



Connecticut Center for
Advanced Technology, Inc.

www.chfcc.org



CHFCC Membership Directory

For more information, please contact:

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Connecticut Center for
Advanced Technology, Inc.
222 Pitkin Street, Suite 101
East Hartford, CT 06108
www.ccat.us



Funding Provided by

Connecticut

Department of Economic and
Community Development



The Connecticut Hydrogen-Fuel Cell Coalition

(CHFCC) works to enhance economic growth through the development, manufacture and deployment of fuel cell and hydrogen technologies and associated fueling systems.

The CHFCC is comprised of representatives from Connecticut's fuel cell and hydrogen industry, labor, academia, government, and other stakeholders.



The Connecticut Hydrogen Fuel Cell Coalition Membership Directory includes information on organizations and companies that are members of the Coalition. Please use this directory as a reference tool to identify organizations and companies that can provide specialized services and products related to the hydrogen and fuel cell industry.

The information contained in the Connecticut Hydrogen Fuel Cell Coalition Membership Directory has been carefully prepared from the best available sources of data. Every effort has been made to ensure that content is accurate, complete and current, however, it is the responsibility of each individual to use the data appropriately, for general informational purposes, and not as an exclusive basis for decision-making. The information presented herein is accurate at the time of publication, and may change. The images used herein were provided by the individual companies and organizations.

AG/ENA

Professional Services - www.arrch2alliance.com

American Hydrogen Association

Non-Profit - www.clean-air.org

Bradley, Foster & Sargent, Inc.

Professional Services - www.bfsinvest.com

Center for Clean Energy Engineering

Professional Services - www.energy.uconn.edu

Connecticut Center for Advanced Technology, Inc.

Non-Profit - www.ccat.us

Connecticut Clean Cities

Government Related - www.eere.energy.gov/cleancities

Connecticut Department of Economic & Community Development

Government - www.decd.org

Connecticut Department of Transportation

Government - www.ct.gov/dot

Connecticut Green Bank

Government - www.ctgreenbank.com

Connecticut Siting Council

Government - www.ct.gov/csc

CTTRANSIT

Public Transit - www.cttransit.com

Design By Analysis, Inc.

Technical Services - www.dbaworks.com

Fuel Cell Perspectives

Professional Services

The Greater New Haven Transit District

Government - www.gnhtd.org

GrowJobsCT

Labor - www.growjobsct.org

Hydrogen Safety, LLC

Professional Services - www.hydrogensafety.com

International Association of Machinists & Aerospace Workers

Labor - www.iamdistrict26.org

Pullman & Comley, LLC

Professional Services - www.pullcom.com

Robinson & Cole, LLP

Professional Services - www.rc.com

Southern Connecticut Natural Gas / Connecticut Natural Gas

Utility - www.soconngas.com / www.cngcorp.com

The United Illuminating Company

Utility - www.uinet.com

Wolf Engineering, LLC

Technical Services - www.wolf-engineering.com

Focus

The design and construction of a Prototype Hydrogen Fueling Station / Information Center.

Key Contacts

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Principal

Architect

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goldberg-agen@msn.com

Address / Web Site

701 Laurel Road

New Canaan, CT 06840

www.arrch2alliance.com

Description

The ARRC/H2 Alliance, a multi-company initiative headed by AG|ENA, has created a unique prototype Hydrogen Fueling Station / Information Center to be built in key locations nationwide. The design offers a distinctive recognizable appearance and innovative features to heighten the public's awareness and acceptance of hydrogen as a clean, safe, renewable source of energy.

The Alliance members combine key resources, expertise and experience needed to design, construct and commission a Hydrogen Fueling Station.

AG/ENA is an architectural firm founded in 1947. They served as design consultants to The Mobil Oil Corporation on a continuous basis from 1966 to 1991. AG/ENA was responsible for the design of numerous prototypes and more than 25,000 stations worldwide.



Focus

Non-profit association for the advancement of hydrogen energy.

Key Contacts

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Director/Senior VP

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Address / Web Site

520 Savoy Street

Bridgeport, CT 06606

www.clean-air.org

Description

American Hydrogen Association (AHA) is an organization of independent scientists, engineers, technicians, inventors, and other renewable energy innovators. AHA members create, develop, fabricate, and test proven technologies and equipment that enable or advance a renewable hydrogen based transition from depletable energy resources to renewables. AHA focuses on testing member's inventions and educating the public on issues regarding economic and energy sustainability in this era of declining depletable resources.

The Group has over 30 calendar years and 600 person years of research, development, fabrication and testing of such energy transition equipment; its members hold over 100 issued patents. The group's technology focuses on clean, efficient, production of hydrogen from most all renewable resources to provide the abundance of clean renewable fuel needed to replace oil. On the consumption side, the focus is on transportation, delivery, and highly efficient consumption of renewable hydrogen in fuel cells and internal combustion engines including those in the vehicle and power plant aftermarket where progress can be rapid.



Focus

An investment management firm.

Key Contacts

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Principal

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Main Office

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www.bfsinvest.com

Description

Bradley, Foster & Sargent is an investment advisory firm providing high-quality, customized investment management services to individuals, families and institutions. Located in Hartford, Connecticut, the firm is independently owned and managed by the Principals of the firm.

At a time when many investment managers are focusing their attention on large institutional clients, Bradley, Foster & Sargent retains as a primary objective providing professional, individually-tailored investment services to individuals, families, entrepreneurs, professionals, non-profit organizations, and smaller institutions. We seek to understand the personal goals and unique circumstances of our clients, designing every portfolio – indeed every decision – to meet those specific needs.

Center for Clean Energy Engineering



Focus

Provide world-class education, research and hands-on training of future scientists and engineers to catalyze and enable the transformation of science to systems in developing a global "Sustainable Energy Economy."

