



FuelCell Energy

FuelCell Energy, Inc.
NASDAQ: FCEL

Product / Hydrogen RD&D Briefing
HTAC Annual Meeting - Hartford
July 15, 2009

reliable, efficient, ultra-clean



● Background

- Connecticut based – two operations, Danbury and Torrington
- 500 Employees - R&D, Manufacturing Engineering, Plant Service and Corporate

● Timeline

- 1969 – Predecessor company, Energy Research Corporation (ERC) founded by to conduct research into fuel cells and advanced battery chemistries
- 1980's – ERC focuses on high-temperature carbonate fuel cell research
- 1992 – ERC successfully demonstrates a 120 kilowatt high-temperature carbonate fuel cell power system. ERC stock goes public
- 1996 – A 2-megawatt ERC fuel cell system goes online in Santa Clara, California, costing \$20,000 per kW
- 1999 – ERC splits off battery division into Evercel, Inc., and renames the company FuelCell Energy (NASDAQ: FCEL)
- 2003 – FCE ships first commercial Direct FuelCell unit to Kirin Brewery in Japan
- 2003 to 2007 – Over 60 units at over 40 installations worldwide



Markets

- 65 MW installed/backlog
 - California/West Coast: 15 MW
 - Japan/Korea: 42 MW
 - Northeast/Canada: 4 MW
 - Europe: 2 MW
- Targeted applications
 - Grid Support: 39 MW
 - Renewable/Wastewater: 9 MW
 - Manufacturing: 6 MW
 - Hotels: 3 MW
 - University & Hospitals: 2 MW
 - Government: 3 MW
 - DFC-ERG 2 MW



Multi-MW and RPS Markets

- Connecticut Project 150
- POSCO Power agreement targets multi-MW potential in South Korea



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Typical Applications



**Small
Commercial/Industrial,
300-Bed Hotels**

300 kW



1.4 MW



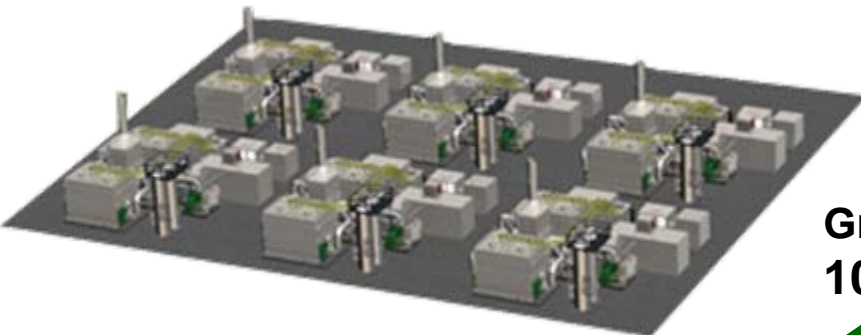
**1000-Bed Hotels, Wastewater Treatment,
Food and Beverage Processors**



