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Fuel Cell Experience & Opportunities

- U.S. Postal Service -

Ray Levinson

October 27th 2008

USPS Facility Energy Data – FY 07

- **~34,000 Buildings**
- **~313,000,000 sq. ft.**
- **27,938 BBTUs per year**
- **89,270 BTUs/sq. ft.**
- **6.0 million MWH, 6.3 million therms**
- **$560,000,000 Annual Energy Cost**

Pacific Area: About 10% of above, except for energy cost ($80 million, or about 14%)

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Fuel Cell Opportunities

- **Stationary Building Base Load**
  - **CHP: Hot Water**
- **Vehicles**
- **Powered Industrial Trucks (P.I.T.)**

  These include tow motors, fork trucks, tractors, platform lift trucks, motorized hand trucks, and other specialized industrial trucks powered by electric motors or internal combustion engines.

Fuel Cell Installation -Team

Chevron: Jim Kleiser, Sr. Engr (415) 733-4589

–jkleiser@chevron.com

Subcontractors

- **ACCO Engineered Systems – energy management system**
- **Atlas/Pellizzari Electric Inc. – electrical systems**
- **Bay City Boiler & Engineering Co. – mechanical systems**
- **Critchfield Mechanical Inc. – mechanical systems**
- **FuelCell Energy – fuel cell manufacturer**

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Fuel Cell Installation Issues - Site

- Site was “Bay Mud” filled in land
- Drive 6 pilings 65 ft. to bedrock
- “Displacement Vehicle” laying on soil
- FC weight: 90,000 lbs.
- “GeoFoam” Used for Hwy on-ramps
- Bricks of Styrofoam
- Poured 130,000 lbs. concrete; 10” in ground, 2” above ground
- Achieved “Neutral Buoyancy”

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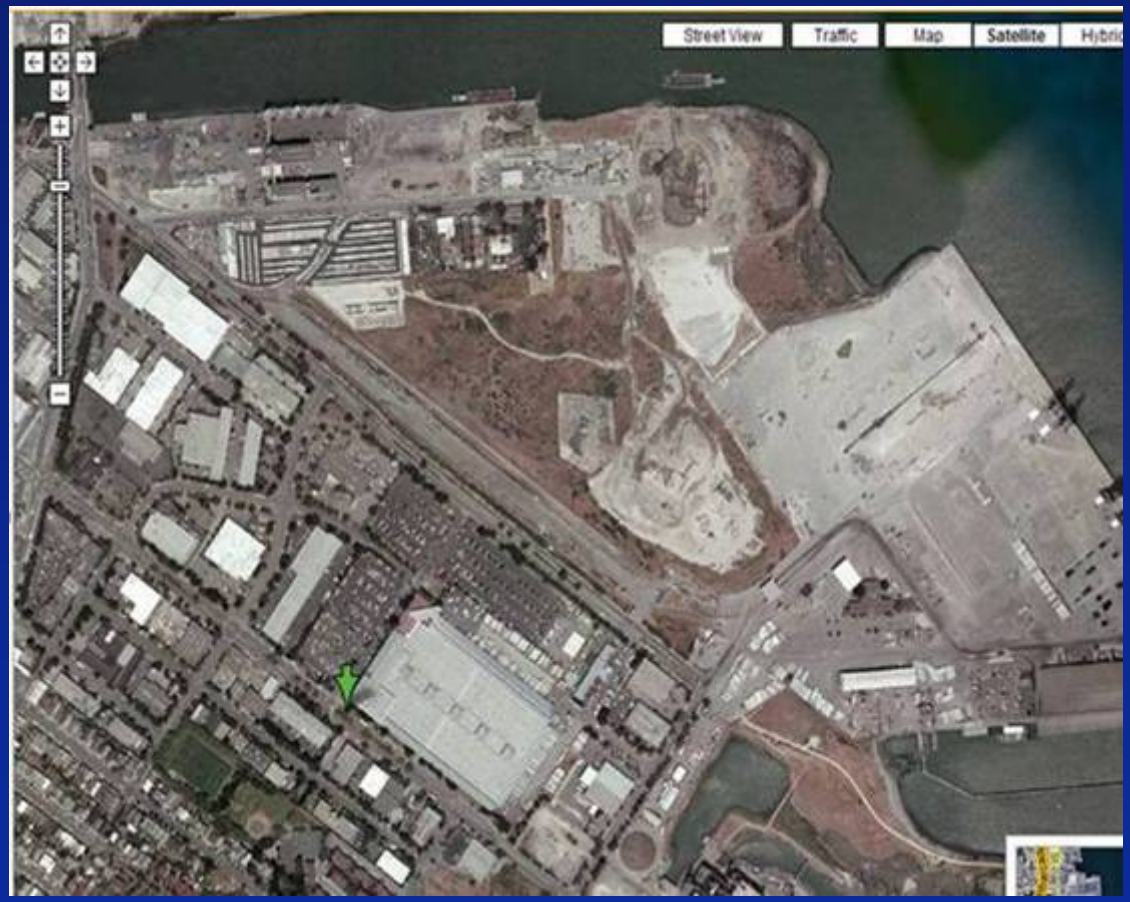
SF P&DC Site