Key Contacts

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Director

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Terry Barber-Tournaud

Program Director

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Address / Web Site

University of Connecticut
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<http://www.energy.uconn.edu/>

Description

The Center for Clean Energy Engineering (formally the Connecticut Global Fuel Cell Center) at the University of Connecticut was founded in 2001 with funding from the Connecticut Clean Energy Fund and Connecticut industry partners. Building upon an established foundation the Center for Clean Energy Engineering (C2E2) is uniquely positioned to provide world-class education, breakthrough research and hands-on training of future scientists and engineers to catalyze and enable the transformation of science to systems in developing a global "Sustainable Energy Economy." In collaboration with its partners, the center conducts advanced research and engineering and assists in demonstration activities in the areas of: efficient energy conversion and storage systems, fuels and fuel processing, natural resource conservation, renewable resource utilization, power management and "smart transmission." The C2E2 has singular expertise in the fields of advanced materials development, including materials synthesis and characterization, engineering design and simulation, systems integration and testing. Leveraging core strength and leadership in advanced fuel cell technologies and power generation systems, C2E2 enables students and researchers to address current and emerging global energy and environmental needs.



**Connecticut Center for
Advanced Technology, Inc.**

Focus

CCAT works in partnership with industry, government, and academia to strengthen technology-led economic competitiveness.

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www.ccat.us

Description

CCAT, a nonprofit economic development organization, is a leader in strengthening competitiveness and high-tech business development. CCAT focuses on three core areas: technology, efficiencies and workforce development, with expertise in energy solutions, manufacturing technology, information technology, and education and workforce strategies. CCAT's Energy team focuses on developing regional models for sustainable and reliable energy use, and has expertise in energy solutions including supply chain management, industry representation, "Roadmap" development, strategic planning, technical analysis, and business assistance. The Connecticut Hydrogen Fuel Cell Coalition is administered by CCAT.

Connecticut Clean Cities



Focus

A statewide coalition to decrease petroleum consumption in transportation.

Key Contacts

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Web Sites

U.S. Department of Energy Clean Cities Program:
www.eere.energy.gov/cleancities

Greater New Haven Clean Cities:
www.nhcleancities.org

Capital Clean Cities of Connecticut:
www.ct-ccc.org

Norwich Clean Cities:
www.norwichcleancities.org

Description

The Connecticut Clean Cities (CCC) are designated members of the U.S. Department of Energy's National Clean Cities Program. Nearly 100 coalitions nationwide work together by supporting local decisions to adopt practices and procedures that contribute to the reduction of petroleum consumption. The CCC propel policies and practices such as advancing the use of cleaner domestic fuels, idle-reduction measures, fuel economy improvements, and new transportation technologies as they emerge.

The CCC work with public and private entities to reduce mobile source air pollution, promote energy diversity, and to foster new business and economic development opportunities by increasing the use of domestically produced, cleaner burning alternative fuels, including biodiesel, electricity, ethanol, hydrogen, natural gas, and propane. The CCC are also committed to educating the general public, local and state officials, as well as private businesses about the benefits of alternative fuel vehicles and alternative fuels, supporting the enactment of the Clean Fuel Legislation and tax incentives at federal, state, and local levels.

Connecticut Department of Economic & Community Development



Department of Economic and
Community Development

Focus

State agency which leads the development and implementation of business policy.

Key Contacts

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Community Development Specialist

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Address / Web Site

505 Hudson Street

Hartford, CT 06106-7106

www.decd.org

Description

The Department of Economic and Community Development (DECD) is the state's lead agency for the development and implementation of policies, strategies and programs all of which are designed to: attract and retain business and jobs, revitalize neighborhoods and communities, ensure quality housing and foster appropriate development in Connecticut's towns and cities.

Connecticut Department of Transportation



Focus

Government.

Key Contacts

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Newington, CT 06111

<http://www.ct.gov/dot/>

Description

The mission of the Connecticut Department of Transportation is to provide a safe and efficient intermodal transportation network that improves the quality of life and promotes economic vitality for the State and the region.



Focus

Strengthening Connecticut's economy, protecting community health, improving the environment and promoting a secure energy supply for the state.

Key Contacts

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www.ctgreenbank.com

Description

The Connecticut Green Bank (formerly the Clean Energy Finance and Investment Authority) was established by the Connecticut General Assembly on July 1, 2011 as a part of Public Act 11-80. As the nation's first full-scale green bank, it is leading the clean energy finance movement by leveraging public and private funds to scale-up renewable energy deployment and energy efficiency projects across Connecticut. The Green Bank's success in accelerating private investment in clean energy is helping Connecticut create jobs, increase economic prosperity, promote energy security and address climate change.



Focus

State agency with jurisdiction over the siting of telecommunication and public utility facilities.

Key Contacts

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Address / Web Site

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New Britain, CT 06051*

www.ct.gov/csc

Description

The Connecticut Siting Council is responsible for:

- Balancing the need for adequate and reliable public utility services at reasonable costs with the need to protect the environment and to minimize damage to the state's scenic, historic, and recreational values;
- Providing environmental standards for the location, design, construction, and operation of public utility facilities that are at least as stringent as federal environmental standards and that are sufficient to assure the welfare and protection of the people of Connecticut;
- Encouraging research to develop new and improved methods of generating, storing, and transmitting electricity and fuel and of transmitting and receiving television and telecommunications signals with minimal damage to the environment;
- Promoting the sharing of telecommunications towers in order to avoid their unnecessary proliferation; and
- Requiring annual forecasts of the demand for electricity together with the planning for facilities needed to supply the predicted demand.



Focus

Public Transit.

Key Contacts

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General Information

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www.cttransit.com

Description

CTTRANSIT provides public transit local and express bus services in the greater Hartford, New Haven, and Stamford, Connecticut metro areas. Serving nearly 27 million passengers per year, CTTRANSIT offers an economical, dependable, and environmentally sound way to reach destinations throughout Connecticut.

CTTRANSIT is a Connecticut Department of Transportation (CT DOT) owned bus service that services the state's major metropolitan centers. Via contract providers, they serve a total of eight different metro areas: Hartford, New Haven, Stamford, Waterbury, New Britain and Bristol, Meriden, and Wallingford.

