

WinterGreen Research, INC.

**Stationary Fuel Cell Market Shares, Strategies, and Forecasts,
Worldwide, 2011 to 2017**

**Stationary Fuel Cell:
Distributed Power in Campus Locations
Harnessing the Intermittent Renewable Energy from Wind and Solar to
Create End to End Energy Delivery Systems**



Torrie The Cat in the Tulips and Elvis the Big Black Dog Carrying His Sstick

Picture by Susan Eustis

WinterGreen Research, Inc.

Lexington, Massachusetts

www.wintergreenresearch.com

REPORT # SH24641817

469 PAGES

175 TABLES AND FIGURES

2011

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CHECK OUT THESE KEY TOPICS

Stationary Fuel Cell
Forecasts
Stationary Fuel Cell Market
Development
Continued Fuel Cell
Commercialization
Fuel Cell Operation
Fuel Environmental Issues
Power of a Fuel Cell
Hydrogen Fuel Cell
Technology
On Grid And Off Grid Issues
Impact of Deregulation

Fuel Cell Issues
Fuel Cell Reliability
Laws and regulations
Solid Oxide Fuel Cells
(SOFC)
Alkaline Fuel Cells (AFC),
Phosphoric Acid Fuel Cells
(PAFC)
Molten Carbonate Fuel Cells
(MCFC)
PEM Technology
Proton Exchange Membrane
(PEM)

Fuel Cells
PEM Fuel Cells
Platinum Catalysts
Vision For The New Electrical
Grid
Fuel Cell Clean Air Permitting
Increased Power Density
Stationary Power
Applications
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0

Distributed Power in Campus Locations

**Stationary Fuel Cell: Market Shares, Strategies, and Forecasts, Worldwide,
2011-2017**

LEXINGTON, Massachusetts (February 24, 2011) – WinterGreen Research announces that it has a new study on Stationary Fuel Cells. Stationary Fuel Cell markets grow as the technology supports smaller more diverse units. The new study has 469 pages and 175 tables and figures.

These markets are poised to grow based on the creation of new efficiencies available directly to campus environments needing distributed energy that is separate from the grid. New composite materials based on nanotechnology are providing specialized high temperature ceramics catalyst materials to make systems more cost effective are achieving consistent price declines throughout the forecast period.

Distributed generation (DG) refers to power generation at the point of consumption. Generating power on-site, rather than centrally, eliminates the cost, complexity, interdependencies, and inefficiencies associated with transmission and distribution. Like distributed computing (i.e. the PC) and distributed telephony (i.e. the mobile phone), distributed generation shifts control to the consumer.

Distributed energy generation is the core of renewable energy from wind and solar. These intermittent sources of renewable energy are only feasible if there is a reliable way to store the energy for use when the wind is not blowing and when it is dark out. Stationary fuel cells provide that.

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The electricity from the renewable energy can be used to manufacture hydrogen in a campus environment. Future generations of stationary fuel cells including Bloom Energy's energy servers offer the unique capacity to operate as an energy storage device, thus creating a bridge to a 100% renewable energy future.

Bloom Energy is a distributed generation solution that is clean and reliable and affordable all at the same time. Bloom's energy servers can produce clean energy 24 hours per day, 365 days per year, generating more electrons than intermittent solutions, and delivering faster payback and greater environmental benefits for the customer. DG systems require modest installations, sunny and provide consistent 24/7/365 load.

As distributed generation moves to the forefront of corporate consciousness, stationary fuel cells including Bloom Energy Servers are designed to meet the needs of economically and environmentally minded companies.

Renewable energy is intermittent and needs stationary fuel cells to achieve mainstream adoption as a stable power source. Wind and solar power cannot be stored except by using the energy derived from these sources to make hydrogen that can be stored. Most likely the wind and tide energy will be transported as electricity to a location where the hydrogen can be manufactured. It is far easier to transport electricity than to transport hydrogen.

Stationary fuel cell markets need government sponsorship. As government funding shifts from huge military obligations, a sustainable energy becomes to most compelling investment model for government sponsored development. Stationary Fuel Cells are a good technology in need of further investment to make the entire renewable energy spectrum competitive.

FuelCell Energy is positioned to offer ultra-clean and reliable power generation. A fuel cell power plant helps meet the needs of customers efficiently. Systems improve the air quality in a service territory. Fuel cell is an electrochemical device that combines hydrogen fuel and oxygen from the air to produce electricity, heat, and water.