Fuel Cell Installation Issues – Gas Supply

- 15 PSI desired
- 5 PSI available, did not want compressor on site
- PG&E ran 50 PSI to site
- Used Gas Pressure Reducing Valve
- Tapped in ahead of Valves
- Did not want different meters for service readers
- Used a tricky gas reduction w/dual pressure system
- 3rd party gas ccontract (Tiger Gas Co.)

Cogen Opportunity

- Use waste heat for hot water supply

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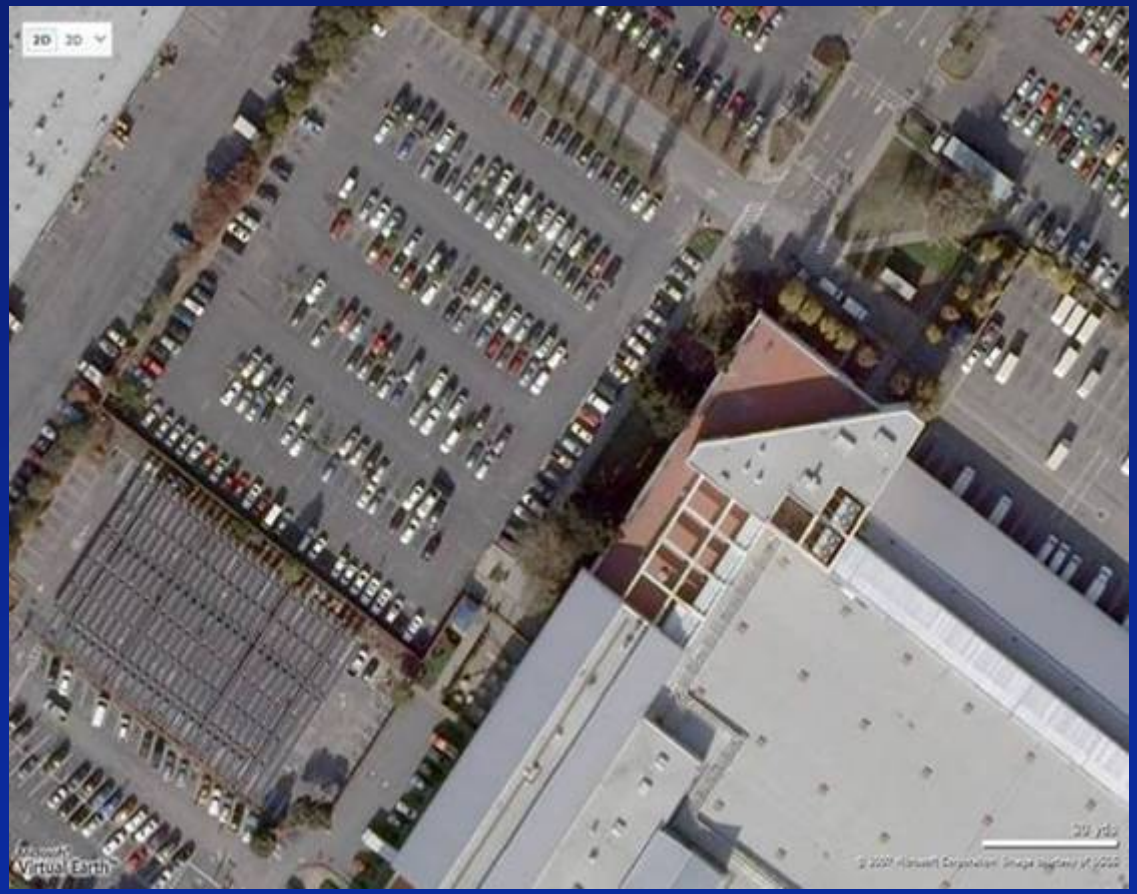
Before



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After

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Installation

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Don’t drop it!