**300-Bed Hospitals, 2.8 MW
Manufacturing, Universities**

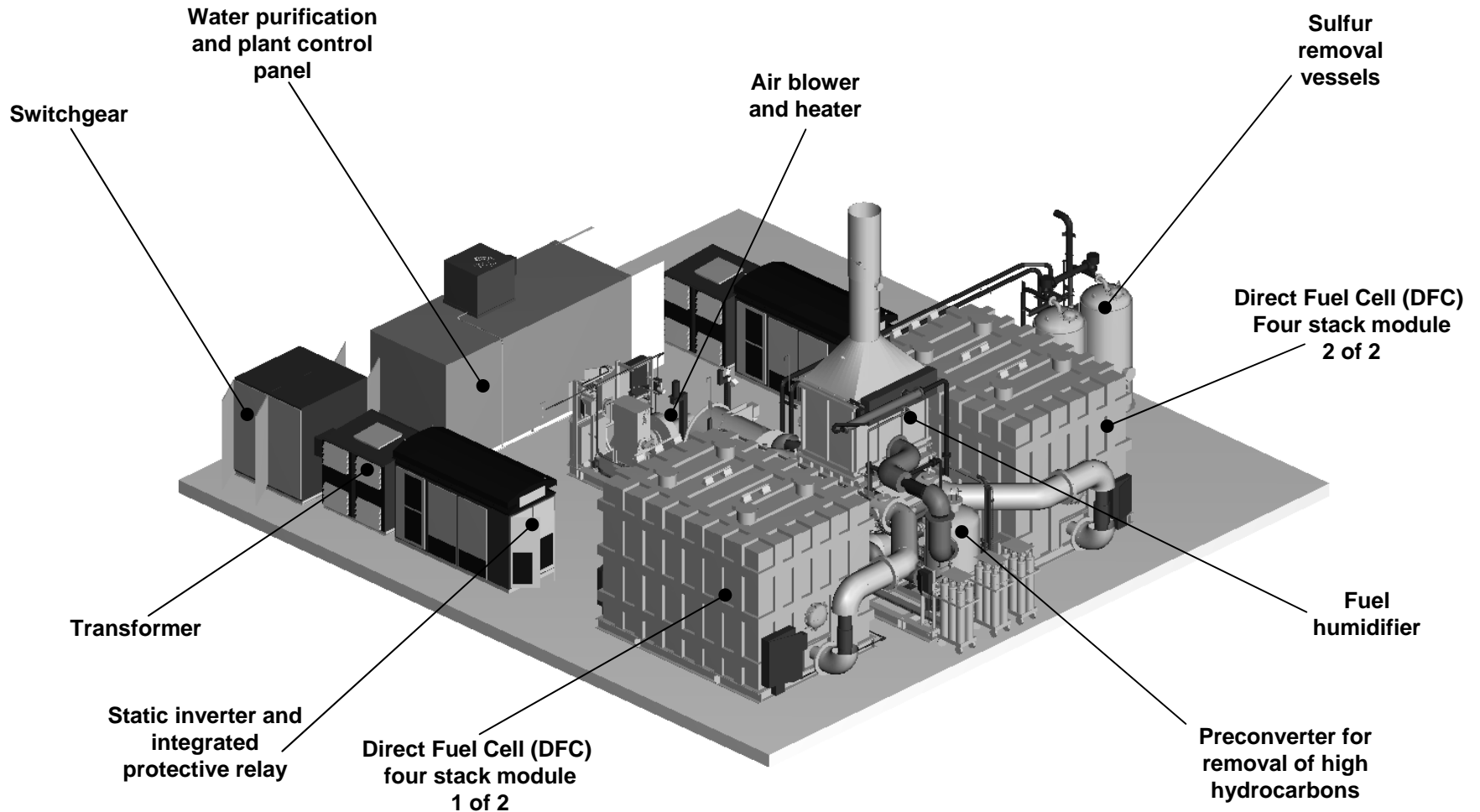


**Grid Support, RPS
10 MW +**



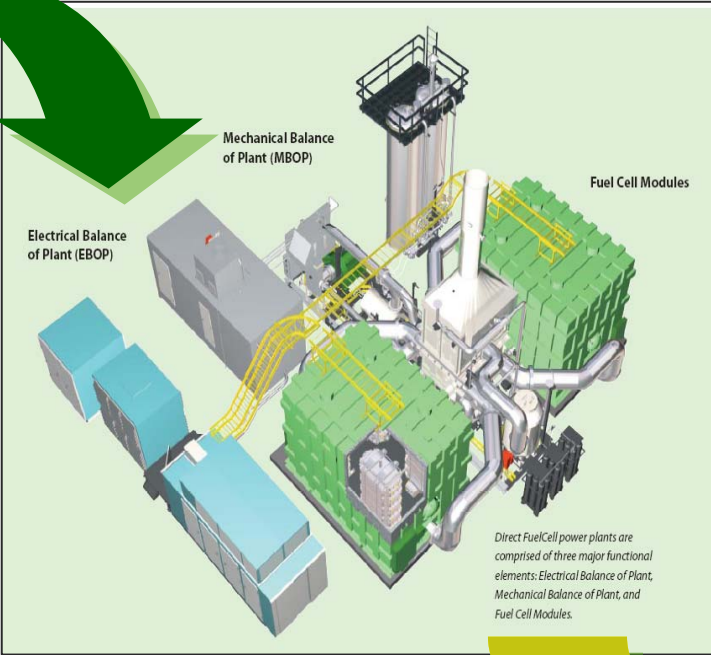


DFC3000 - General Powerplant Overview





- FUEL RESOURCES**
- NATURAL GAS
 - METHANOL
 - ETHANOL
 - PROCESS METHANE
 - BIOGAS
 - COAL GAS



- INTEGRATED SYSTEMS IMPROVE EFFICIENCY**
- DFC – (47%)_e
 - DFC – ERG (55-60%)_e
 - DFC/T – (55-60%)_e
 - DFC H₂ (50-60%)_e
 - DFC – CHP (60-80%)

Diversity of Fuels plus High Efficiency – High Sustainability



- Combined Heat and Power
- Hotels, universities, hospitals, manufacturing manufacturing
- Wastewater treatment facilities on biogas





- Utility-side of the meter
- MW-Scale
- Renewable Portfolio Standards application, e.g. CT Project 150
