

Fuel Cell Fuel Sources
Market Analysis, Forecasts, and Supplier Strategies
2002 to 2007

Fuel Cell Fuel Sources Market Assessment



Picture by Susie Eustis

MOUNTAINS OF OPPORTUNITY

WinterGreen Research, Inc.
Lexington, Massachusetts

www.wintergreenresearch.com

**Application Integration Markets,
Fuel Cell Functional Characteristics
Energy Security Risks
Fuel Cell Description
Fuel Cell Operation
MARKET STRATEGIES FORECASTS TO 2007**

**Fuel Cell Fuel Sources Markets,
Fuel Cell Campus And Residential Market Analysis
Mass Transit Fuel Cell Market Forecasts
MARKET STRATEGIES FORECASTS TO 2007**

CHECK OUT THESE KEY TOPICS

Total Hydrogen Infrastructure Costs

Fuel Alternatives

Changes In The Electricity Distribution Model

Millennium Cell Hydrogen Generation

Fuel Cells Fuel Sources Market Growth Opportunities

Fuel Cell Dependence On Hydrogen

Costs Of Hydrogen Compressor, Storage Unit, And Dispensers

Fuel Cell Campus And Residential Market Analysis Campus

Stationary Fuel Cell Market Forecasts

Passenger Vehicle Fuel Cell Dollars Per System

Mass Transit Fuel Cell Market Forecasts

Vehicle Fuel Cell Regional Analysis

Analysis Of Methanol To Replace Gasoline And3

The Internal Combustion Engine

CHECK OUT THESE KEY TOPICS

OPPORTUNITY ABOUNDS

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Fuel Cell Fuel Sources Market Analysis, Forecasts, and Supplier Strategies. 2002 to 2007

Natural gas appears to be the fuel of choice for fuel cell hydrogen. Natural gas can be used to make hydrogen. Natural gas is ubiquitous.

Shell Hydrogen appears to have the lead in developing fuel for fuel cells. Other market participants appear to have promising technologies. Shell Hydrogen, Hydro-Québec, and Gesellschaft fur Elektrometallurgie (GfE) have established a joint venture for developing, manufacturing and marketing hydrogen storage products. Gesellschaft fur Elektrometallurgie (GfE) is a German alloy company. The partners are convinced that metal hydrides provide the best means of safely and reliably storing hydrogen.

There is a vast difference between the cost of a refueling station for natural gas conversion to hydrogen and methanol as illustrated hereafter -- \$1.2 million for natural gas versus \$68,000 for methanol in 2005.

However, the natural gas route just takes capital. Once the refueling infrastructure is built, fuel cells will take hold in the market.

The cost of these natural gas refueling depots at \$1.2 million each in 2005 is expected to drop to \$300,000 per station by 2011 (See Figure ES-1).

Companies Profiled

Market Leaders

Altair
Ballard
Ceramic
Dais Analytic
DaimlerChrysler
Duracell
Energizer
Energy Partners Ltd.
Engelhard Corporation
Evonyx's Evictory
Ford
FuelCell Energy
GreenVolt Power
H Power Corp

Hydrovolt Energy

Companies Profiled (Continued)

IdaTech

Impco

International Fuel Cells / United Technologies

Johnson Controls / Optima Batteries

Manhattan Scientifics Inc

Medis Ethanol Fuel Cell

Metallic Power

Millennium Cell

Mitsui

Niagara Mohawk Power Corporation

Nuvera

Plug Power Fuel Cell

PowerTek

Proton Energy Systems

Rayovac

Schatz Energy Research Center

Teledyne

Texaco

Toyota Fuel Cell Cars

Trojan Battery

Ultralife Batteries

Xcellsis

Zevco

Fuel Cell Fuel Sources Market Analysis, Forecasts, and Supplier Strategies 2002-2007

REPORT METHODOLOGY

THIS IS THE HUNDRED AND THIRTY-SECOND REPORT IN A SERIES OF MARKET RESEARCH REPORTS THAT PROVIDE FORECASTS IN COMMUNICATIONS, TELECOMMUNICATIONS, THE INTERNET, COMPUTER, SOFTWARE, AND TELEPHONE EQUIPMENT. 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. 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 PARTICIPATION 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.

YOU MUST HAVE THIS STUDY

Fuel Cell Fuel Sources Market Analysis, Forecasts, and Supplier Strategies 2002-2007

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ABOUT THE COMPANY

WINTERGREEN RESEARCH, FOUNDED IN 1985, PROVIDES STRATEGIC MARKET ASSESSMENTS IN TELECOMMUNICATIONS, COMMUNICATIONS EQUIPMENT, HEALTH CARE, AND ADVANCED COMPUTER TECHNOLOGY. INDUSTRY REPORTS FOCUS ON OPPORTUNITIES THAT WILL EXPAND EXISTING MARKETS OR DEVELOP MAJOR NEW MARKETS. THE REPORTS ASSESS NEW PRODUCT AND SERVICE POSITIONING STRATEGIES, NEW AND EVOLVING TECHNOLOGIES, AND TECHNOLOGICAL IMPACT ON PRODUCTS, SERVICES, AND MARKETS. 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.

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, 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.