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Fuel Cell Landed!

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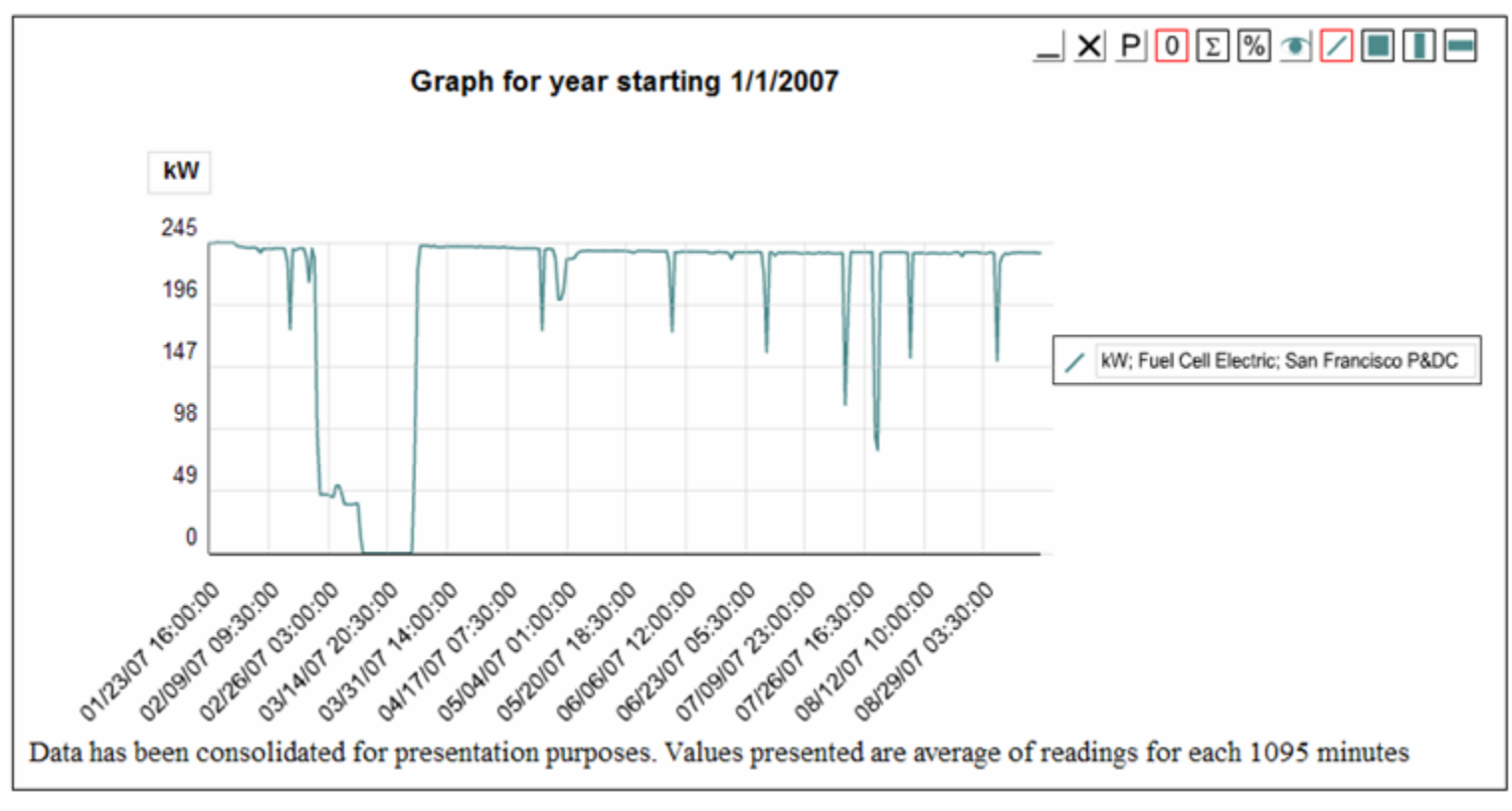
