Fuel Cell Fuel Sources Market Opportunities, Strategies, and Forecasts, 2007 to 2013

Fuel Cell Fuel Sources

Picture by Susie Eustis

MOUNTAINS OF OPPORTUNITY

WinterGreen Research, Inc.
Lexington, Massachusetts

www.wintergreenresearch.com

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CHECK OUT THESE KEY TOPICS

FUEL CELL MARKET DEVELOPMENT
ALTERNATIVE FUEL SOURCE FOR FUEL CELLS
ECONOMICS OF FUEL COST
Hydrogen Gas, H2, Essential to Power Fuel Cell Engines
Governments Exists to Create Infrastructure
Fuel Cell Transportation Competitive Landscape
FUEL CELL SUPPLY INFRASTRUCTURE
END TO END FUEL SOURCE PARAMETER ANALYSIS
HYDROGEN PRODUCTION
FUEL CELL OPERATIONS
METHANOL FUEL CELLS
FUEL CELL TECHNOLOGY
HYDROGEN POTENTIAL
NATURAL GAS AND HYDROGEN FUEL DELIVERY
BARRIERS TO ALTERNATIVE FUEL USE
STRATEGIC ALLIANCES

OPPORTUNITY ABOUNDS

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A unique and integrated fuel cell power system is aimed directly at low output applications where smaller internal combustion engines (ICE) and batteries are the power source. These include personal transport and fleet type vehicles used in closed range environments (airports, amusement parks, golf courses, malls, delivery circuits).

Renewable energy is the only alternative for making hydrogen. Other sources of energy are more efficiently used directly. Natural gas should be used directly. Electricity is available in off peak hours to make some hydrogen. Otherwise, renewable sources are the most reasonable energy source for manufacturing hydrogen.

Fuel cells for buildings and homes might make good backup generators, but not daily energy sources. Hydrogen can be produced on Earth by water electrolysis. This process may be very efficient (in excess of 80%). There is always a catch. The process uses electricity. It therefore does not make much sense to use electricity to generate hydrogen to generate electricity.

The production of high purity hydrogen can happen via electrolysis for export. Hydro electricity is generally an attractive way to achieve power sources. The achievement of transporting the electricity efficiently over long distances is perhaps a more effective means of using hydropower than of converting the hydro power to manufacturing hydrogen.

The time scale of the market broadening for natural gas in the motor vehicle sector strongly depends on the build-up of a refueling infrastructure. Favorable conditions for alternative energy sources are expected to encourage vehicle production and consumer acceptance.

Over the longer term, the chemistry of fuel cells will be studied and mastered. At that time, renewal sources of energy including wind and solar power will be converted to hydrogen for use in the fuel cells. The high cost of the catalyst platinum is one of several deterrents to rapid implementation hydrogen infrastructure. Natural gas is an interim technology that can be used in local filling stations to manufacture hydrogen should that become economically attractive.

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Renewable energy as a fuel source for hydrogen manufacture is what scientists think is needed. Infrastructure investment at $247 million in 2005 is expected to reach $25.2 billion by 2013. In this manner the global economy can evolve.

Estimated potential for the main alternative fuels by 2020: biomass derived fuels 15%, natural gas 10%, LPG 5% and hydrogen a few per cent.

Companies Profiled

Market Participants

Air Products
Anuvu
Ballard
California Fuel Cell Partnership
DaimlerChrysler
Dynetek
Defense Advanced Reasearch Projects Agency (DARPA)
Ebara
Energy Convrsion Devices
Energy Partners Ltd.
Ford
FuelCell Energy
Fuel Cell Technologies
GE Energy
General Motors
GreenVolt Power
HERA
Hitachi/Tokai
Hydrogenics
Hyundai Motor
Icelandic New Energy
IdaCorp/IdaTech
Impco
Johnson Controls/Optima Batteries
Merubeni
Matsushita
Messer
Millennium Cell
Mitsui
NEC
Niagra Mowhawk Power Corp
Nuvera
Northeast Advanced Vehicle Consortium (NAVC)
Palcan
Northern Power Systems
Polar
Proton Energy Systems
Plug Power
PSA Peugeot Citroen
Polyfuel
Samsung Advanced Institute of Technology
Sanyo
Siemans Westinghouse
Snow Leopard
Teledyne Technologies/Teledyne Energy Systems
Tokyo Gas
Toshiba
TotalFinaElf
Toyota
UTC Fuel Cells
Ultralife Batteries

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REPORT METHODOLOGY

THIS IS THE *TWO-HUNDRED AND FOURTEENTH* REPORT IN A SERIES OF MARKET RESEARCH REPORTS THAT PROVIDE FORECASTS IN COMMUNICATIONS, TELECOMMUNICATIONS, THE INTERNET, COMPUTER, SOFTWARE, TELEPHONE EQUIPMENT, AND ENERGY. 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

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ABOUT THE COMPANY

WINTERGREEN RESEARCH, HAS A UNIQUE RESEARCH STRATEGY THAT RELATES TO IDENTIFYING MARKET TRENDS THROUGH READING AND INTERVIEWING OPINION LEADERS. BY READING THE ELECTRONIC EQUIVALENT OF 40 FEET OF PAPER, WINTERGREEN RESEARCH SENIOR ANALYSTS CAN LEARN A LOT MORE ABOUT MARKETS, A LOT FASTER THAN CAN BE LEARNED THROUGH EXPENSIVE SURVEYS AND FOCUS GROUPS. 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.

IT IS A LUXURY REALLY, AVAILABLE TO ONLY A VERY FEW PEOPLE, TO BE ABLE TO GATHER INFORMATION, LOTS OF INFORMATION FROM READING MASSIVE AMOUNTS OF CONTENT, AND THEN TRYING TO MAKE SENSE OF THAT CONTENT. THE ABILITY TO THINK ABOUT MARKET TRENDS IS ENHANCED BY DOING IT OVER AND OVER FOR MANY DIFFERENT MARKETS. THAT IS WHAT WINTERGREEN RESEARCH IS ALL ABOUT: READING AND THINKING IS AN ESSENTIAL ASPECT OF COMPETITIVE ANALYSIS. TALKING TO OPINION LEADERS IS THE THIRD ESSENTIAL ASPECT OF PRODUCING GOOD, RELIABLE DATA.

WINTERGREEN RESEARCH, FOUNDED IN 1985, PROVIDES STRATEGIC MARKET ASSESSMENTS IN TELECOMMUNICATIONS, COMMUNICATIONS EQUIPMENT, HEALTH CARE, INTERNET AND ADVANCED COMPUTER TECHNOLOGY. INDUSTRY REPORTS FOCUS ON OPPORTUNITIES THAT 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.

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