- Heat uses not always available
 - Waste heat can be used to produce produce more power

DFC-ERG™ - waste heat supports pressure letdown power generation in gas distribution system, >60% efficiency

Organic Rankine Cycle generation generation with waste heat from from DFC exhaust

Ultra high efficiency DFC/T systems systems





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Cal State Northridge
Northridge



1.0 MW CHP >80% Total Efficiency



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Newest Fleet
Member



DFC 3000 (2.4 MW) - Gold Star Electric Power Station - Korea



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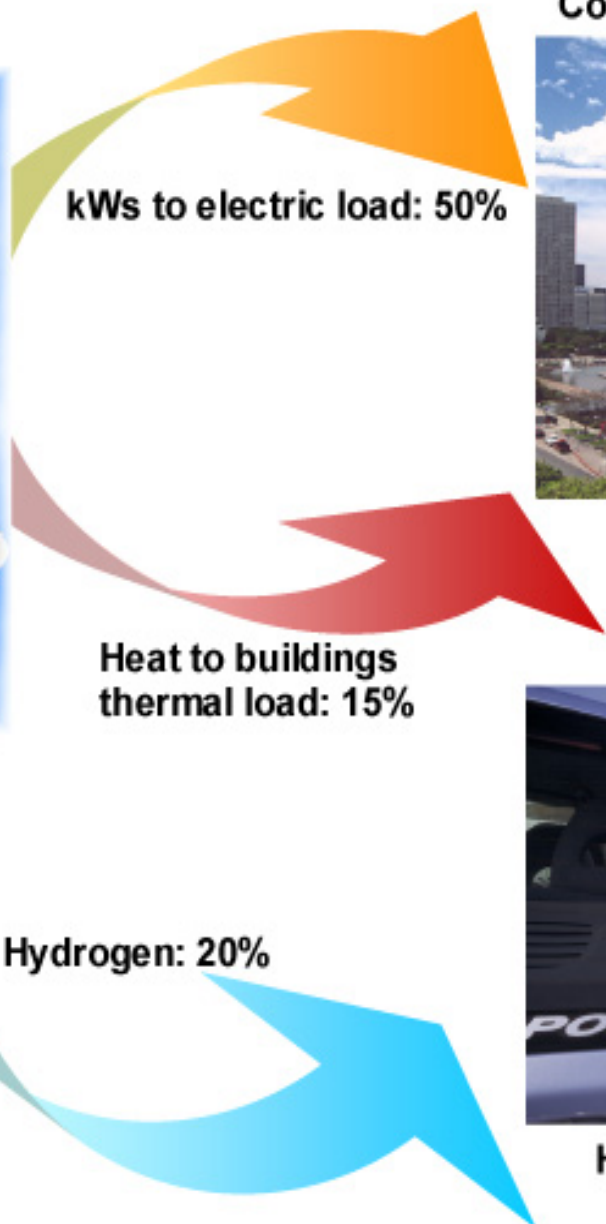
Hydrogen Development and Demonstration