In April of 2007, CTTRANSIT introduced its first hydrogen fuel cell powered bus. In 2010 they increased this number to five buses making it the second largest hydrogen fuel cell bus fleet in the country. These buses are true zero emission vehicles whose only discharge is warm water vapor. The project is a collaborative effort with UTC Power, another Coalition member, located in nearby South Windsor, CT.

Focus

Design By Analysis (DBA) is a full service mechanical engineering consulting business, supporting a myriad of industries including Aerospace, Industrial, and Fuel Cell.

Key Contacts

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President

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www.dbaworks.com

Description

Since 1995, DBA has served over 160 customers worldwide, including the leading companies in the development of fuel cells for stationary and portable power generation applications.

As a partner in the Fuel Cell and Hydrogen Industry, DBA has helped OEMs in all phases of the product cycle, from concept development through to power plant installation, including the support of fuel cell manufacture.

DBA's Fuel Cell experience encompasses a variety of projects, including:

- Design of SOFC, PEM, Molten Carbonate and Direct Methanol Technologies
- Design and Analysis of Cells and Cell Stacks (including miniature stacks for laptops, cell phones)
- Balance of Plant Configuration
- System Optimization
- Layout, Packaging and Component Sizing and Selection
- Component Design (Blowers, Heat Exchangers, Manifolds)
- Layout of MW Size Plant
- Fixtures and Tooling for Manufacture and Installation

In recognition of its strong fuel cell knowledge base, DBA was awarded a NAVY STTR for a Hybrid Propulsion Torpedo using PEM Fuel Technology.



Fuel Cell Perspectives

Focus

Fuel Cell Perspectives works with industry, government and academia to assist them in identifying attractive fuel cell applications and solutions to technical and policy issues.

Key Contacts

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Address

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Portland, CT 06480

Description

Fuel Cell Perspectives is an independent consulting firm specializing in all aspects of fuel cells including: application analysis, stack and gas cleanup design, materials, marketing and sales strategies, and the impact of Public Policy and Utility rate structures on fuel cell market growth. The Principal, John Trocciola, has over 45 years of applicable experience in all fuel cell technologies including, AFC, PAFC, PEM, MCFC and SOFC and has been issued 43 US patents in these fuel cell technologies and their applications.

The Greater New Haven Transit District



Focus

Direct transportation services.

Key Contacts

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Executive Director

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Address / Web Site

840 Sherman Avenue

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www.gnhtd.org

Description

The Greater New Haven Transit District (GNHTD) is a quasi-governmental agency established in 1973 for the purpose of operating and providing a variety of transportation programs and services. It is one of fourteen regional transit districts in Connecticut. The GNHTD provides direct transportation services.

The GNHTD has extensive experience with alternative fuel vehicles for public transportation, including a fuel cell powered paratransit bus. The GNHTD is also developing a hydrogen refueling station in Hamden to accommodate fuel cell electric vehicles.

Some of these programs are mandated by the Americans with Disabilities Act (ADA) and are supported by funding from the US and Connecticut Department of Transportation.

The GNHTD encourages all individuals eligible for ADA certification or for Dial-A-Ride to apply for and use the program to meet their local transportation needs.



Focus

A nonprofit 501(c)3 organization that works to sustain and grow manufacturing, and manufacturing jobs, in Connecticut.

Key Contacts

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Director

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Address / Web Site

*365 New Britain Road
Kensington, CT 06037*

www.growjobsct.org

Description

GrowJobsCT is a coalition encompassing labor, business, the community and elected representatives, whose mission is to build a campaign to help preserve and expand manufacturing in Connecticut, in order to sustain manufacturing employment in our state, both for the current workforce and generations to come.

GrowJobsCT is a unique coalition, bringing together non-traditional allies united by the common goal of seeking ways to ensure the survival of Connecticut manufacturing. The coalition's Advisory Board includes members of Congress, manufacturers, developers, and private and public union representatives. GrowJobsCT focuses particularly on issues of workforce development, "green jobs" initiatives, health care reform, and state and federal policies that can encourage job growth.

GrowJobsCT sees the Connecticut fuel cell industry as a crucial part of the state's future, and advocates for an strong, ongoing private-public partnership to help realize the full potential of fuel cell technologies.



Focus

Minimizing risk exposures in order to facilitate the expanding development and use of existing and new Hydrogen related technologies.

Key Contacts

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Address / Web Site

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www.hydrogensafety.com

Description

Our customers reduce their potential corporate risk exposures thereby overcoming technical and economic barriers to commercializing their Hydrogen based technologies. Hydrogen Safety, LLC (HS) is a fully independent, engineering consultant practice providing risk mitigating strategies for avoiding accidents that result in property damage and substantial business interruptions. Because people are equally at risk, we provide custom and technologically current training offerings that raise the awareness of Hydrogen issues and enable our clients to have the competencies to more effectively address the unexpected. HS serves both the many existing users of Hydrogen and the emerging applications of Hydrogen as process gas and energy carrier.

International Association of Machinists & Aerospace Workers



Focus

IAM District 26 is an AFL-CIO labor union representing workers in diverse occupations throughout Connecticut, Rhode Island and Massachusetts.

Key Contacts

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James Parent

Assistant Directing Business Representative

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Address / Web Site

365 New Britain Road

Kensington, CT 06037

www.iamdistrict26.org

Description

District 26 of the International Association of Machinists and Aerospace Workers (IAM) is an AFL-CIO/CLC labor union which represents more than 10,000 workers in Connecticut, Rhode Island and Massachusetts. IAM District 26 members work at some of Connecticut's largest and most significant workplaces, including UTC Power, Pratt & Whitney, Hamilton Sundstrand, Electric Boat and Stanley Works.

Though primarily based in manufacturing, IAM District 26 is now a diverse organization, representing workers in health care, housing and other public sector employment as well as non-profit and service jobs, including auto and aircraft repair and maintenance. The union accomplishes its mission through organization, education, communications and negotiations.

