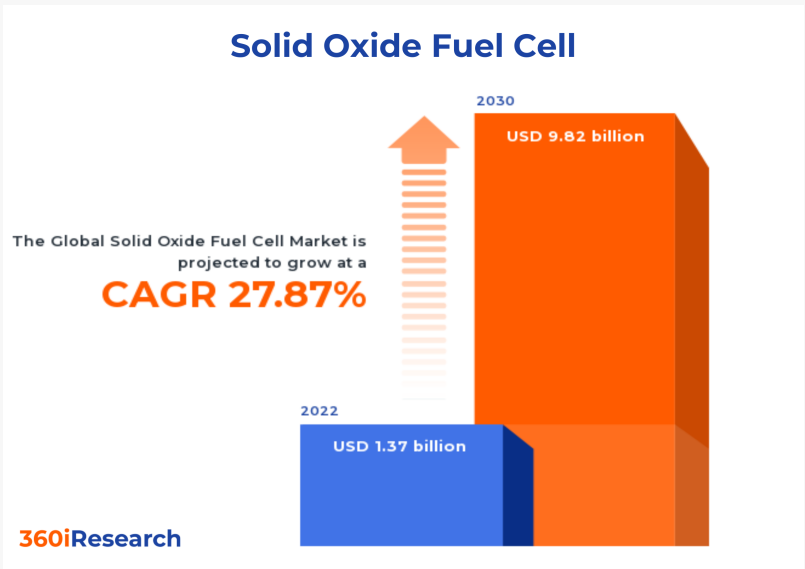
Solid Oxide Fuel Cell Market worth $9.82 billion by 2030, growing at a CAGR of 27.87% - Exclusive Report by 360iResearch

The Global Solid Oxide Fuel Cell Market to grow from USD 1.37 billion in 2022 to USD 9.82 billion by 2030, at a CAGR of 27.87%.



Solid Oxide Fuel Cell Market - Exclusive Report by 360iResearch

PUNE, MAHARASHTRA, INDIA , November 10, 2023 / EINPresswire.com/ -- The "Solid Oxide Fuel Cell Market by Type (Planar, Tubular), Fuel Type (Biogas, Blended Hydrogen, Natural Gas), Power, Application, End-User - Global Forecast 2023-2030" report has been added to 360iResearch.com's offering.

The Global Solid Oxide Fuel Cell Market to grow from USD 1.37 billion in 2022 to USD 9.82 billion by 2030, at a CAGR of 27.87%.

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The solid oxide fuel cell market encompasses producing, distributing, and applying solid oxide fuel cells (SOFCs). These electrochemical devices convert chemical energy stored in fuels such as natural gas, hydrogen, biogas, and oxygen directly into electricity and heat through an efficient and low-emission process. SOFC technology has gained significant attention in automotive & transportation, data centers, and hydrogen generation industries as it has the potential for clean energy generation, maintaining stability during voltage fluctuations, high electrical efficiency, lower greenhouse gas emissions, and versatility in stationary, portable, or transportation applications. The increasing demand for energy-efficient power generation and rising focus on hydrogen-powered fuel cells drive solid oxide fuel cell market growth. However, high investment in fuel cell infrastructure, high operating temperatures, and start-up time of SOFC is limiting the adoption of solid oxide fuel cells. Companies are focusing on materials innovation, cost

reduction through manufacturing process improvements, and complementary technologies to overcome these issues. Furthermore, increasing the adoption of SOFC for data centers and the military is an opportunity for the market.

Fuel Type: Extensive use of blended hydrogen in SOFCs
Biogas comprises methane and carbon dioxide and is manufactured through the anaerobic digestion of organic waste material. Solid oxide fuel cells (SOFCs) utilizing biogas offer a sustainable solution to power generation by decreasing greenhouse gas emissions. Biogas-based SOFCs are particularly beneficial for industries generating high volumes of organic waste, such as agriculture and wastewater treatment facilities. Blended hydrogen refers to hydrogen gas mixed with natural gas or other gases as an alternative fuel source for SOFC systems. Implementing blended hydrogen offers advantages such as reduced carbon emissions and increased energy efficiency compared to conventional hydrocarbon fuels. Natural gas is the commonly used fuel for SOFC systems due to its widespread availability, relatively low cost, and well-established infrastructure. Natural gas-powered SOFCs are ideal for stationary power generation applications such as commercial and industrial facilities and residential buildings. Biogas-based SOFCs significantly affect industries with high organic waste generation and present an eco-friendly alternative to conventional energy sources. Blended hydrogen offers flexibility in emissions reduction and efficiency enhancement by modifying blend ratios according to specific needs. In contrast, natural gas-powered SOFCs benefit from existing infrastructure and lower costs but do not provide the same environmental benefits as their counterparts.

