Dave Underwood
08-3-5

plug power

Comments on Amendments to the California Zero Emission Vehicle Regulation

To: California Environmental Protection Agency
Air Resources Board
1001 I Street, 2nd Floor
Byron Sher Auditorium
Sacramento, California 95814

From: David Underwood
Plug Power Inc.
(509) 443-3931

Thursday March 27, 2008
9:00 am
Agenda Item #08-3-5

Good morning, Chairman Nichols and Members of the Governing Board, I represent Plug Power Inc. and am testifying as part of the Board's deliberations on the rulemaking to consider amendments to the fuel cell component of the Zero Emission Vehicle (ZEV) regulation. Plug Power is a leader in the development of energy systems utilizing fuel cells for stationary power applications, emergency backup power and materials handling lift trucks. Plug Power has long espoused the values of sustainability and is commercializing fuel cell systems that contribute to our country's energy independence. We wanted to point out to you that there is another way to achieve critical mass of fuel cells in addition to on-road hydrogen vehicles.

PEM fuel cells are proving to be attractive to replace traditional solutions, such as batteries and diesel generators. Fuel cell products for extended run backup power and materials handling are commercially available today (right now) and provide an environmentally friendly way to increase fuel cell volumes in California and comply with the pending FCC ruling on backup power requirements for the telecom industry. California has long taken a leadership role in adopting new energy technologies and building the hydrogen economy. We come here today to suggest to the Board that stationary fuel cells for emergency backup power is a short-term step in building the hydrogen infrastructure and using commercially available fuel cells across California *now*.

To make the point, Plug Power has learned that there are approximately 30,000 cell phone towers operating in California today—a number of them have backup power provided by an oversized diesel generator that is restricted by operational permit limits by local air quality districts. Your Board has spoken many times in the recent past on the important priority you place on controlling diesel emissions and in promoting fuel cells---the Governor himself has set forth goals on building the hydrogen highway. It is our believe that our company and others in the industry could replace over 10,000 diesel generators used in the state's telecom industry with clean fuel cell backup power units. Our request to the Board is to look to us to assist in the effort in the short term, which would give the automakers and others (working with us) the time to develop on-road fuel cells that can help meet clean air and GHG goals. Some have suggested that the Board consider an incentive program or a rulemaking to prohibit locating dirty, backup diesel

generators in favor of clean power generating sources like our fuel cells. The Board would request it of the industry and an action like this would immediately move thousands of fuel cells into the marketplace right away. Thank you.