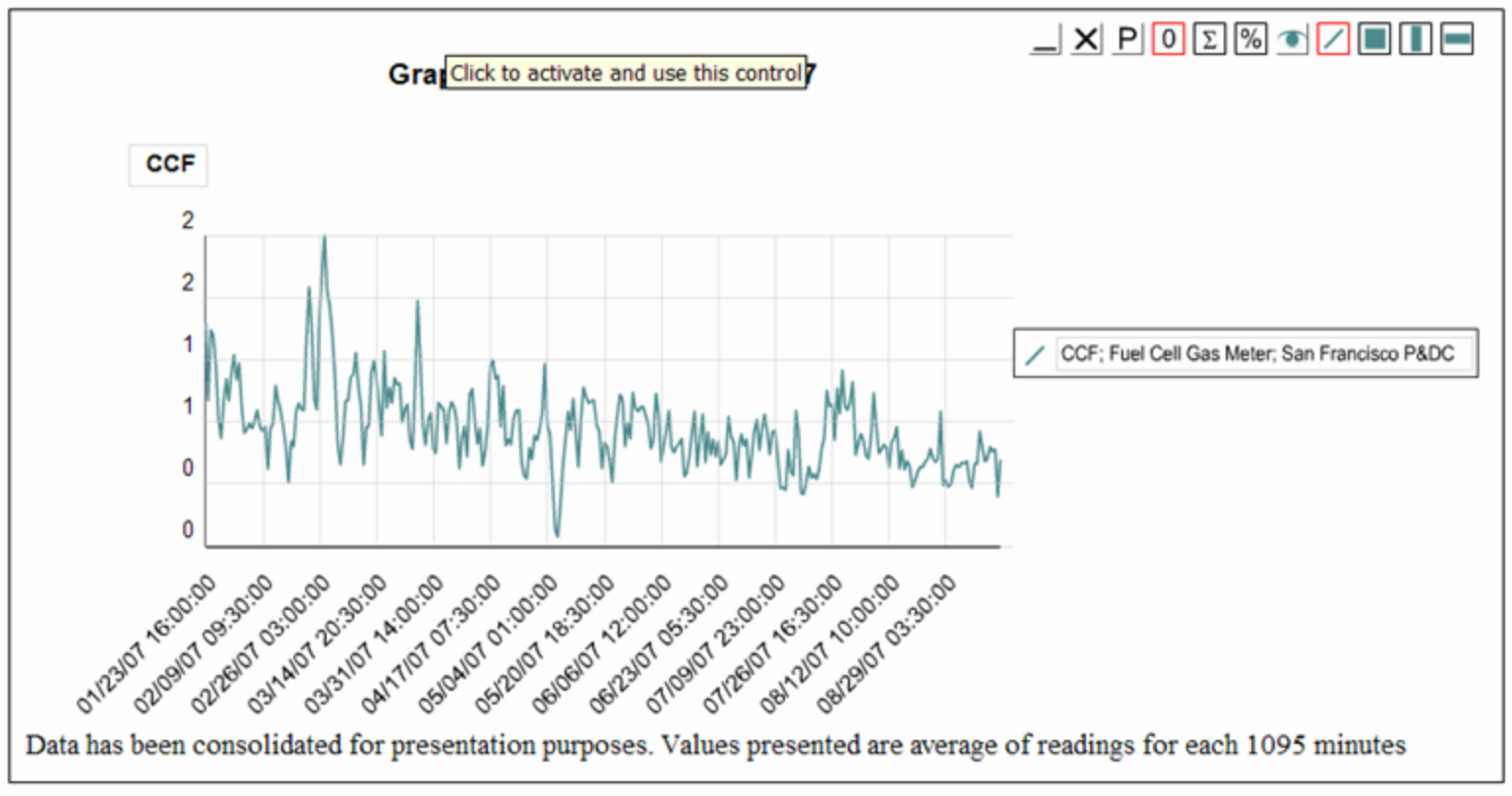
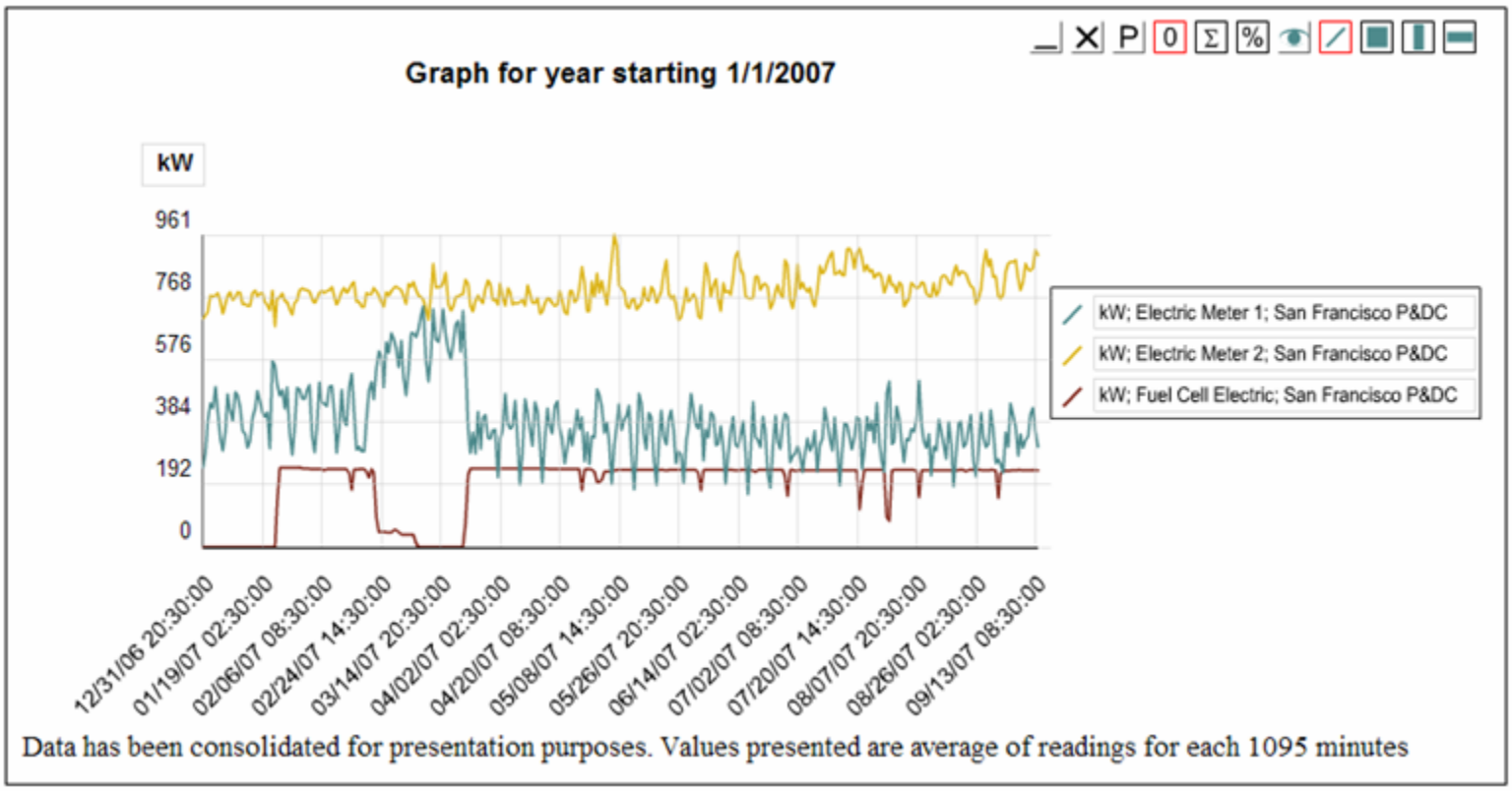
Fuel Cell Output