End-User: Wider scope of usage across various industries
In the commercial sector, SOFCs are commonly used for distributed energy generation and combined heat and power (CHP) applications in office buildings, retail centers, hotels, and educational institutions. The need for reliable power supply and energy cost reduction drives this preference. Additionally, SOFCs enable businesses to meet sustainability goals by reducing greenhouse gas emissions compared to traditional combustion-based systems. The industrial sector leverages SOFCs primarily for large-scale power generation at automotive manufacturing facilities, data centers, hydrogen generation plants, power generation infrastructures, refineries, and chemical plants. These installations require consistent power supply with minimal downtime; hence, they benefit from the high availability rates offered by SOFCs. Moreover, industries utilizing waste heat recovery can attain enhanced efficiency levels through integrated solid oxide fuel cell systems. In the residential sector, SOFCs are gaining traction due to their ability to provide efficient decentralized power generation for single-family homes or multi-unit buildings. Homeowners benefit from reduced energy costs and increased independence from grid fluctuations. Additionally, utilizing CHP systems allows residents to efficiently generate heat alongside electricity, contributing to household energy savings. The commercial sector uses SOFC technology for distributed energy generation and CHP applications that meet sustainability goals while ensuring reliable power supply. The industrial sector focuses on large-scale power generation, high availability rates, and waste heat recovery integration opportunities. The residential industry primarily benefits from decentralized power generation, cost savings, and

grid independence.

Power: Accelerating deployment of small-scale solid oxide fuel cells across the residential sector
Large-scale solid oxide fuel cells (SOFCs) with capacities above 500 kW are designed for utility-scale power generation, industrial applications, and large commercial buildings such as hospitals, universities, and data centers. These fuel cells offer high efficiency and reduce greenhouse gas emissions. Medium-scale SOFCs cater to distributed power generation needs for small industries, businesses, and communities. Applications of medium-scale SOFCs include combined heat and power (CHP) systems that generate electricity and usable heat simultaneously, significantly improving overall energy efficiency. Small-scale SOFCs with a capacity of 1kW to 10kW are preferred for residential applications and backup power units in remote locations. These systems offer homeowners energy independence and cost savings through efficient electricity generation while providing grid support by feeding excess power back into the grid. Large-scale SOFCs serve utility-level needs; medium-scale fuel cells cater to businesses and communities; and small-scale fuel cells target residential applications.

Applications: Rising adoption of SOFCs as it offers high-energy density and low-noise operation
Portable SOFCs provide power to small-scale devices and remote off-grid applications. These fuel cells have gained significant attention as they offer high-energy density, compact size, and low noise operation. Stationary SOFCs cater to larger power generation requirements such as residential or commercial buildings, data centers, industrial facilities, and utility networks. Solid oxide fuel cells are increasingly being explored for transport applications due to their potential for reducing the pollution of air and emissions of greenhouse gases in the transportation sector.

Type: Advancements in SOFCs design for the better performance of the cells
Planar SOFCs are characterized by their flat and thin design, allowing for higher power densities than tubular designs. The planar design provides benefits such as ease of manufacturing, scalability in power output, high energy efficiency, low emissions, and flexibility in fuel sources. Tubular SOFCs feature a cylindrical design, where the electrolyte is formed into a tube shape, and the electrodes are deposited on the outer and inner surfaces of the tube. This configuration provides several advantages, such as excellent mechanical strength, high thermal cycling stability, longer operating life, and easier sealing for its geometry.

Regional Insights:
In the Americas, SOFCs have gained prominence for their potential applications in distributed power generation for commercial and industrial sectors. Companies have patented novel SOFC designs to support clean energy solutions across the Americas. European countries have witnessed a surge in demand for SOFC technology owing to their commitment to reducing greenhouse gas emissions. The MEA region is undergoing significant growth in renewable energy adoption as countries aim at diversifying their energy mix beyond fossil fuels. Consequently, there is an increased interest in fuel cells, particularly SOFCs, as an alternative power source for remote locations with limited grid access or weak infrastructure. Asia-Pacific, China, Japan, and

India are the countries contributing to SOFC market growth owing to the surging awareness of the need to reduce harmful carbon emissions. China has made significant investments in fuel cell technology development. Japan's ENE-FARM residential fuel cell program, which utilizes SOFCs, has been a major catalyst for increased consumer adoption in this region. Similarly, India's Green Hydrogen Energy Ecosystem Roadmap supports R&D and commercialization efforts targeting fuel cell technologies. With increasing research, investment, and global initiatives pushing toward sustainable energy solutions, the adoption of solid oxide fuel cells is growing in various regions.

FPNV Positioning Matrix:

The FPNV Positioning Matrix is essential for assessing the Solid Oxide Fuel Cell Market. It provides a comprehensive evaluation of vendors by examining key metrics within Business Strategy and Product Satisfaction, allowing users to make informed decisions based on their specific needs. This advanced analysis then organizes these vendors into four distinct quadrants, which represent varying levels of success: Forefront (F), Pathfinder (P), Niche (N), or Vital(V).

Market Share Analysis:

The Market Share Analysis offers an insightful look at the current state of vendors in the Solid Oxide Fuel Cell Market. By comparing vendor contributions to overall revenue, customer base, and other key metrics, we can give companies a greater understanding of their performance and what they are up against when competing for market share. The analysis also sheds light on just how competitive any given sector is about accumulation, fragmentation dominance, and amalgamation traits over the base year period studied.