IAM District 26 works to protect and promote the interests of their members and working people. They believe that whenever possible, finding common ground with other interested parties is a key to social progress.

Focus

Legal counsel for businesses.

Key Contacts

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Main Line

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Address / Web Site

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www.pullcom.com

Description

Pullman & Comley, LLC has played an active and distinguished role in the Connecticut and New England business community since 1919.

The firm is legal counsel to many fast growing businesses and has continued to grow and adapt to meet our clients' changing needs, helping them to address the challenges and opportunities of every economy. We serve major financial institutions, public and private companies of all sizes, health care providers, service businesses, trade associations, manufacturers and emerging growth businesses in the alternative energy and information technology industries, as well as government entities, non-profit organizations and individuals. With offices in Bridgeport, Hartford and Stamford, Connecticut and White Plains, New York, our firm is organized into practice sections that offer clients both depth of experience and the flexibility to team across disciplines for customized, solution-oriented service.



Focus

Our lawyers serve institutional and industrial clients in a full range of legal disciplines from intellectual property and technology, energy and communications, environmental, land use, and real estate development to corporate, mergers and acquisitions, securities, labor and employment, immigration, contracts, tax, and financial services.

Key Contacts

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Address / Web Site

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www.rc.com

Description

Robinson & Cole, with over 260 lawyers and 250 nonlegal professional staff, is a premier law firm celebrating over 160 years of exceptional client service. Our geographic reach meets the regional, national, and global nature of our clients' operations and our accessible partners, client-tailored service plans, and electronic communications strategies, all help us manage legal issues more effectively.

Southern Connecticut Natural Gas / Connecticut Natural Gas



Focus

Natural gas provider.

Key Contacts

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Main Line

Southern CT Natural Gas

800.SOCT.GAS

Main Line

Connecticut Natural Gas

860.727.3000

Address / Web Sites

180 Marsh Hill Road

Orange, CT 06477

www.soconngas.com www.cngcorp.com www.energyeast.com

Description

The Southern Connecticut Gas Company (SCG), an Energy East company, provides natural gas energy to approximately 165,000 customers in 22 Connecticut communities in Fairfield, New Haven and Middlesex counties, primarily along the shores of Long Island Sound.

SCG is a well established company with an excellent track record. They have been in the business for more than 150 years, delivering competitively priced natural gas energy to manufacturers, commercial and industrial customers, and all other natural gas markets.

Connecticut Natural Gas (CNG) is also an Energy East company that provides natural gas for 141,000 customers in 21 municipalities within the Hartford, New Britain and Greenwich areas. Their goal is to provide their customers with a safe, reliable source of energy with exceptional service, at the least cost.

The United Illuminating Company



The United Illuminating Company

Focus

Providing electricity for a portion of Connecticut municipalities.

Key Contacts

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Main Line

United Illuminating

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Customer.service@uinet.com

Address / Web Site

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www.uinet.com

Description

The United Illuminating Company (UI), was formed in 1899 when the Bridgeport Electric Company merged with the New Haven Electric Company. UI is a regional distribution utility providing electricity and energy-related services to more than 320,000 customers in the Greater New Haven and Greater Bridgeport areas.

UI does not generate electricity, but purchases, transmits, distributes and sells it to residential, commercial and industrial customers in a service area of about 335 square miles. This service area includes the principal cities of Bridgeport and New Haven and their surrounding municipalities. The population of this area is approximately 726,000 or 21% of Connecticut's population.

UI has always been dedicated to the communities they serve. That's why they provide more than electricity. They spearhead conservation efforts, encourage economic growth, assist area businesses and fund important charity organizations through established and often one-of-a-kind programs.



Focus

Wolf Engineering helps aerospace and alternative energy businesses to create, evaluate and improve their products. We specialize in flow, temperature and chemical reaction systems and components.

Key Contacts

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Description

At Wolf Engineering, we are technology improvement specialists. We work with you to evaluate your engineering problems and come up with successful, creative solutions. We provide a flexible, cost-effective supplement to your internal R&D team. Our experienced staff specializes in chemical/mechanical systems and components. Our services range from complete project management, to individual engineering tasks within process and system design, prototype design and manufacturing, and testing and evaluation. Our expertise covers heat and mass transfer, thermodynamics, acoustics and vibration, reliability and safety, chemical systems, catalysts, membranes, and fuel cells.

Advent Technologies

Original Equipment Manufacturer - www.advent-energy.com

Dexmet Corporation

Original Equipment Manufacturer - www.dexmet.com

Doosan Fuel Cell America, Inc.

Original Equipment Manufacturer - www.doosanfuelcellamerica.com

Engineered Fibers Technology, LLC

Original Equipment Manufacturer - www.eftfibers.com

FuelCell Energy, Inc.

Original Equipment Manufacturer - www.fuelcellenergy.com

Infinity Fuel Cell and Hydrogen, Inc.

Original Equipment Manufacturer - www.infinityfuel.com

Precision Combustion, Inc.

Original Equipment Manufacturer - www.precision-combustion.com

Proton OnSite

Original Equipment Manufacturer - www.protononsite.com

Sustainable Innovations

Original Equipment Manufacturer - www.sustainableinnov.com

Treadwell Corporation

Original Equipment Manufacturer - www.treadwellcorp.com

US FuelCell - A Division of US Hybrid Corporation

Original Equipment Manufacturer - www.usfuelcell.com



Focus

Advent Technologies is an international technology company that develops new materials and systems for energy applications based on its proprietary technology.

Key Contacts

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Patras Science Park

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Description

Advent Technologies is the leader in the design, development and production of polymers, membranes, and membrane electrode assemblies (MEAs) for high temperature proton exchange membrane (PEM) fuel cells. The high temperature PEM fuel cell allows for co-generation of heat and power, high tolerance to fuel impurities, fuel flexibility, and simpler system design; factors that will help in cost reduction and mass adoption of the fuel cell technology. Advent Technologies' high temperature membrane & MEA are based on a proprietary polymeric material that enhances the mechanical, thermal, chemical and oxidative stability which are critical for high temperature operation. Advent Technologies' products are available under the brand name Advent TPS® and have the distinction of performing at the highest temperature recorded for high temperature PEM MEA to this date worldwide.