reliable, efficient, ultra-clean

DFC-H₂ Power Plant: Trigeneration System



DFC-H₂ POWER PLANT



Commercial/Industrial Building



H₂ - REFUELING STATION



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Ultra-Clean, Efficient, Reliable Power



Submegawatt DFC-H₂ PSA – Testing at FCE (APCI-DOE Project)



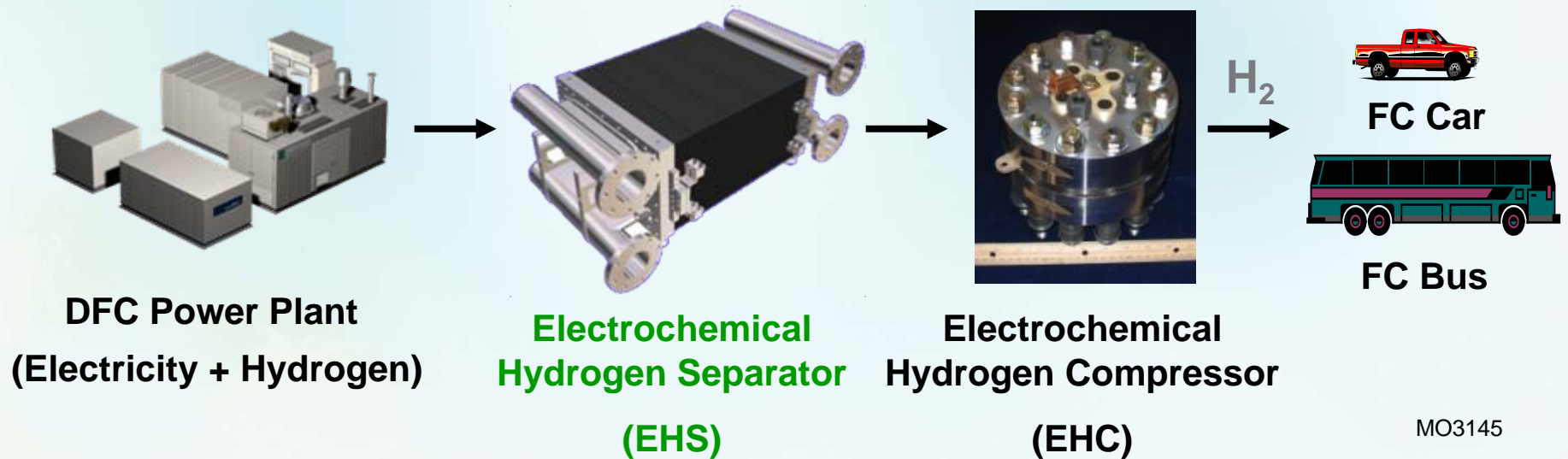
PSA



Compressor



Anode Exhaust Processing
and H₂ Purification System:
Has been separating **200+ lb/day**
Hydrogen for >2,000 hrs



MO3145

The Modularity of DFC-H₂-EHC System is Uniquely Suitable for Hydrogen Refueling Applications

EHS System Demonstration at Univ. of CT

- Demo Unit separated 1200 liters/hr H₂ (up to 2700 lit/hr demonstrated) – can refuel approx. one car per day
- >10,000 hours of operation
- Reliable operation, no EHS-related shutdowns