BACKGROUND INFORMATION

Stationary Fuel Cell Benefits

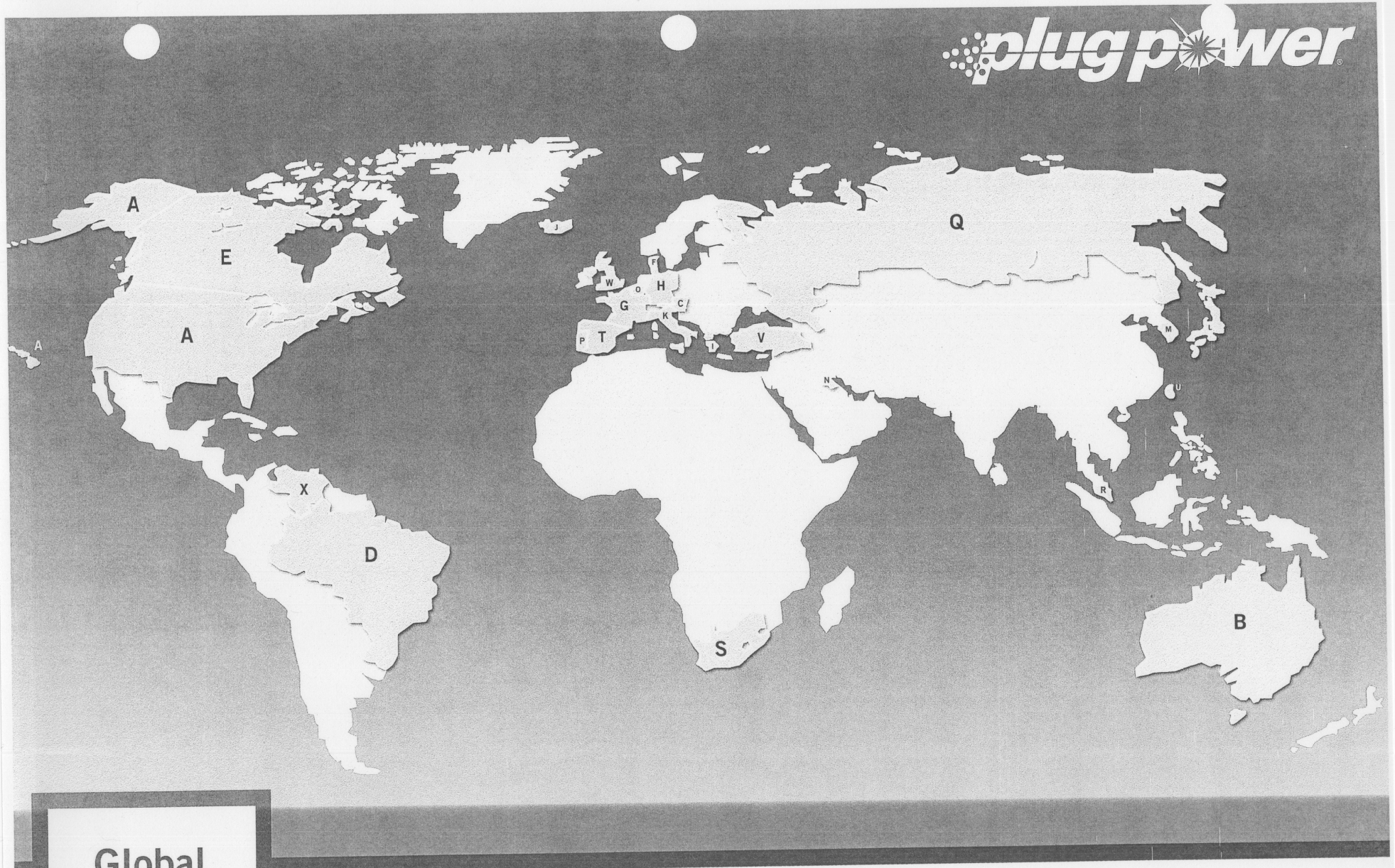
- Recent FCC ruling mandates eight hours of backup power for cell sites, remote switches and digital loop carrier system remote terminals that are normally powered from local AC commercial power.
- Network reliability requirements are increasing due to increased competition and new services, causing a correlated increase in power consumption and network reliability requirements. Overlay work requires the ability to add incremental power, while weak infrastructures warrant extended runtimes (24-48 hours)
- There are fuel cells being used today at sites across the State of California. Carriers are aware of the pending regulations, looking to extend their backup power capability and evaluating diesel generators, lead-acid batteries and fuel cells as potential options.
- The FCC ruling may result in the proliferation of diesel generators for backup power at cell sites in California. There are approximately 27,000 cell sites in California. Based on our experience with telecommunications companies, we estimate 10,800 of these sites are using diesel generators. Over five years, this equates to significant emissions equivalent to over 1,600 automobiles. The use of fuel cells avoids these emissions.
- In backup applications, fuel cells can provide power for critical infrastructure such as communication systems and water utilities.
- Fuel cell systems are designed to stringent standards developed by the telecommunications industry that qualify equipment under extreme environmental conditions and requires specific levels of technological resiliency including temperature extremes, wind-driven rain, altitude, earthquake and ballistics tolerance.
- When fueled by hydrogen from a renewable energy source such as solar, wind, or hydropower, or if the fuel source is bio-fuel like ethanol from plant wastes, CO2 emissions are net zero.
- Fuel cells can provide highly reliable electricity. Some studies estimate that power quality and reliability issues cost our economy alone as much as $150 billion per year in lost materials and productivity, while others have reported estimates as high as $400 billion per year.

Motive Power Fuel Cell Benefits

- Fuel cells used in materials handling applications make a compelling economic case in many markets. Companies such as Wal-Mart, Nissan, Bridgestone and Ace Hardware (in California) are using fuel cells and hydrogen refueling in distribution center and warehouses today and seeing positive value generated by labor savings, productivity improvements (3.5%), and reduced maintenance. They are also being used in military supply logistics.
- Collectively, the North American market opportunity to supply hydrogen to distribution centers is multi-billion dollars. 17,850 Class 1 and 34,340 Class 3 lift trucks in California provide cost effective, controlled industrial settings for distributed hydrogen refueling

capability. Individual warehouses represent the opportunity to build a commercial scale hydrogen infrastructure with consistent high utilization and predictable adoption.

- Refueling of fuel cells requires less than one minute, greatly decreasing vehicle and operator downtime. Fueling stations can be located strategically around a factory or warehouse and eliminate the need for a battery room and free up additional commercial space. Labor costs associated with changing batteries are eliminated and there is less wear on equipment caused by battery droop.
- Safe, clean and efficient technology eliminates emissions and toxic chemicals. Fuel cells produce zero harmful emissions during operation, and unlike batteries, do not create lead or sulfuric acid waste.
- Fuel cell units fit into the existing equipment space occupied by batteries, eliminating the need for retrofits and making it a cost-effective and easy solution for customers to adopt.