Product / Process Info

Product

Membrane Electrode Assemblies. The Advent portfolio of high temperature MEAs includes both our TPS® and PBI based assemblies. The TPS family is known for the highest operating temperature (180 °C to 200 °C) and good acid management. The PBI technology has been licensed from BASF and was formerly known as the P1100W MEA. The PBI platform has the highest acid loading and proven lifetime of approximately 20,000 hrs. Both MEAs operate without additional water and with impure hydrogen containing 1-3% CO.

Product

Components for Membrane Electrode Assemblies. Advent manufactures and markets the TPS membrane, used in high temperature membrane electrodes assemblies. We also make and market gas diffusion electrodes, which are found in a wide variety of applications such as in components for membrane electrode assemblies, sensors, hydrogen generation, and industrial processes.

Product

Conjugated dyes for organic photovoltaic arrays. As an offshoot of the chemistry developed for our TPS membrane, Advent has a series of compounds with outstanding characteristics for use in OPVs.

Product Offering



Status:

Commercially Available



Status:

Commercially Available



Status:

In development - Inquire for samples

Focus

Dexmet Corporation manufactures precision expanded metals, foils and polymers with exacting mechanical and electrical properties to meet very tight conductivity, weight and dimensional tolerances needed in electrochemistry applications. Dexmet's precision expansion process ensures high reproducibility leading to more consistent cell production and lower cost of quality. Dexmet Quality System is ISO 9001:2008 certified

Key Contacts

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Eric Toro

Marketing Specialist
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www.dexmet.com

Description

Dexmet is the premier manufacturer of MicroGrid® and PolyGrid® precision metal foils and polymers. Dexmet specializes in producing Ultra-thin, lightweight expanded materials available in a wide variety of sizes and patterns to meet electrical, strength, and bonding characteristics required in both fuel cell and battery technologies. Our specifically built expanding machines are designed to provide an open area product from .001" (.025 mm) thickness up to .060" (1.5 mm) with opening sizes ranging from .020" (.50 mm) up to .500" (13 mm). Dexmet's expanding process minimizes scrap and yields more material output than any other method of producing an open area product. This makes it more efficient and more cost effective than perforated foils, woven, and chemically etched materials when working with expensive materials like Niobium, Zirconium, Titanium, Silver and Nickels. Dexmet can also provide value added processing which include die cutting, solid intersperse, selvedge edge, annealing, specialty coating. We have also developed a new corrugation process which provides a 3-D effect to the material. This process creates more surface area, increased strength, and increased overall thickness from thin raw material stock. This feature is great for anode or cathode materials, flow field, or support for gas diffusion layers.

Product / Process Info

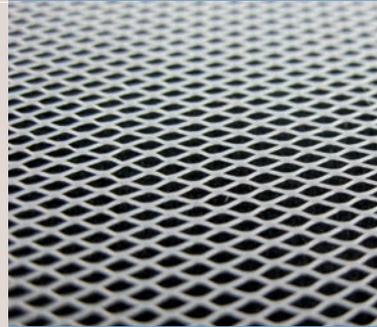
Product

Expanded Metals - MicroGrid® precision expanded foils from Dexmet are used in fuel cells, batteries, ultra-capacitors and other electrochemical applications where an open area mesh, with high precision, mechanical and electrical properties are required. The expansion process can be conducted on most ductile metals, including Titanium, Nickel, Niobium, Stainless Steels, or we can work with your proprietary materials. Typical applications for this material are anode substrates, cathode collectors, flow fields, or as a support for a gas diffusion layer. Our corrugated products can be utilized in these areas to increase surface area, strength, thickness to provide better multi-directional flow.

Product

Expanded Plastics - PolyGrid® precision expanded polymers from Dexmet are used in applications requiring a polymer support layer with an open area. Other uses encompass the renewable energy market, or where a polymer mesh with high precision openings, mechanical strength, or physical compatibility is required. Expanded polymers are used as an alternative to a woven or extruded product where overall thickness and uniformity is critical when combining it with a membrane layer. Dexmet PolyGrid® is available in most polymers or we can work with proprietary materials. Dexmet produces the expanded polymers in a Class 10,000 Clean Room to ensure cleanliness.

Product Offering



Doosan Fuel Cell America, Inc.



Focus

Fuel cells, systems and applications - stationary

Key Contacts

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Description

Doosan Fuel Cell America, Inc. is a new fuel cell company founded on the strength of the people and technology developed at United Technologies over the past fifty years. In July 2014, Doosan Corporation acquired the assets of ClearEdge Power (formerly UTC Power). Doosan Fuel Cell America, Inc. is a global leader in providing clean, continuous-duty, cost-competitive stationary fuel cell energy systems. Our PureCell® systems operate 24/7 with high efficiency and ultra-low emissions, allowing our customers to generate their own electricity and heat onsite while reducing their utility expenses and environmental emissions. With over 11 million fleet operating hours, PureCell® systems have demonstrated unparalleled durability and reliability.

Doosan Fuel Cell America, Inc. is a subsidiary of Doosan Corporation, a global leader in infrastructure support and power generation equipment with annual revenues exceeding \$21 billion. Doosan Group companies include Bobcat Company (construction equipment), Doosan Skoda Power (steam turbines), and Doosan Babcock (engineering and services). Doosan employs over 3000 people in the United States, and 43,000 people in 38 countries worldwide.

Product / Process Info

PureCell Model 400 System

The highly efficient PureCell Model 400 system generates 400 kW of assured electrical power, plus 1.7 million Btu/hour of heat, for combined heat and power (CHP) applications.

Typical market sectors include supermarkets, hospitals, data centers, industrial, bottling plants, pharmaceutical, educational institutions, prisons, mixed-use office/residential, food-processing facilities, and other energy-intensive facilities with continuous baseload power and thermal energy requirements.

