic.com/>

<sup>2</sup> [https://www.tmeic.com/sites/default/files/assets/files/csr/Sustainability\\_report\\_eng.pdf](https://www.tmeic.com/sites/default/files/assets/files/csr/Sustainability_report_eng.pdf)

### ***Envisaging Visionary Scenarios Through Mega Trends***

With a laser-sharp focus and cognizance in leveraging megatrends, TMEIC is highly successful in pursuing existing market opportunities and creating new avenues for customer value enhancement. Through Frost & Sullivan's research, it is evident that TMEIC employs a highly structured, holistic, and robust collaborative process to evaluate the implications of megatrends and the opportunities they present. A key attribute driving the company's excellence in implementing visionary scenarios through megatrends is its customer intimacy, accentuated by close proximity to the market.

TMEIC has identified and is capitalizing on two megatrends: carbon neutrality (CN) and digital transformation (DX). Harnessing these megatrends, the company has branded its strategies as "Growth20". It pursues approaches that enable it to achieve its three-pronged business goal of 'Global Business Expansion,' 'New Business Acceleration,' and 'Existing Business Stabilization.'

The company recognizes that shifting from fossil fuels to sustainable energy sources is imperative for CN. Renewables provide the most promising energy; to utilize renewables, power electronics technology is essential. TMEIC consistently delivers exceptional solutions powered by its cutting-edge technology, bolstering business growth in the present and future and contributing to CN through green solutions, such as PV inverters for renewables and the motor/inverter systems for the electrification of large compressors in place of gas turbines.

#### ***TM Spirits and ERS-PJ***

The company notes that in the megatrend of CN, energy management is crucial for plant operation. Energy management entails conventional energy-saving activities and analysis and forecast of energy consumption and minimization. Carbon dioxide (CO<sub>2</sub>) reduction activities are now one of the key indexes for enterprise management. TMEIC expects to contribute to the industry's growth by offering customers a unique solution called "TM Spirits," designed to seamlessly implement best practices into their factory or plant's energy management by optimizing hardware operations.

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***- Gautham Gnanajothi  
Global Vice President of Research***

In response to the CN megatrend, the company plans to augment customers' plants by understanding how they operate the hardware products. By involving in the energy management of the customer's plants, TMEIC expects to expand the scope and performance of its solutions and the power electronics industry's growth. In addition, TMEIC intends to maintain its first-mover

advantage by introducing different CN-centered solutions by 2025.<sup>3</sup>

<sup>3</sup> Ibid.

For New Business fields, especially related to CN, TMEIC put together the Energy Resource Solution Project (ERS-PJ) team in December 2020. ERS-PJ leverages versatility in skills by including employees from all divisions to build new solutions by coordinating the company's existing technologies. Some of the trailblazing green solutions<sup>4</sup> designed by ERS-PJ include: alternating current (AC)/direct current (DC) converters, an integrated control system (for green hydrogen plants), explosion-proof electric motors for hydrogen stations catering to fuel cell vehicles (FCVs) and hydrogen combustion engine vehicles (HCEVs), AC/AC frequency converters, and "Smart Energy Solution" systems for condensing the carbon footprints of the factories.

ERS-PJ also represents TMEIC's dedication to customer experience. The company improves its solutions by leveraging customer feedback. It takes a "feedforward" approach, proposing innovative solutions based on customers' needs relating to CN and addressing new issues (never experienced before). This strategic approach promotes a strong sense of ownership among customers by hearing their voices.

TMEIC anticipates solid customer evaluation for other solutions promoted by ERS-PJ because of the team's high level of depth in understanding customer requirements. As the company's special project to catalyze markets and solutions for CN, ERS-PJ's existence has proven a successful initiative and acquired nods from customers, leading new businesses and yielding successful examples of green hydrogen solutions.

### ***Demonstrating Leadership through Continuous Product Innovation and Technology Leveraging***

TMEIC notes that the photovoltaic (PV) and energy storage system (ESS) markets are progressively enlarging. Harmonizing with these industry trends, the company developed and launched "Universal Inverter" for better energy availability and achieved good customer evaluations. This has contributed significantly to achieving shipments of more than 45 GW of photovoltaic inverters to date. The company supplies large-capacity inverters. With the global economy recovering from COVID-19, the demand for materials (e.g., iron/steel) has increased. TMEIC has successfully fulfilled orders for motor drive inverters from iron/steel industry customers. Its Fuchu Works factory in Tokyo is actively manufacturing the largest number of inverters ever.<sup>5</sup> Furthermore, TMEIC's product design of motor drive inverters has elevated demand due to its high cost/performance throughout the life cycle and the efficiency of generating high-quality steel. These inverters can regenerate power when the motor speed decreases. The COVID-19 pandemic has galvanized DX. The large-scale data center market is also expanding, with the digital data flow booming exceptionally fast. From the CN aspect, data centers must be energy-efficient, and the electric power feeding system to the servers should be reliable. Therefore, TMEIC manufactures high-demand, large-capacity, and resourceful uninterruptible power supply (UPS) solutions. The company's outstanding UPS offerings feature redundant functions, facilitating reliable power supply systems with significant capacity to data centers. It is also worth noting that to manufacture each product and guarantee proper customer support locally, the company has local factories in large markets: the United States, China, and India.