Gas Consumption



Plant Energy Use



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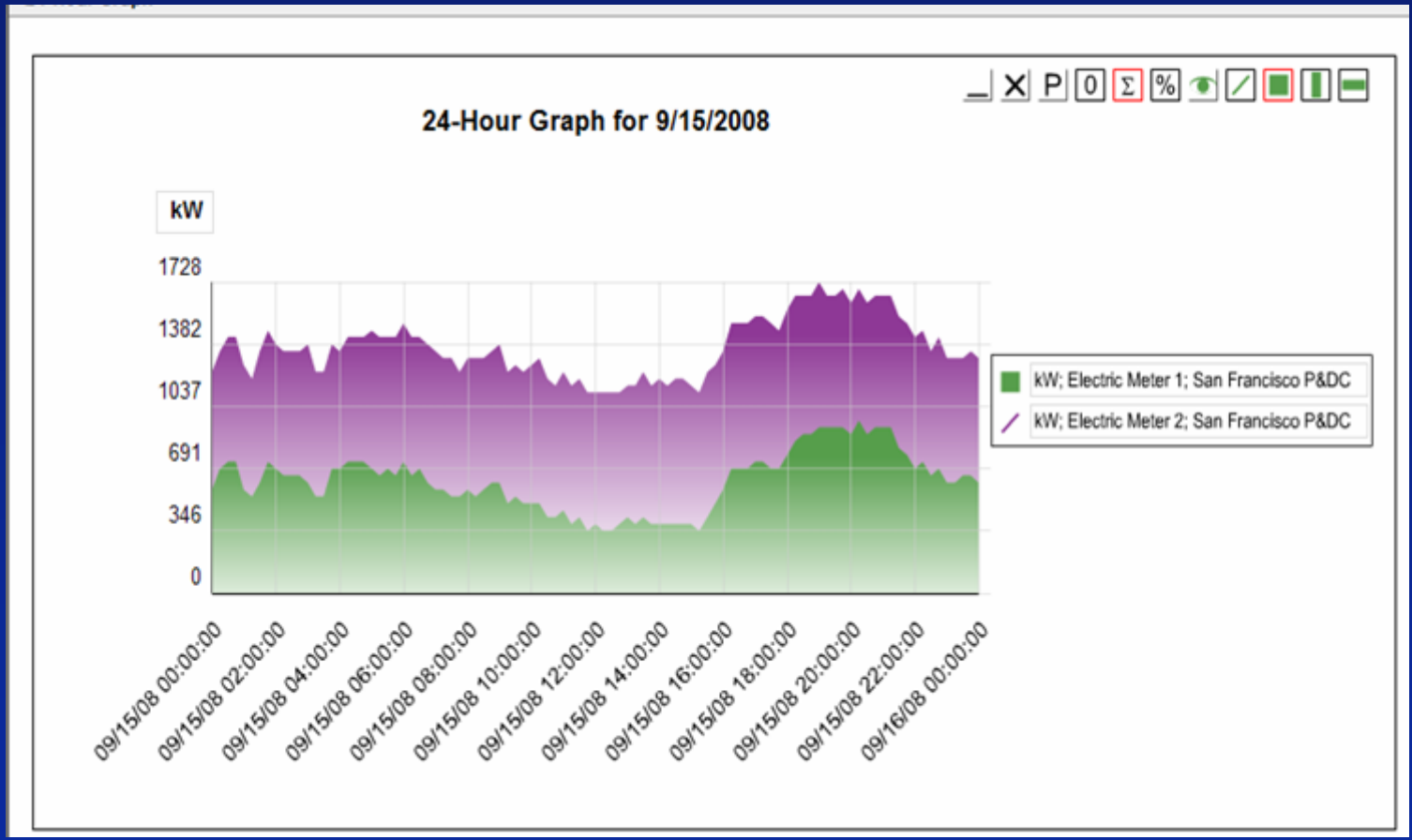
Plant Energy Profile



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Bottom Line:

12 Month Performance

- **Gas Therms Used: 175,060**
- **Gas Cost: $134,157.07**
- **kWH Produced: 1,933,734**

Received $250,000 grant from the U.S. Dept. of Defense Climate Change Fuel Cell Program

HydroGen3 Fuel Cell Vehicle (2 vehicles)

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- Three year agreement with General Motors to test a GM fuel cell minivan in Washington DC area.
- Evaluate the fuel cell technology and potential benefits for fuel economy, emission.
- Being used for mail delivery in Fort Belvoir, VA and Springfield, VA PO daily from Sept. 2004 – Sept. 2007
- Expanded the program to Irvine, CA for another test vehicle from Sept. 2006 – Sept. 2007

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HydroGen3 Fuel Cell Vehicle (2 vehicles)