Energy Secretary
Bodman visited the Unit
at UConn in June 2006

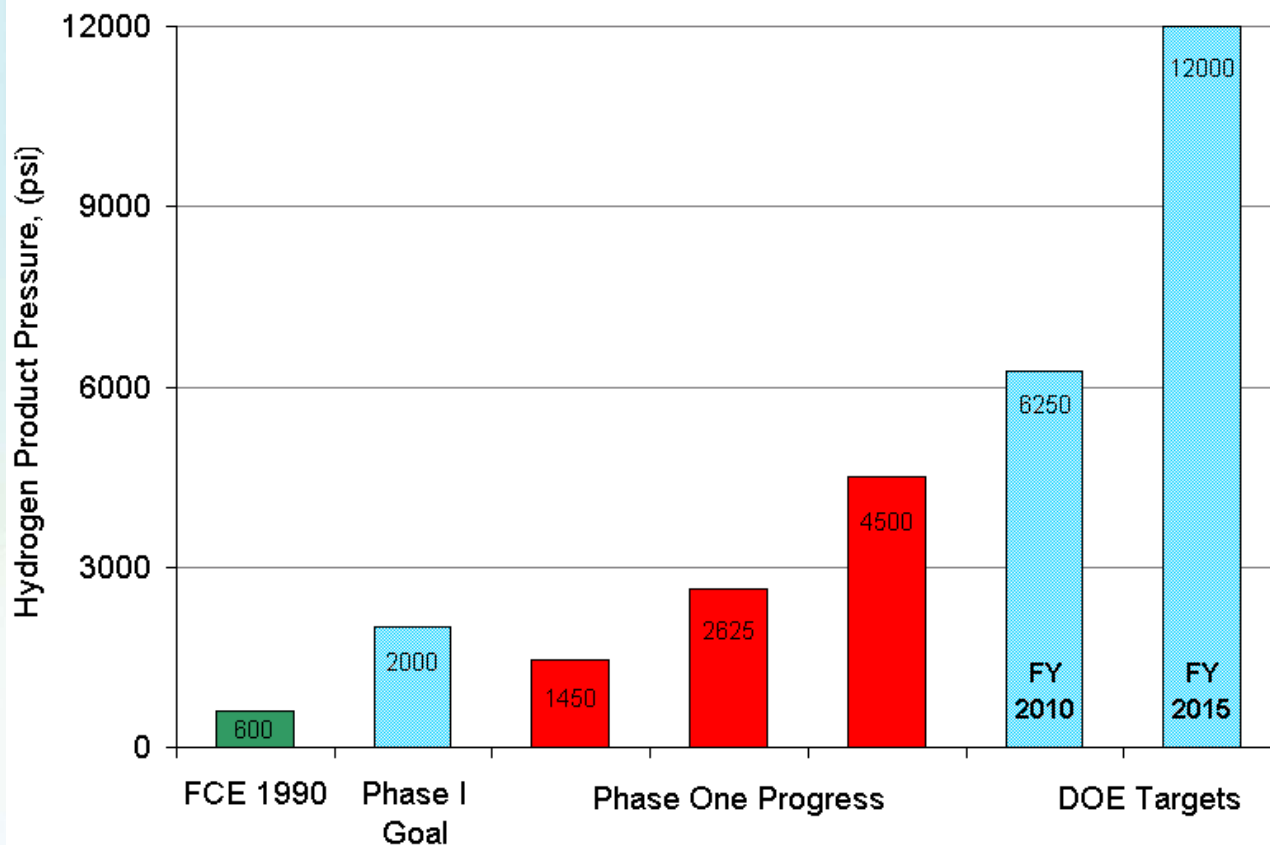


US Army Corps
of Engineers.
Engineer Research and
Development Center



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Electrochemical Hydrogen Compressor Dev.



- Scaled up from single cell to 3-cell stack
- Tested 3-cell stack for >1,000 hrs at up to 3,000 psi