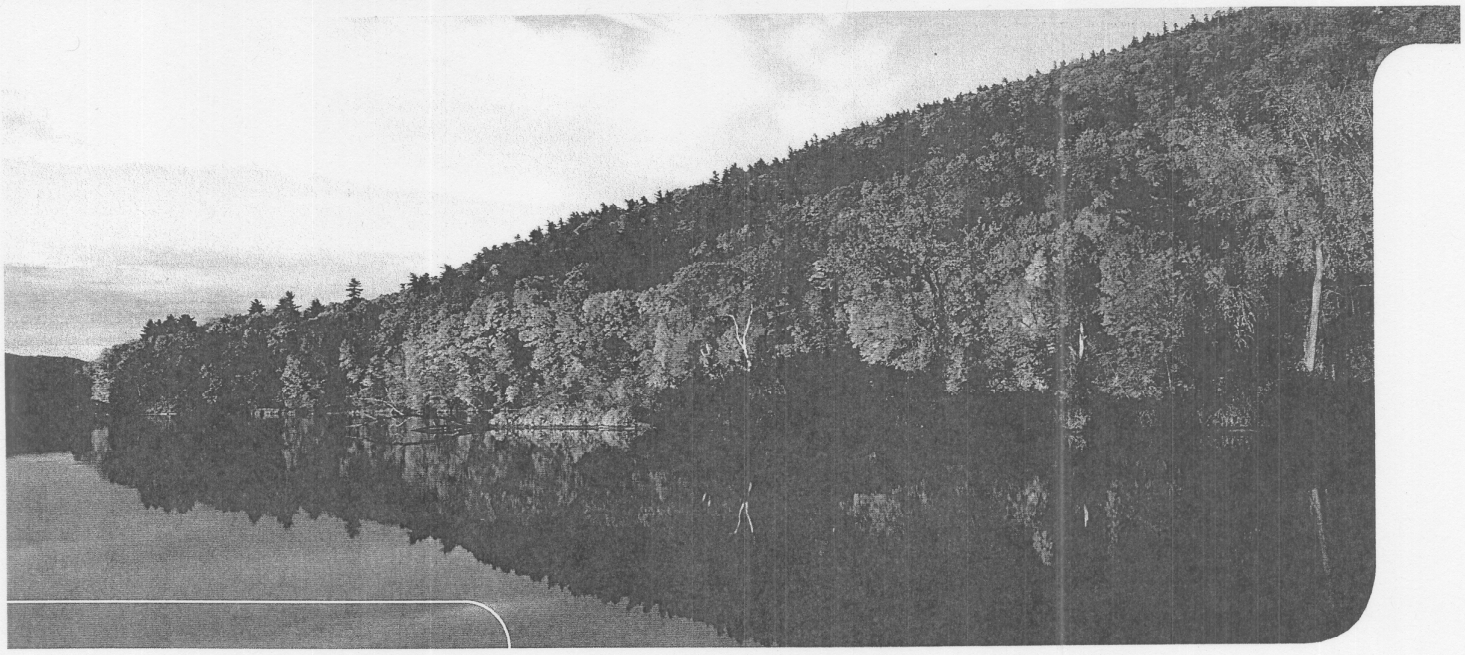
Global Customer Installations

United States *(A)*

Alabama, Arizona, California, Colorado, Connecticut, Delaware, Florida, Georgia, Hawaii, Illinois, Kansas, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Montana, New Jersey, New Mexico, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Texas, Virginia, Washington D.C.

International Countries

Australia *(B)*, Austria *(C)*, Brazil *(D)*, Canada *(E)*, Denmark *(F)*, France *(G)*, Germany *(H)*, Greece *(I)*, Iceland *(J)*, Italy *(K)*, Japan *(L)*, Korea *(M)*, Kuwait *(N)*, Luxembourg *(O)*, Portugal *(P)*, Russia *(Q)*, Singapore *(R)*, South Africa *(S)*, Spain *(T)*, Taiwan *(U)*, Turkey *(V)*, United Kingdom *(W)*, Venezuela *(X)*



>> Transforming the Energy Landscape

Plug Power Inc. (NASDAQ: PLUG) develops, manufactures, delivers and services a proprietary line of fuel cell solutions, which **provide clean, reliable on-site energy** for customers throughout the world. Since its inception in 1997, Plug Power has focused extensively on the commercialization of fuel cells using Proton Exchange Membrane (PEM) and related fuel processing and system management technologies. Operating at relatively low temperatures (60–160°C) with high power density, PEM fuel cells can vary their output quickly to meet shifts in power demand and are well suited for applications requiring quick startup.