Direct FuelCell (DFC) power plants are designed to efficiently use fuels and provide renewable and ultra-clean baseload power. FuelCell Energy implements molten carbonate fuel cell (MCFC) power plants that depend on electrolyte for large, high-temperature fuel cells. The electrolyte uses a liquid solution of lithium, sodium and/or potassium carbonates, soaked in a matrix material. They operate at 650 degrees C. They are generally large systems with power ranges that extend to 2 mW. Their large size and mass limits the technology to large stationary applications. Fuel Cell Energy uses a nickel catalyst.

FuelCell Energy stationary fuel cells are used in data centers, universities, commercial and institutional facilities. As an environmentally friendly power source, fuel cells are reliable, provide a consistent voltage output, run on various fuels, and produce both electricity and heat. Those advantages have led to stationary fuel cell installations in retail stores, telecommunication facilities, hospitals, and schools.

According to Susan Eustis, primary author of the study, "growth is spurred by the need to store the intermittent energy generated from renewable sources. Electricity generated from wind and solar can be stored as hydrogen and used in stationary fuel systems. Trends toward technology breakthroughs depend on investment in nanotechnology."

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Global demand for stationary fuel cells is projected to increase from \$122.9 million in 2010 to \$2.6 billion in 2017. Growth of stationary fuel cells is a function of the need to harness intermittent energy generated from renewable wind and solar energy sources. By using stationary fuel cells to address issues relating to intermittency an end to end energy system is achieved.

Key Words: stationary fuel cell market shares, Stationary Fuel Cell Market Forecasts, Stationary Fuel Cell Market Development, Market For Continued Fuel Cell Commercialization, Fuel Cell Operation, Fuel Environmental Issues, Power of a fuel cell, Hydrogen fuel cell technology, On grid and off grid issues, Impact of deregulation, Fuel cell issues, Fuel cell reliability, Laws and regulations, Solid oxide fuel cells (sofc), Alkaline fuel cells (afc), Phosphoric Acid Fuel Cells, Phosphoric Acid Fuel Cell (PAFC) Technology, Molten Carbonate Fuel Cells, Solid Oxide Fuel Cells, PEM Technology, Proton Exchange Membrane (PEM) Fuel Cells, PEM Fuel Cells, Platinum Catalysts, Vision For The New Electrical Grid, Fuel Cell Clean Air Permitting, Increased Power Density, Stationary power applications, <http://www.wintergreenresearch.com/reports/fuel%20cell%20stationary.html>

Companies Profiled

Market Leaders

FuelCell Energy
United Technologies
Samsung

Ballard Power Systems
Bloom Energy
IdaTech

Market Participants

Stationary Fuel Cell Company Profiles
Acumentrics
Ansaldo Fuel Cells
Blasch Precision Ceramics
Delphi 5-21
Doosan Corporation

Enbridge
Fuel Cell Technologies
Fuji
GE
HydroGen LLC
IdaTech / Plug Power's
Nuvera

POSCO Power
Samsung Everland
Southern California Edison
Versa Power Systems

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Report Methodology

This is the 464th report in a series of primary market research reports that provide forecasts in communications, telecommunications, the Internet, computer, software, telephone equipment, health equipment, and energy. Automated process and significant growth potential are a priorities in topic selection. The project leaders take direct responsibility for writing and preparing each report. They have significant experience preparing industry studies. Forecasts are based on primary research and proprietary data bases.

The primary research is conducted by talking to customers, distributors and companies. The survey data is not enough to make accurate assessment of market size, so WinterGreen Research looks at the value of shipments and the average price to achieve market assessments. Our track record in achieving accuracy is unsurpassed in the industry. We are known for being able to develop accurate market shares and projections. This is our specialty.

The analyst process is concentrated on getting good market numbers. This process involves looking at the markets from several different perspectives, including vendor shipments. The interview process is an essential aspect as well. We do have a lot of granular analysis of the different shipments by vendor in the study and addenda prepared after the study was published if that is appropriate.

Forecasts reflect analysis of the market trends in the segment and related segments. Unit and dollar shipments are analyzed through consideration of dollar volume of each market participant in the segment. Installed base analysis and unit analysis is based on interviews and an information search. Market share analysis includes conversations with key customers of products, industry segment leaders, marketing directors, distributors, leading market participants, opinion leaders, and companies seeking to develop measurable market share.

Over 200 in depth interviews are conducted for each report with a broad range of key participants and industry leaders in the market segment. We establish accurate market forecasts based on economic and market conditions as a base. Use input/output ratios, flow charts, and other economic methods to quantify data. Use in-house analysts who meet stringent quality standards.