The Model 400 system generates a significant amount of thermal energy in the form of "high" and "low" grade heat. The high-grade heat of the Model 400 can be used to drive a single-effect absorption chiller to produce an average of about 50 tons of chilled water. The heat from multiple fuel cells can be combined to drive larger absorbers. While high-grade heat is being used to create chilled water, low-grade heat can simultaneously be used to provide useful heat, allowing for combined cooling, heat and power applications for buildings.

The Model 400 also offers customers tremendous energy density and location flexibility. It can be installed outdoors or indoors, from basements to rooftops and requires a fraction of the area and volume required by equivalent solar/wind systems.

Product Offering



Engineered Fibers Technology, LLC



Focus

High technology fibers, materials and services.

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Description

Engineered Fibers Technology develops and manufactures Spectracarb™ porous graphite gas diffusion (GDL) papers and panels with high conductivity in a wide range of densities, thicknesses and porosities to customer specific specifications. GDL thicknesses range from 0.1 mm to over 4 mm, and densities can be controlled between 0.25 and 0.9 g/cm³. Spectracarb GDL products are widely used in PEM, PAFC, and other fuel cells, electrolyzers, humidifiers, electrochemical processing and other electrochemical devices.

EFT manufactures the widest range of GDL materials available in the market, and specializes in the custom production of unique customer specific materials, custom production, and engineering services related to GDL development.

EFT is also a leading source of precision cut short cut technical fibers, fibrillated fibers and EFTec™ Nanofibrillated Fibers and services for wet-laid high performance papers and engineered materials applications.

Product / Process Info

Product

Short-Tec™ – Wide range of EFT short-cut fibers available for technical applications in addition to specialized contract cutting of customer fibers. An infinite range of short-cut fiber lengths from 0.25 mm to 75 mm, and staple lengths to several inches. EFT / customer defined to meet specific requirements. Cutting capabilities from laboratory samples on the order of grams to full truckload production orders. Complete laboratory, processing and applications engineering support provided.

Product Offering

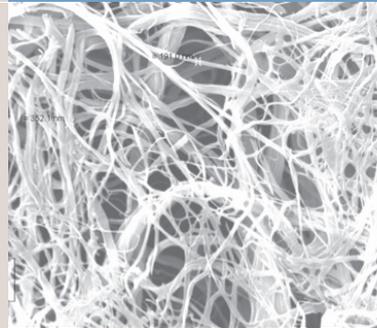


Status:

Commercially available

Product

EFTec™ – Available in a range of standard grades, either as a wet lap (about 20% solids) or as an aqueous slurry (<5% solids). Three types of precursor material are available, and all types can be produced with different fiber lengths and different degrees of fibrillation. All grades are being produced on a commercial scale and can be delivered in truck-load / container load quantities, as well as smaller development / production quantities.

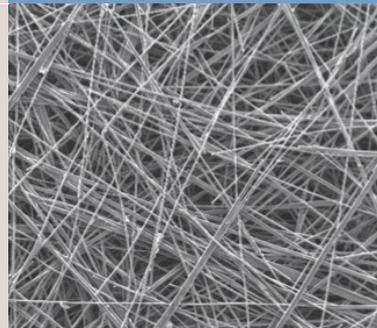


Status:

Commercially available

Product

Spectracarb™ – In production for over twenty years and are widely used in government, academic and industry PEM and PAFC fuel cells, electrolyzers and other electrochemical devices, from developmental to full commercial scales. Spectracarb™ GDL papers and panels consist of graphitized resin bonded carbon fibers that form porous sheets, with high electrical / thermal conductivity and chemical / corrosion resistance that control the proper flow of reactant gases (hydrogen and air) and the water transport in the membrane electrode assembly (MEA).



Status:

Commercially available



Focus

FuelCell Energy, Inc. (NASDAQ: FCEL) is a global leader in the design, manufacture, operation and service of ultra-clean, efficient and reliable fuel cell power plants

Key Contacts

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www.fuelcellenergy.com

Description

FuelCell Energy, Inc. (NASDAQ: FCEL) is a global leader in the design, manufacture, operation and service of ultra-clean, efficient and reliable fuel cell power plants. FuelCell's Direct FuelCell® power plants are generating ultra-clean, efficient and reliable power at more than 50 locations worldwide. With approximately 300 megawatts of power generation capacity installed or in backlog, FuelCell Energy is a global leader in providing ultra-clean baseload distributed generation to utilities, industrial operations, universities, municipal water treatment facilities, government installations and other customers around the world. The Company's power plants have generated more than one billion kilowatt hours of ultra-clean power using a variety of fuels including renewable biogas from wastewater treatment and food processing, as well as clean natural gas. For more information please visit our website at www.fuelcellenergy.com

See us on YouTube at - <http://www.youtube.com/user/FuelCellEnergyInc>

Product / Process Info

Product

DFC[®]300 (300 Kilowatt) – Compact, ultra-clean and efficient, 24/7 power plant for commercial and industrial applications. Certified to meet CARB 2007 standards for emissions. FCE has

CT-manufactured DFC300 systems manufactured in Connecticut deployed globally with partners such as MTU, Marubeni, Enbridge, Chevron and POSCO Power.

Product Offering



Status:

Commercially available

Product

DFC[®]1500 (1.4 Megawatt) – Modular power plant for distributed generation and Combined Heat and Power with electrical efficiency of 47%. The DFC1500 is the first Megawatt class fuel cell power plant in the world, combining the basic Direct FuelCell (DFC) technology into a platform for an array of product applications.



Status:

Commercially available

Product

DFC[®]3000 (2.8 Megawatt) – Expanded version of the MW class product and operates on a variety of fuels. The DFC3000 is the building block for FCE's multi-megawatt power plants, allowing utility-scale systems 10 MW and larger.



Status:

Commercially available

Infinity Fuel Cell and Hydrogen, Inc.



Focus

Fuel cell systems for demanding aerospace, defense and commercial applications.