>> The Road to Market Adoption

Having installed more than 650 fuel cell systems throughout the world, Plug Power is an established leader in the emerging hydrogen fuel cell industry. Currently focused on turnkey, backup power solutions for telecommunications, broadband, utility and uninterruptible power supply applications, Plug Power has made significant headway into the USD 1.9 billion global backup power market. Its flagship product, GenCore®, provides a compelling value proposition for telecommunications providers seeking lower life-cycle costs and increased reliability from a clean energy source.

In 2006, Plug Power received USD 217 million in cash proceeds from an investment by Smart Hydrogen, a partnership created to participate in the global hydrogen economy. A clear validation of Plug Power's leadership position, the resources are being used to broaden and accelerate the company's business strategy.

In March and April 2007, Plug Power acquired Cellex Power Products, Inc. and General Hydrogen Corporation, respectively, both leaders in the development and commercialization of motive power fuel cell solutions for electric lift trucks. Used primarily in indoor material handling operations such as large-scale distribution centers and warehouse operations, where zero emissions is required, hydrogen fuel cells replace the industrial lead acid batteries currently used to power electric lift truck fleets. By acquiring both Cellex Power and General Hydrogen, Plug Power can offer fuel cell power units for all three classes of electric lift trucks and serve the entire fleet requirements of its customers. Through these acquisitions, Plug Power diversified its commercially viable fuel cell portfolio with entry into the USD 1.5 billion motive power market.

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>> Leveraging the Power of Partnerships

As part of its sales and marketing strategy, **Plug Power has built a powerful network of relationships with well-established companies,** creating enhanced capabilities for distribution, marketing and supply chain management. For example, the National Innovation Company New Energy Projects, a collaborative effort between Norilsk Nickel *(the world's largest producer of nickel and palladium)* and the Russian Academy of Sciences, is currently working with Plug Power to explore technology and market development activities in Russia.

Led by a dedicated and experienced channel management team, Plug Power has forged key relationships with national and international strategic channel partners. By extending its global reach through a growing number of value added resellers, Plug Power continues to reach key worldwide customers in targeted geographic areas and market segments.

Plug Power has also cultivated important partnerships to help expand the Company's technology portfolio and accelerate its product development. Recent partnership initiatives include the following:

- **Home Energy Station IV** — Honda R&D Co., Ltd. of Japan and Plug Power executed contracts for joint development of a fourth-generation Home Energy Station (HES IV), a project which will include advanced research and development. Slated for installation in the summer of 2007, it replaces the HES III which provided hydrogen-refueling services to fuel cell vehicles operating in Southern California from November 2005 through December 2006.
- **Solid Oxide Fuel Cells** — In 2006, Plug Power formed a collaborative relationship with NexTech Materials, Ltd. to develop solid oxide fuel cell power systems. The two companies plan to complete a number of joint activities including market research, fuel cell stack development and testing, system design and prototype construction.
- **High-Temperature PEM** — In an unprecedented transatlantic alliance funded by the U.S. Department of Energy and the European Union, Plug Power has partnered with Vaillant GmbH, PEMEAS, Domel Elektromotorji, the Bulgarian Academy of Sciences, Gaia Group and the Imperial College of London to develop and demonstrate three high-temperature combined heat and power PEM fuel cell systems.

[In total, Plug Power currently holds 154 U.S. patents and 10 foreign patents with 186 patents pending worldwide.]

>> Establishing Global Reach

Headquartered in Latham, NY, with offices in Washington, D.C, Apeldoorn, The Netherlands and most recently Richmond, British Columbia, the Company employs about 370 people. The Latham facility includes executive, sales and administrative offices as well as research laboratories and a 50,000 square foot manufacturing facility with dedicated production and production test facilities based on lean manufacturing principles. Additional research, sales and customer support activities are carried out in Apeldoorn and Richmond. With customers in 22 countries on five continents, Plug Power maintains a sales presence in Latin America, Russia, South Africa and India.

>> Delivering Global Promise

Plug Power is driven by the triple bottom line — **People, Planet and Profit**. Leading the way towards the development of the hydrogen economy, Plug Power is a company built by passionate individuals who share a common goal to help transform the energy industry in ways that will positively impact the economy, society and the environment. The Company's development of sustainable processes and products will help ensure the preservation of natural resources. Future generations will view Plug Power as a steward of the energy transformation — changing the way energy is harnessed, distributed and used.