### ***AC/DC Converters and Integrated Control System for Green Hydrogen Projects***

Green hydrogen is a major global industry trend. TMEIC has delivered three sets of AC/DC converters in

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<sup>4</sup> Ibid.

<sup>5</sup> TMEIC's Interview with F&S

Japan for green hydrogen projects. The company integrated the converters with its groundbreaking power electronics technology, supplying DC to electrolyzers and working in tandem with the future power network governed by renewables. The solution entails the latest pulse-width modulation converter at the AC power network side and controls the reactive power for stabilizing the AC voltage. The company's integrated control system boosts the power flow by monitoring the balance between renewable generation and green hydrogen plant demand. The system forecasts renewable power generation according to the generation operation records. It also plans the power supply schedule of the plant based on the ESS state of charge and the renewable generation forecast.<sup>6</sup>

TMEIC has incorporated dual functions (to control the power to the electrolyzers and the reactive power) in the control system. The AC/DC converter supplies large DC with small ripples using advanced current control technology. The ripple current components are smaller than those of the conventional rectifiers. A smaller ripple current enhances the hydrogen production efficiency and prolongs the electrolyzer's life. TMEIC is crafting a more advanced integrated control system to escalate renewable generation and stably operate green hydrogen production.<sup>7</sup>

TMEIC's new technology improves upon the weaknesses of traditional rectifiers. Conventional rectifiers can cause AC voltage changes by unnecessarily varying the reactive power with the change in the power for hydrogen production. The difference in reactive power can cause AC voltage variation. Moreover, traditional rectifiers generate harmonic currents. The rectifiers require reactive power compensators and harmonics filters to address these issues. The filters can cause resonance phenomena in the electric power networks, which may stimulate disturbances to the power networks. TMEIC's cutting-edge inverters are an optimum solution to these limitations.

TMEIC's AC/DC converter for green hydrogen is a prime example of why customers trust this brand. The company developed its product according to excellent planning and in-depth analysis (by ERS-PJ) of customer needs and long-term perspectives for power network transformation. After comprehensive market analysis, the ERS-PJ found two areas for potential development, large-scale hydrogen mass production and local generation and hydrogen fueling stations.

### ***Explosion-proof Electric Motor for Hydrogen Stations***

For achieving CN in 2050, the development of FCVs and HCEVs will be valuable. One of the challenges in spreading hydrogen-fueled vehicles is the hydrogen stations. The stations must magnify their efficiency to fill FCVs or HCEVs as their number increases alongside the expansion of the hydrogen station network. TMEIC has developed new explosion-proof electric motors to meet this requirement, optimizing the hydrogen stations' filling efficiency. The company's electric motor surpasses existing explosion-proof motors with numerous advantages. It is applicable at sites under possible hydrogen atmospheres, and its electric motors endure frequent start/stop operations for the continuous fueling of FCVs. As a result, these motors have acquired the IE3 class, the highest efficiency certificate from the International Electrotechnical Commission. The company expects to release the explosion-proof electric motor and the

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<sup>6</sup> Ibid.

<sup>7</sup> Ibid.

integrated control system to the markets before its competitors by properly comprehending customer needs as it did for the AC/DC converter.<sup>8</sup>

### ***Extra-large Motor and Drive Inverters for Electrifying Compressors***

TMEIC has delivered extra-large motors and drive inverters to pipeline projects to electrify the compressor stations. In traditional technology, gas turbines drive large compressors and consume natural gas and exhaust CO<sub>2</sub>. To replace the large gas turbines (rated at several tens of megawatts), TMEIC built extra-large motors and drive inverters matching the capacity of large turbines. The company also expects its technology to yield benefits to hydrogen transportation systems. The extra-large motors and drive inverters have better system efficiency for driving compressors. The total system efficiency will decrease using turbines in the hydrogen transportation system.

### ***Smart Energy Solution and Smart Factory***

To amplify the iron/steel segment, TMEIC leads the digitalization of the operation and control systems. TMEIC deploys its highly regarded digital technology at the customers' plants. Maximizing this technology, the company is working on an energy management solution and plans to commercialize it in industries and renewable markets. TMEIC's solution will initially offer a visualized overview of various operational statuses related to energy in the plants. For the next steps, the solution will generate forecasts of energy demand or power generation and supply plans for enhancing energy utilization by analyzing the collected massive data.

As part of its Smart Factory initiatives, TMEIC uses PlantLogMeister (PLM) for digitalizing operation records, which plant operators wrote manually in the past. PLM records the plant operators' activity reports and updates them on their next duty through digital technology. The company plans to develop a trailblazing solution by converting the records to text data for further utilization. TMEIC will then design solutions to enable amplified safety and efficiency in plant operations using the operation and maintenance records.

