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

WinterGreen Research, Inc.
Lexington, Massachusetts
www.wintergreenresearch.com

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

REPORT # S80310009998 200 PAGES 150 TABLES AND FIGURES 2002 $2,800

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

Table of Contents

REPORT # S80310009998 200 PAGES 150 TABLES AND FIGURES 2002 $2,800

FUEL CELL FUEL SOURCES PRODUCTS

3. HYDROGEN, FUEL, AND INFRASTRUCTURE FOR FUEL CELLS

List of Tables and Figures

FUEL CELL \FUEL SOURCE EXECUTIVE SUMMARY

FUEL CELL FUEL SOURCES MARKET DESCRIPTION

FUEL CELL FUEL SOURCES MARKET FORECASTS

REPORT # S80310009998 200 PAGES 150 TABLES AND FIGURES 2002 $2,800

TROJAN BATTERY TARGET MARKETS

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, MULITPROCESSING, 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.

REPORT # S80310009998 200 PAGES 150 TABLES AND FIGURES 2002 $2,800

WINTERGREEN RESEARCH, INC.

ORDER FORM

Return To: WinterGreen Research, Inc.
6 Raymond Street
Lexington, MA 02421 USA
Phone: (781) 863-5078 --- Fax: (781) 863-1235 or (781) 860-0897

PLEASE ENTER MY ORDER FOR:

Application Integration
Market Opportunities, Strategies, and Forecasts
2002-2007

-ALL REPORTS ARE AVAILABLE IN EITHER PRINT OR PDF-

_____PDF _____PRINT

____ENCLOSED IS MY CHECK FOR $2,800 FOR SINGLE COPY, $3,800 FOR WEB SITE POSTING

____PLEASE BILL MY COMPANY USING P.O. NUMBER_____

____PLEASE CHARGE MY MASTERCARD/VISA/AMERICAN EXPRESS—

CARD NUMBER _____EXP. DATE_____
If charging to a Credit card you may e-mail the order form, but not the card information
Fax or Call with credit card information - Do not send card number as e-mail - You may send the order as e-mail

____ADDITIONAL COPIES, @ $375 (EXTRA COPY PRICE IN EFFECT ONLY WITH INITIAL ORDER)

NAME_____TITLE_____

SIGNATURE_____

COMPANY_____DIVISION_____

ADDRESS_____

CITY_____STATE / ZIP_____

TELEPHONE_____

FAX_____

EMAIL_____

PLEASE NOTE: RESIDENTS OF MASSACHUSETTS AND CONNECTICUT MUST INCLUDE APPROPRIATE SALES TAX
SUBSCRIBERS OUTSIDE THE UNITED STATES MUST PROVIDE PREPAYMENT IN U.S. FUNDS

REPORT # S80310009998 200 PAGES 150 TABLES AND FIGURES 2002 $2,800