Key Contacts

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Description

Infinity Fuel Cell and Hydrogen, Inc. has focused on the development of air independent fuel cells and high pressure electrolyzers since 2002. Over the past decade we've developed air independent fuel cell systems for NASA's manned and unmanned mission objectives as well as for the Navy's future unmanned underwater vehicles. These air independent systems are also in demand for high altitude unmanned aircraft and airship applications.

Complementing our Power At Any Altitude® paradigm will be the introduction of ultra lightweight fuel cell systems for low altitude unmanned aircraft, including small drones. This lightweight, high power density approach can also be utilized in powering high intensity non-traditional weapons systems.

With an entrepreneurial focus and decades of Fortune 500 experience behind us, the Infinity team is actively engaged in developing power and energy systems for 21st century applications.

Product / Process Info

Air Independent Fuel Cell

Infinity's patented Advanced Product Water Removal (APWR) technology combined with a non flow-through design provides a fuel cell power system for use in many demanding applications requiring air independent power generation. The design passively removes water without traditional gas recirculation and complicated centrifugal separators typically required to manage entrained water in space, high altitude flight or deep underwater. This results in a compact package that eliminates much of the parasitic balance of plant hardware and rotating parts that contribute to higher cost and lower reliability.

Product Offering



Status:
Prototype

High Pressure Electrolysis

The generation of hydrogen at 150 bar (2,175 psi) from an electrolysis stack allows for the removal of one to two stages of compression when filling compressed gas tanks. This can be critical to increasing reliability and reducing cost. Infinity has developed and field tested high pressure storage systems for the US military.



Status:
Field Prototype

Regenerative Fuel Cell System

Infinity has built and fielded regenerative fuel cell / electrolyzer systems for the US military. When combined with a renewable energy source, such as solar, the complete system is capable of high pressure hydrogen generation and multi kilowatt power output. Systems have also been developed for space and high altitude applications as well.



Status:
Field Prototype



Focus

Develops and manufactures catalyst-based clean energy products and systems, including ultra-compact high efficiency fuel processors and components for fuel cells, engines and distributed hydrogen production.

Key Contacts

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Description

Precision Combustion, Inc. (PCI) develops and manufactures catalytic devices for clean energy applications. In the hydrogen sector, PCI is a world leader in the development and production of fuel processors and components as well as clean and efficient burners. The company's fuel-flexible Microlith® fuel processor systems are uniquely compact and highly efficient in converting conventional liquid and gaseous fuels to hydrogen-rich reformate for fuel cells, engines, burners and hydrogen production. Customers include leading manufacturers of fuel cell systems, chemicals, gas turbines, aerospace systems, engines and the U.S. Government.

We put the fuel in fuel cells®.

Product / Process Info

Product

Microlith® Fuel Processors – We put the fuel in fuel cells® - Allow fuel cells to use conventional fuels, independent of a H2 infrastructure. PCI CPOX, ATR and SR-based reformers are ultra-compact, with rapid startup and transient response, and are demonstrated with a wide variety of fuels. Efficiency is near-equilibrium with very low C1+ slip, and sulfur tolerance is high (to 3,000 ppm for our ATR), with post-reformer S removal to <1 ppm. Prototypes have been shipped from 3 kWt to MW scale. We work with multiple system manufacturers. PCI is also developing fuel processors for distributed hydrogen generation and engine injection.

Product

Auxiliary Fuel Cell Components – PCI develops and manufactures several innovative auxiliary components and systems for fuel cell applications. These include anode gas burners, water gas shift reactors, selective CO preferential oxidation reactors (PROX) and desulfurizers. PCI also develops balance of plant components for its integrated fuel processors which include COTS pumps, blowers, heat exchangers, steam generators, condensers, injectors, igniters and proprietary software controls.

Product

Fuel Reformer Test Cart Services – PCI provides fuel reformer test cart services to fuel cell stack, separation membrane and automotive manufactures for testing fuel cell stacks, hydrogen separation membranes, engines and NOx trap regeneration among other applications. The packaged system include the appropriate reformer, controls, facilities connections and computer controlled interface for production of hydrogen-containing syngas on demand.

Product Offering



Status:

Customized to optimize performance for a customer's fuel cell system



Status:

Tested with fuel cell stacks



Status:

Prototypes for evaluation available



Focus

Proton OnSite is a global leader in hydrogen energy and innovative gas solutions.

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Description

Since 1996, we have been developing and applying hydrogen technology in creative and practical ways that best meets the diverse requirements of our customers. Our advanced proton exchange membrane (PEM) electrolysis systems coupled with our uncompromising attention to excellence and quality enables us to deliver, install and support hydrogen generation units on every continent.

More recently, we have expanded our product offerings to include hydrogen control systems, nitrogen generators and air generators. We have also expanded our services to include packaged solutions incorporating tanks, compressors and other ancillary equipment. These products and services now allow us to serve a broader commercial set of markets including power plants, semiconductor manufacturers and laboratories.

Proton OnSite is a trusted supplier to the U.S. military, aerospace, fueling and renewable energy industries because at Proton, we understand that the current energy market demands leadership, expertise and innovation. We are at the forefront of the clean energy industry, committed to developing superior electrochemical system solutions that provide the most value to our partners throughout the globe.

Product / Process Info

Product

HOKEN H Series – Hydrogen generation systems for medium hydrogen supply requirements. The H-Series will effectively replace tube trailer deliveries with on-demand hydrogen production in a compact footprint. Offers a modular system approach in outputs of 2 Nm³/hr to 6 Nm³/hr.

Product

HOKEN S Series – Hydrogen generation systems for smaller industrial and laboratory hydrogen supply requirements. The S-Series will effectively replace 6 pack cylinder deliveries for both batch and continuous process demands. Offers a simple air-coded system design in outputs of 0.5 Nm³/hr to 1.0 Nm³/hr.

Product

HOKEN C Series – Hydrogen generation systems for larger industrial and vehicle fueling applications. The C-Series will effectively replace bulk and liquid deliveries with on-demand hydrogen production in a compact footprint. Offers high efficiency 30 bar hydrogen production in outputs of 10 to 30 Nm³/hr.