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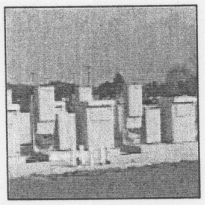
U.S. GSA QUALIFIED VENDOR

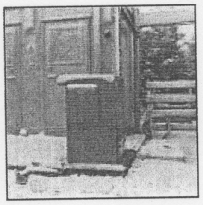
DESCRIPTION

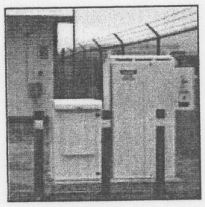
Plug Power's GenCore® 5-kilowatt backup power fuel cell system has been approved by the U.S. General Services Administration (GSA) for listing on the Federal Supply Schedule. Federal agencies may purchase GenCore® fuel cell systems to provide backup power in a variety of AC and DC applications, along with related accessories, maintenance, support and other related incidental services, directly from the Federal Supply Service Schedule.

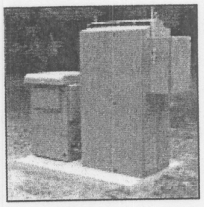
GENCORE® FUEL CELL SYSTEMS

GenCore® fuel cell systems are rugged, reliable, low-maintenance systems that provide power quietly, predictably, and with zero emissions. Designed to interface with critical power quality devices and supply backup power until primary power is restored, they deliver clean, reliable backup power without the need for additional switching or skipping gear.









Unlike batteries and generator sets, which can be unpredictable and maintenance-dependent, GenCore® systems offer field-proven reliable operation and a three-year maintenance cycle—in addition to a ten-year lifespan. To date, over 120 GenCore® systems have been installed in telecommunications, cable broadband, utility and UPS applications.

DETAILED CONTRACT INFORMATION

Commodity Description:	Power Distribution Equipment, Generators and Batteries
Group Number:	61
Contract Number:	GS-07F-5680R
Use of Contracts:	Nationwide, all federal agencies and political subdivisions
Product Offerings:	• GenCore® 5T system (-48v and +24v) • GenCore® 5B system (+48v) • GenCore® 5U120 system (120v) • Technician Training (other items also available)

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FUEL CELL SYSTEMS

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GenCore® Systems

IN TODAY'S 24/7 WORLD, BACKUP POWER KEEPS YOUR CUSTOMERS CONNECTED.

Increase system reliability. Maximize network availability. Decrease operating costs.

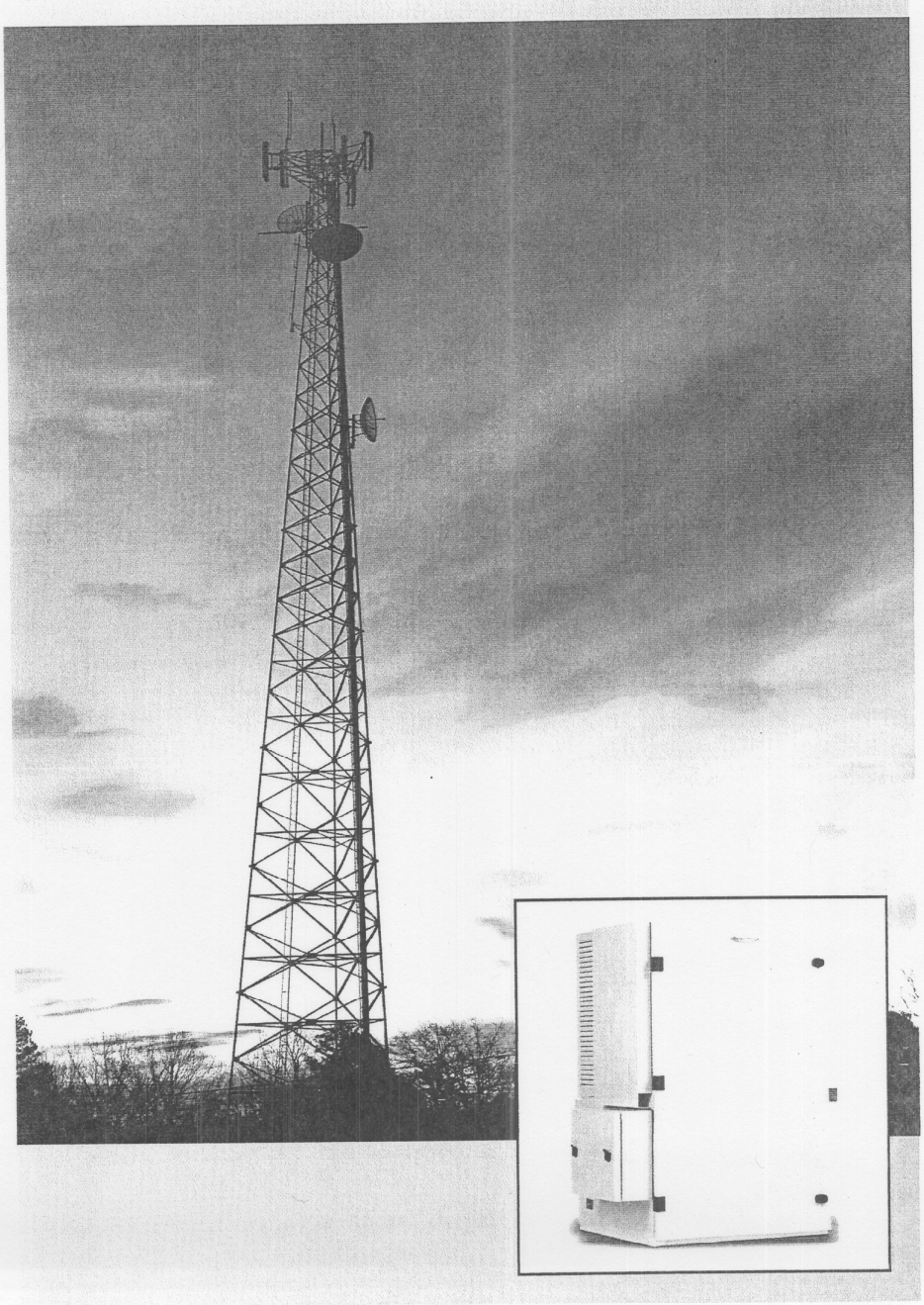
Plug Power's GenCore® hydrogen fuel cell systems provide clean, quiet and energy efficient solutions for the critical backup power needs of wireless and wireline providers. Our flexible, platform-based product architecture delivers backup power and runtimes that are scalable to your specific needs.