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Interviewing key industry participants, experts and end-users is a central part of the study. Our research includes access to large proprietary databases. Literature search includes analysis of trade publications, government reports, and corporate literature.

Findings and conclusions of this report are based on information gathered from industry sources, including manufacturers, distributors, partners, opinion leaders, and users. Interview data was combined with information gathered through an extensive review of internet and printed sources such as trade publications, trade associations, company literature, and online databases. The projections contained in this report are checked from top down and bottom up analysis to be sure there is congruence from that perspective.

The base year for analysis and projection is 2010. With 2010 and several years prior to that as a baseline, market projections were developed for 2011 through 2017. These projections are based on a combination of a consensus among the opinion leader contacts interviewed combined with understanding of the key market drivers and their impact from a historical and analytical perspective. The analytical methodologies used to generate the market estimates are based on penetration analyses, similar market analyses, and delta calculations to supplement independent and dependent variable analysis. All analyses are displaying selected descriptions of products and services.

This research includes referencde to an ROI model that is part of a series that provides IT systems financial planners access to information that supports analysis of all the numbers that impact management of a product launch or large and complex data center. The methodology used in the models relates to having a sophisticated analytical technique for understanding the impact of workload on processor consumption and cost.

WinterGreen Research has looked at the metrics and independent research to develop assumptions that reflect the actual anticipated usage and cost of systems. Comparative analyses reflect the input of these values into models.

The variables and assumptions provided in the market research study and the ROI models are based on extensive experience in providing research to large enterprise organizations and data centers. The ROI models have lists of servers from different manufacturers, Systems z models from IBM, and labor costs by category around the world. This information has been developed from WinterGreen research proprietary data bases constructed as a result of preparing market research studies that address the software, energy, healthcare, telecommunications, and hardware businesses.

YOU MUST HAVE THIS STUDY

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ABOUT THE COMPANY

WinterGreen Research, research strategy relates to identifying market trends through reading and interviewing opinion leaders. By using analysis of published materials, interview material, private research, detailed research, social network materials, blogs, and electronic analytics, the market size, shares, and trends are identified. Analysis of the published materials and interviews permits WinterGreen Research senior analysts to learn a lot more about markets. Discovering, tracking, and thinking about market trends is a high priority at WinterGreen Research. As with all research, the value proposition for competitive analysis comes from intellectual input.

WinterGreen Research, founded in 1985, provides strategic market assessments in telecommunications, communications equipment, health care, Software, Internet, Energy Generation, Energy Storage, Renewable energy, and advanced computer technology. Industry reports focus on opportunities that expand existing markets or develop major new markets. The reports access new product and service positioning strategies, new and evolving technologies, and technological impact on products, services, and markets. Innovation that drives markets is explored. Market shares are provided. Leading market participants are profiled, and their marketing strategies, acquisitions, and strategic alliances are discussed. The principals of WinterGreen Research have been involved in analysis and forecasting of international business opportunities in telecommunications and advanced computer technology markets for over 30 years.

The studies provide primary analytical insight about the market participants. By publishing material relevant to the positioning of each company, readers can look at the basis for analysis. By providing descriptions of each major participant in the market, the reader is not dependent on analyst assumptions, the information backing the assumptions is provided, permitting readers to examine the basis for the conclusions.

About The Principal Authors

Ellen T. Curtiss, Technical Director, co-founder of WinterGreen Research, conducts strategic and market assessments in technology-based industries. Previously she was a member of the staff of Arthur D. Little, Inc., for 23 years, most recently as Vice President of Arthur D. Little Decision Resources, specializing in strategic planning and market development services. She is a graduate of Boston University and the Program for Management Development at Harvard Graduate School of Business Administration. She is the author of recent studies on worldwide telecommunications markets, the top ten internet equipment companies, the top ten contract manufacturing companies, and the Top Ten Telecommunications market analysis and forecasts.

Susan Eustis, President, co-founder of WinterGreen Research, is a senior analyst. She has done research in communications and computer markets and applications. She holds several patents in microcomputing and parallel processing. She has the original patents in electronic voting machines. She has new patent applications in format varying, multiprocessing, and electronic voting. She is the author of recent studies of the Regional Bell Operating Companies' marketing strategies, Internet equipment, biometrics, a study of Internet Equipment, Worldwide Telecommunications Equipment, Top Ten Telecommunications, Digital Loop Carrier, Web Hosting, Web Services, and Application Integration markets. Ms. Eustis is a graduate of Barnard College.

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