Product

HOKEN M Series – The M Series is an innovative, ground-breaking product that can be integrated with renewable sources of generation, convert surplus electricity to produce hydrogen, and store that hydrogen as energy for future use. The M Series can be packaged into a 40 foot ISO container, and can accept one and two megawatts (MWs) of power to produce between 400 and 800 kilograms of hydrogen per day.

Product Offering



Status:

Commercially available



Status:

Commercially available



Status:

Commercially available



Status:

Commercially available

Sustainable Innovations



Focus

Developer of Fueling and Energy Storage Products.

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Description

Sustainable Innovations was founded in 2007 to focus on the development of novel technologies that are critical to meeting the needs for long-term human sustainability. The team brings a solid background in the development of clean hydrogen energy systems, carbon dioxide and atmospheric management and energy storage technologies to address human vitality needs. Its goal is to form partnerships with research teams and product-focused companies to foster the development and transition of key technologies from the laboratory to the marketplace.

Sustainable Innovations is currently developing highly efficient, large-scale hydrogen/halogen energy storage products to augment renewable and utility-based power systems. The company is also developing novel technologies for hydrogen processing/compression for both industrial and transportation markets.

Product / Process Info

Product

H2RENEW™ is an advanced electrochemical hydrogen separator and compressor (EHS&C) that can purify low quality hydrogen from process waste and other sources and compress it to high pressures for convenient, compact storage. This is done using Sustainable Innovations' proprietary electrochemical cell architecture that can be constructed in modular form to address a variety of required capacities.

Product

HALO-GEN™ is a low cost, highly efficient, and scalable energy storage technology that can be flexibly configured to provide multiple energy storage and electric grid support benefits. HALO-GEN™ technology's high efficiency (>80%) and low cost is based on reversible hydrogen/ bromine chemistry.

Product

CO2RENEW™ produces hydrocarbon fuels and commodity chemicals from waste carbon dioxide electrochemically. Our process generates alcohols and organic acids, on-site, from waste carbon dioxide, at one-half of the cost of conventional means. Sustainable Innovations' carbon-neutral system will derive carbon dioxide from waste gas and create high value products using electricity from renewables.

Product Offering



Status:

In development



Status:

In development



Status:

In development



Focus

Oxygen and hydrogen generation.

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Description

Treadwell applies innovative thinking, visionary design capabilities and highest quality manufacturing to custom designed and manufactured electro-chemical systems, including hydrogen and oxygen generators. Treadwell also offers precision oxygen cleaning services for your military or aerospace applications.

Product / Process Info

Product

Treadwell has recently developed a line of proton exchange membrane (PEM) based water electrolyzers capable of producing both hydrogen and oxygen gas.

Proton Exchange Membrane Hydrogen Generator -
This 6 KW system produces hydrogen at a rate of 20 SLPM (standard liters per minute).

Product

Medium Pressure Hydrogen Generator -
This 90 KW system is capable of producing 180 SLPM of hydrogen at 1100 psi.

Product Offering



Status:

Commercially available



Status:

Commercially available

Focus

US FuelCell is the premier supplier of integrated fuel cell powerplants, "Hydrogen APU™", for medium- and heavy-duty commercial vehicles, including the most robust powerplant in transit bus operation.

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US Hybrid Corporation
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Description

US FuelCell is a subsidiary of US Hybrid. It was established in 2013, after US Hybrid's purchase of the United Technologies' UTC Power PEM Fuel Cell Transportation division along with the UTC global PEM IP license to commercialize the PEM Fuel Cell technology for commercial vehicles. US FuelCell continues to operate in the same facility and is focused on manufacturing PEM fuel cell power plants with integrated control and power conversion for medium and heavy-duty fuel cell commercial buses and trucks.

The unique feature of the US Fuel Cell power plant is that it not only includes the balance of plant, but also offers an integrated DC-DC power converter, allowing the power plant to function as an Hydrogen Engine "H2APU™". We are adding our proven advanced electronics and system know-how to the H2APU™, making it easier for end-user commercial deployment with lower total capital and life cycle cost. US FuelCell's PureMotion™ PEM fuel cell product line is the global leader in life-hours durability, achieving more than 18,000 hours of operation and zero stack failure in transit bus applications.

US FuelCell is at the forefront of the clean energy industry, committed to developing more efficient and cleaner energy solutions for transportation that provide the most value to our transportation industry partners globally.

Product / Process Info

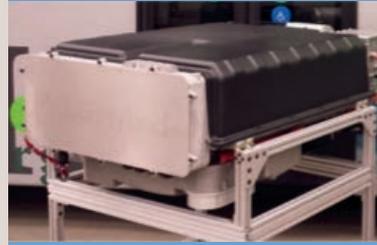
Product

PureMotion™ 150 Fuel Cell APU - The 150kW system has been designed for fuel cell hybrid medium-and heavy-duty commercial vehicles applications. The robust and fast transient capabilities make this APU ideal for transit, articulated buses, street cars, light rail, drayage trucks, and off-road applications. The industry leading durability of over 12,000 hours ensures years of clean service.

Product

PureMotion™ 80 Fuel Cell APU - The 80kW Auxiliary Power Unit is our most robust fuel cell with fast transient power capabilities providing a fully integrated freeze capable system with a rapid startup design and industry leading power density specifically designed for medium-and heavy-duty goods movement, transit bus, utility applications, refrigerated & cargo trucks, and off-road applications.

Product Offering



Power	150 kW
Efficiency†	59%
Fuel Type	SAE J2719 Hydrogen
Cooling (WEG)	125 kW max
Inlet Temperature	59 to 72°C
Dimensions	1465 x 890 x 506 mm
Weight	474 kg



Power	80 kW
Efficiency†	56%
Fuel Type	SAE J2719 Hydrogen
Cooling (WEG)	95 kW max
Inlet Temperature	55 to 57°C
Dimensions	875 x 879 x 614 mm
Weight	248 kg