Unlike traditional technologies, which can be unpredictable and maintenance dependent, GenCore systems deliver the reliable backup power you need over a wide range of harsh outside plant operating environments — with reduced operating costs and zero emissions.

Clean. Quiet. Predictable. GenCore.

Put the power of the future to work for you — today.

E-mail us at gencore@plugpower.com or visit www.plugpower.com to learn more.

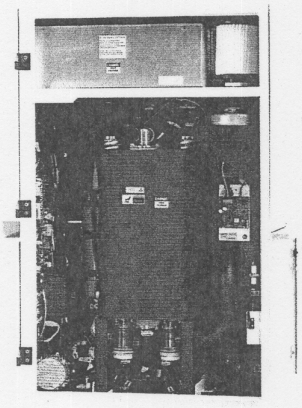


Clean, Quiet, Reliable Backup Power.

Features and Benefits

Fuel Cell Technology – A new option in extended runtime backup power to replace or enhance battery or engine generator systems.

Electrical Energy Storage Module (EESM) – Provides transient bridging power to ensure immediate response to power interruptions.



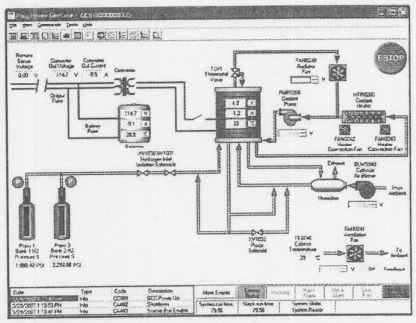
GenCore cabinet with access door removed, showing the fuel cell stack.

Fuel Storage System – Available in a variety of forms, hydrogen fuel storage is scalable to meet specific site and provider needs.

Thermal Management System – Extreme temperature tolerant design allows for operation from -40°C to +50°C.

Remote Monitoring/Control – Ensures system availability.

Reliable Product, Reliable Company – Offers standard two-year product warranty, extensive network of installation & service partners, product training, and service hotline.



Graphical Service Interface (SI) software allows local or remote monitoring & control of GenCore system.

Product Enhancements – GenCore options/upgrades are available on special request, please contact factory:

- Ultracapacitor-based EESM for high-temperature applications which can limit battery life
- Wireless communications for remote monitoring/control
- Extended runtime Hydrogen Storage Module (HSM) for backup applications of 72 hours or longer
- Reduced footprint HSM for applications at space-restricted sites