### ***Commercialization Success Driven by Leadership Focus***

TMEIC's extraordinary business approach and technology infrastructure empower it to sustain a robust financial performance. In fiscal 2021, the company's consolidated sales reached 241 billion yen (the second highest ever). In fiscal 2022, despite adverse influence from the market environment and price competition (especially in overseas markets), the company anticipates its consolidated sales to exceed 300 billion yen, a record high galvanized by large projects and overseas business expansion. Irrespective of unfavorable market conditions, such as price hikes in raw materials, TMEIC has maintained the return on sales steady at a 5% average since fiscal 2018.<sup>9</sup> TMEIC's excellent consolidated sales growth is a testament to its customer-centric approach, revolutionary products, and exceptional operational strategies, earning its customers' trust and loyalty and enabling it to capture market share.

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<sup>8</sup> Ibid.

<sup>9</sup> Ibid.

Additionally, it recorded a compound annual growth rate of 3.9% from fiscal 2012 to 2022. The escalation in TMEIC's overseas sales ratio signifies a strong return from the investments (to the global bases) in the main markets (China, India, and North America). The company's global offices swiftly increased

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**- Gautham Gnanajothi**  
**Global Vice President of Research**

production and worked with sales teams closely targeting every market. The effective operations transpired substantial growth of TMEIC's international activities and sales.<sup>10</sup> TMEIC's high brand equity and financial success empower it to revolutionize the business framework alongside ever-changing market trends and customer demands, demonstrating the success of the "Growth20" policy. "TMEIC is now looking ahead at a milestone in 2030 with the vision of "Growth20."<sup>11</sup> TMEIC's leadership is further bolstered by its constant product enhancements based on the voice of customer analysis. In essence, the company delivers products and solutions that not only address the current market gaps and challenges but are also designed to accommodate future anticipated needs. A great attestation to this is its unique multi-dimensional and

multi-faceted approach towards implementing carbon neutrality, exemplified by its smart factory, green energy, and energy management.

The company's unique products persistently strengthen commercialization success. It expects the Static Var Compensation System (a TMEIC trademark) to expand the company's market growth. Positioned in "Growth20", this solution will help with the electrification of metal melting furnaces.

TMEIC believes that the best values are to boost the profits or the advantages for the industrial customers for a long time. To achieve this outcome, the company focuses on projects' initial and running costs. High efficiency, reliability, and long-term maintenance support are crucial for small running costs. TMEIC's strategy is to offer technologically superior products at attractive costs. The company does not partake in competitive price wars. It supplies large quantities of products in the market only after the customers recognize the excellence and quality of TMEIC's solutions.

The company uses client feedback and monitors market trends to guide its product roadmap and continuously evolve its solutions. Continuous orders from customers help TMEIC analyze successful and unsuccessful cases. One of TMEIC's differentiating factors is its policy and attitude towards customer benefits or profits, creating a high long-term value, something that other market players cannot easily duplicate. The company delivers suitable and sufficient services post-delivery for a better customer service experience and greater satisfaction. This approach increases customer retention and repeat orders and promotes a sense of respected ownership in purchasing TMEIC's solutions.

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<sup>10</sup> Ibid.

<sup>11</sup> Ibid.

## Conclusion

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TMEIC has established itself as a market leader in the global power electronics industry by maximizing longstanding expertise, trailblazing solutions (such as photovoltaic inverters, energy storage system, hydrogen rectifiers, UPS, and motor drive inverters), product reliability, technological advancements, robust global presence, and customer focus. TMEIC's ability to identify industry trends and challenges and modify, upgrade, or create solutions, accordingly, adds to its competitive edge. With initiatives like the Energy Resource Solution Project, Smart Energy Solution, and Smart Factory, the company demonstrates preparedness for megatrends, such as carbon neutrality and digital transformation. Its outstanding financial performance, augmented brand image, and high product demand testify to the company's emphasis on continuous advancement that catalyzes profits and customer benefits. TMEIC visualizes its strategies as "Growth20" and pursues approaches that help it achieve its current and future business goals ('Global Business Expansion,' 'New Business Acceleration,' and 'Existing Business Stabilization'). TMEIC addresses customers' unmet needs with a strong leadership focus that incorporates customer-centric strategies and exemplifies best practice implementation. It remains a reliable partner, sustaining a reputation for delivering the overall best in the power electronics space.

With its strong overall performance, TMEIC earns Frost & Sullivan's 2023 Global Company of the Year Award in the power electronics industry.



## What You Need to Know about the Company of the Year Recognition

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Frost & Sullivan's Company of the Year Award is its top honor and recognizes the market participant that exemplifies visionary innovation, market-leading performance, and unmatched customer care.

### Best Practices Award Analysis

For the Company of the Year Award, Frost & Sullivan analysts independently evaluated the criteria listed below.

#### *Visionary Innovation & Performance*

**Addressing Unmet Needs:** Customers' unmet or under-served needs are unearthed and addressed by a robust solution development process

**Visionary Scenarios Through Mega Trends:**

Long-range, macro-level scenarios are incorporated into the innovation strategy through the use of Mega Trends, thereby enabling first-to-market solutions and new growth opportunities

**Leadership Focus:** Company focuses on building a leadership position in core markets and on creating stiff barriers to entry for new competitors

**Best Practices Implementation:** Best-in-class implementation is characterized by processes, tools, or activities that generate a consistent and repeatable level of success

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

#### *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