GM Fuel Cell Vehicles

HydroGen3 liquid

- Fuel: 4.6 kg LH_2
- Range (EDC): 400 km

HydroGen3 compressed 700

- Fuel: 3.1 kg CH_2 at 700 bar (10,000 psi)
- Range (EDC): 270 km

GM

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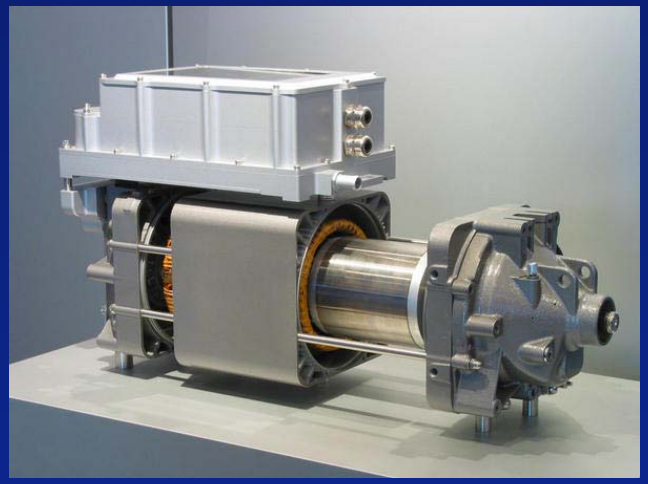
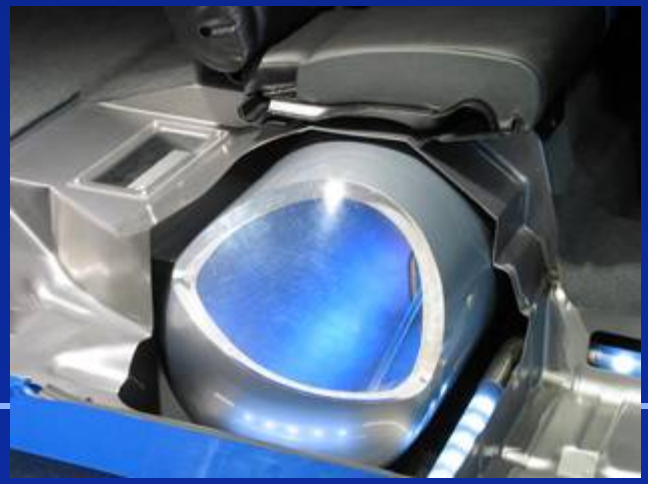
Major components of HydroGen 3 fuel cell vehicles





Alternative Fuel Program
HydroGen3 Fuel Cell (cont.)

Experience

- Usage: From Sept. 2004 – Sept. 2007
- Experimental vehicles
- Very reliable
- Delivered 1,200,000 mail pieces and packages for USPS from 9/2004 –9/2007
- Fuel economy is double of gasoline vehicles
- Very limited number of refueling stations

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Current - USPS Fuel Cell Vehicle Program

- Signed new Agreement with GM in February 2008 to test 2 HydroGen 4 Equinox in Washington DC and Irvine, CA
- Signed the Interagency Agreement with DOE in April 2008 for funding support from Office of Hydrogen and Fuel Cells.
- The first Equinox began mail delivery in July, 2008 at Irvine, CA. The second Equinox will be deployed in Washington DC by November, 2008
- Continue the dialog with other vehicle manufacturers such as Ford and Chrysler to test and evaluate other fuel cell vehicles

HydroGen 4

Chevrolet Equinox Fuel Cell Vehicle (2 vehicles)

- Certified by EPA as zero-emission vehicle
- 200 miles driving range

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Powered Industrial Trucks (P.I.T.s)

Off-Road Large Spark-Ignition (Gasoline and LPG) > 25 Horsepower

- This area of the Off-Road Mobile Sources website pertains to off-road large spark-ignition (LSI) equipment greater than 25 horsepower, including farm, construction, and industrial equipment, powered by gasoline and liquefied petroleum gas (LPG), and other alternate fuels.
- Typical applications that use LSI engines include forklifts, specialty vehicles, airport service vehicles, large turf care equipment, portable generators, and a wide array of other agricultural, construction, and general industrial equipment. ***The U.S. EPA has sole authority to control new farm and construction equipment under 175 horsepower.***

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Powered Industrial Trucks (P.I.T.s)

- **Typical USPS processing center**

  Santa Ana P&DC has

  – **14 electric forklifts**

  – **3 propane forklifts**

  – **30 - 40 TowMotors/Mules - all battery/electric powered**

- **There are 300+ processing centers in USPS!**

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Would you like to know more about this session?

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