GenCore

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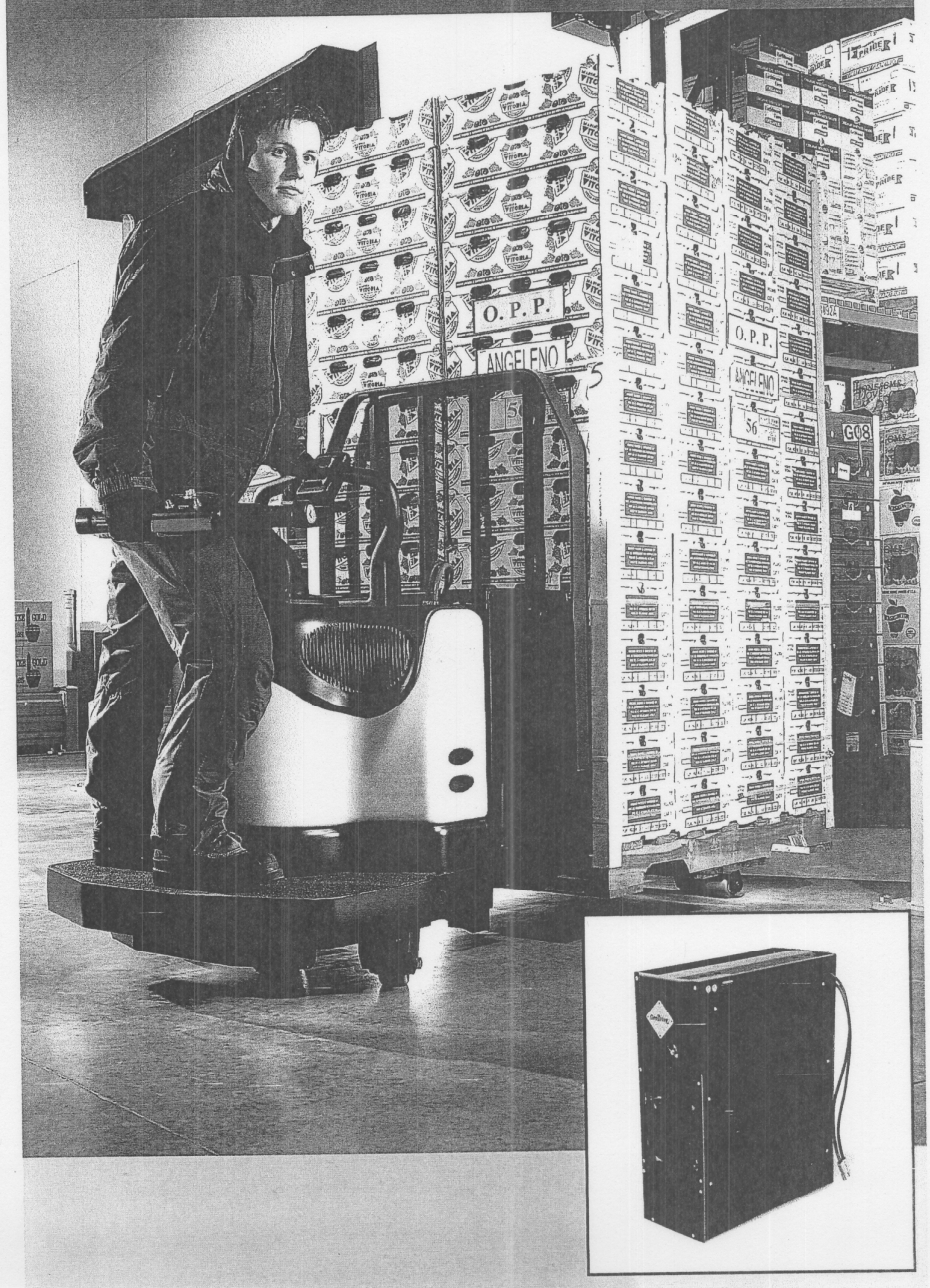
PRODUCT CHARACTERISTICS		5T48	5T24
Output	Maximum Output Power	5kW	
	Output Voltage Range, User Adjustable	-48.0 to -55.5 Vdc	+24.9 to +27.5 Vdc
	Output Current Limit	115 Amps DC	240 Amps DC
	Maximum Output Ripple	250mV Pk to Pk, 100mV RMS	
	Typical Runtime with Std 6 Cylinder Hydrogen Storage Module (HSM)	27 Hours @ 2kW Output Power 11 Hours @ 5kW Output Power	
Input	Gaseous Hydrogen	99.95% Purity, Dry, CGA G-5.3 Industrial Grade B	
	Supply Pressure	64 to 110 psig (4.4 to 7.6 bar)	
	Fuel Consumption	1.2 scfm (34 slm) or ~3 hrs/cylinder at 3kW output power 2.2 scfm (63 slm) or ~2 hrs/cylinder at 5kW output power	
Environmental	Ambient Temperature	-40°F to +122°F (-40°C to +50°C) Full Rated Output Power at up to +25C Output Power Derated to 4.92kW @ +35°C, 4.85kW @ +45°C & 4.55kW @ +50°C	
	Relative Humidity	5% to 95% non-condensing	
	Altitude	-197 ft to 13,150 ft (-60m to 4000m) >1500 ft (457m) Output Power is Derated 75W per 1000 ft (305m)	
Physical	Maximum Envelope Dimensions, not including fuel storage	46 inches Height x 36 inches Width x 32 inches Depth (117cm H x 91cm W x 81cm D)	
	Weight	608 lbs (276 kg)	
Safety	Compliance	FCC Class A, CSA (ANSI FC-1), CE and NEBS Level 3	
Emissions	Water	Nominal: 0.53 gph (2.0 lph) Max: 1.1 gph (4.2 lph)	
	CO, CO_2, SO_x, NO_x	Negligible	
	Audible Noise	< 60 dBA @ 1m	
Sensors	Gas Hazard Detection	Included	
	Pad Shear, Water Intrusion, Tampering	Optional	
Control	Microprocessor	Included	
& Monitoring	Programmable Start Voltage Range	-48.0V to -55.0Vdc	+24.9V to +27.0Vdc
	Programmable Start Delay	50 seconds maximum	
	Communications	RS-232C & USB Included, Modem & Ethernet/IP Optional	
	Software	Graphical Service Interface provides status, event log & control of unit via laptop PC (not included)	
Alarms	4 Form C Dry Contacts	"Low Fuel", "Minor Alarm", "Major Alarm" & "Fuel Cell Running" all Included	