Key Company Profiles:

The report delves into recent significant developments in the Solid Oxide Fuel Cell Market, highlighting leading vendors and their innovative profiles. These include AISIN CORPORATION, Alma Clean Power, AVL group, Ballard Power Systems Inc., Bloom Energy Corporation by Duke Energy corporation, Ceres Power Holdings plc, Convion Ltd., Cummins Inc., Doosan Fuel Cell Co., Ltd., E&KOA Co., Edge Autonomy, Elcogen AS, FuelCell Energy, Inc., h2e Power Systems Pvt. Ltd., KYOCERA Corporation, Mitsubishi Heavy Industries, Ltd., Nexceris, Nissan Motor Co., Ltd., OxEon Energy, LLC., Phillips 66 Company, Precision Combustion, Inc., Robert Bosch GmbH, Rolls-Royce plc, Shell International B.V., Siemens AG, SolydEra SpA, Special Power Sources LLC, Storagenergy Technologies, Inc., Sunfire Fuel Cells GmbH, Upstart Power, Inc., Watt Fuel Cell Corporation, and ZTEK Corporation, Inc..

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Market Segmentation & Coverage:

This research report categorizes the Solid Oxide Fuel Cell Market in order to forecast the revenues and analyze trends in each of following sub-markets:

Based on Type, market is studied across Planar and Tubular. The Planar commanded largest market share of 51.35% in 2022, followed by Tubular.

Based on Fuel Type, market is studied across Biogas, Blended Hydrogen, and Natural Gas. The Natural Gas commanded largest market share of 41.54% in 2022, followed by Biogas.

Based on Power, market is studied across Large-scale SOFCs (above 500kW), Medium-scale SOFCs (10kW to 500kW), and Small-scale SOFCs (1kW to 10kW). The Large-scale SOFCs (above 500kW) commanded largest market share of 40.34% in 2022, followed by Medium-scale SOFCs (10kW to 500kW).

Based on Application, market is studied across Portable, Stationary, and Transport. The Stationary commanded largest market share of 46.65% in 2022, followed by Portable.

Based on End-User, market is studied across Commercial, Industrial, and Residential. The Industrial is further studied across Automotive & Transportation, Data Centers, Hydrogen Generation, and Power Generation. The Industrial commanded largest market share of 46.65% in 2022, followed by Commercial.

Based on Region, market is studied across Americas, Asia-Pacific, and Europe, Middle East & Africa. The Americas is further studied across Argentina, Brazil, Canada, Mexico, and United States. The United States is further studied across California, Florida, Illinois, New York, Ohio, Pennsylvania, and Texas. The Asia-Pacific is further studied across Australia, China, India, Indonesia, Japan, Malaysia, Philippines, Singapore, South Korea, Taiwan, Thailand, and Vietnam. The Europe, Middle East & Africa is further studied across Denmark, Egypt, Finland, France, Germany, Israel, Italy, Netherlands, Nigeria, Norway, Poland, Qatar, Russia, Saudi Arabia, South Africa, Spain, Sweden, Switzerland, Turkey, United Arab Emirates, and United Kingdom. The Americas commanded largest market share of 41.13% in 2022, followed by Europe, Middle East & Africa.

Key Topics Covered:

8. Solid Oxide Fuel Cell Market, by Power
9. Solid Oxide Fuel Cell Market, by Application
10. Solid Oxide Fuel Cell Market, by End-User
11. Americas Solid Oxide Fuel Cell Market
12. Asia-Pacific Solid Oxide Fuel Cell Market
13. Europe, Middle East & Africa Solid Oxide Fuel Cell Market
14. Competitive Landscape
15. Competitive Portfolio
16. Appendix

The report provides insights on the following pointers:
1. Market Penetration: Provides comprehensive information on the market offered by the key players
2. Market Development: Provides in-depth information about lucrative emerging markets and analyzes penetration across mature segments of the markets
3. Market Diversification: Provides detailed information about new product launches, untapped geographies, recent developments, and investments
4. Competitive Assessment & Intelligence: Provides an exhaustive assessment of market shares, strategies, products, certification, regulatory approvals, patent landscape, and manufacturing capabilities of the leading players
5. Product Development & Innovation: Provides intelligent insights on future technologies, R&D activities, and breakthrough product developments

The report answers questions such as:
1. What is the market size and forecast of the Solid Oxide Fuel Cell Market?
2. Which are the products/segments/applications/areas to invest in over the forecast period in the Solid Oxide Fuel Cell Market?
3. What is the competitive strategic window for opportunities in the Solid Oxide Fuel Cell Market?
4. What are the technology trends and regulatory frameworks in the Solid Oxide Fuel Cell Market?
5. What is the market share of the leading vendors in the Solid Oxide Fuel Cell Market?
6. What modes and strategic moves are considered suitable for entering the Solid Oxide Fuel Cell Market?

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