GenDrive™

FUEL CELL PRODUCTS TO POWER PALLET TRUCKS



HYDROGEN FUEL CELL SOLUTIONS FOR MATERIAL HANDLING OPERATIONS.

Designed specifically for the demanding requirements of high-throughput warehousing, distribution and manufacturing operations, GenDrive™ fuel cell solutions combine full-shift duty with high speed performance to maximize the effectiveness of your operation.

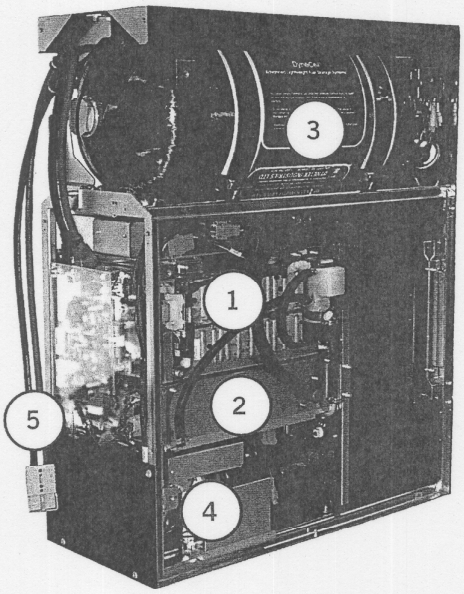
Powerful Benefits

- **Increased Productivity**
  Higher throughput per shift
- **Lower Operational Costs**
  Eliminate battery change out
- **Additional Commercial Space**
  Battery rooms eliminated
- **Zero Emissions**
  Safe, clean and efficient power sources
- **Transparent Transition**
  Fits seamlessly into the battery compartment

Recharge Your Workforce, Not Your Batteries.

E-mail us at gendrive@plugpower.com or visit www.plugpower.com to learn more.

Clean, Constant, Full-Shift Motive Power



GenDrive™

1. **Fuel Cell Hybrid System:** Our proven combination of fuel cell stack and advanced batteries balances the need for rapid acceleration with operational efficiency, while generating zero emissions.
2. **DC/DC Converter:** Unique proprietary design provides a seamless transition between power supplied by the fuel cell and the advanced batteries, creating an optimal balance in electrical performance at constant voltage.
3. **Hydrogen Storage System:** Holds enough fuel to sustain a pallet truck for an entire shift at full speed. The units deliver maximum output and can be fueled in as little as 60 seconds, substantially reducing vehicle and personnel downtime.
4. **Systems Controller:** Intelligently monitors diagnostics, stack and system performance to optimize output, support effective planned maintenance and reduce total cost of ownership.
5. **Unit Size and Electrical Connector:** Designed to fit seamlessly into the existing battery compartment and equipped with the SB 175 industry standard pallet truck connector, GenDrive is a drop-in replacement for lead-acid batteries.

GenDrive™

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PRODUCT CHARACTERISTICS	GD-3M24
Power Output	
Nominal Voltage	27 Vdc
Operating Voltage Limits	18-31 Vdc
Output Current: Continuous[1]	78 A
Output Current: 5 Second Burst	400 A
Peak Output Current: <1 second	1125 A
Hydrogen Storage	0.8 kg
Equivalent Nominal Ahr Rating	550 Ahrs
Power Input	
Regenerative Current Input (Maximum)	500 A
Mechanical and Electrical Interfaces	
Dimensions	13"x31"x38.5"
Weight	590 lbs
Electrical Connector	SB 175
Storage and Operating Conditions	
Ambient Temperature Range	32°F - 104°F

[1] at 85°F Ambient

Specifications subject to change without notice.

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