

ClearEdge

Delivering Smart Energy Today[™]

ClearEdge5 - a Fuel Cell Based 5 kW

micro CHP System

4th IPHE Workshop - Stationary Fuel Cells

Tokyo International Forum

Tokyo, March 1, 2011

About ClearEdge Power

- Established in 2003
- Headquartered in Hillsboro, Oregon, with field offices in California and ROK
- Full service provider for customer
 - Design & Manufacture
 - Installation & Permitting
 - Service & Maintenance
- Manufactured in our 75,000 sq. ft. facility
- Certifications:
 - ISO 9001 Quality Management Systems
 - ISO 14001 Environmental Management Systems





ClearEdge5

- Designed to address the urgent concerns:
 - Increased demand on grid infrastructure

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- High energy costs
- Environmental impact

Why HT PEM

Incentives for Fuel Cells

Commercialization of ClearEdge5 - Residential

Commercialization of ClearEdge5 - Commercial



ClearEdge5: A New Energy Solution





- Lower cost than grid: LCOE as low as \$0.09 per commercial kWh and \$0.12 per residential kWh¹
- Cleaner than grid: 37% less CO₂ with untraceable levels of NOx and SOx
- Continuous base-load power: Provides clean, uninterrupted power 24x7 including during grid disturbances
- High efficiency: Up to 90% CHP energy efficiency and designed for 40% electrical efficiency
- Scalable with multi-fuel capacity: Easily installed in multi-unit configuration. Currently utilizing natural gas, future versions expected to operate on biogas or propane

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 Aesthetic design: Compact and quiet system operates indoors or outdoors

¹ Levelized cost of energy applies to initial launch market of California.

Cleaner Energy Than the Grid



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Unique Platform Design



The ClearEdge5 System Architecture



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Incentives for Fuel Cells

Self-Generation Incentive Program in California	 What is the SGIP Program? AB 970, passed in September of 2000, required the California Public Utilities Commission (CPUC) to adapt "specified energy conservation initiatives." In March 2001, CPUC put together a task force to create an incentive program. The SGIP program is limited to Fuel Cells (both renewable and non-renewable) and Wind Turbines. The rebate rate is \$2.50 per watt, which equals \$12,500 per unit. Program Administrators include: Pacific Gas and Electric (PG&E), Southern California Edison (SCE), Southern California Gas (SCG), and California Center for Sustainable Energy (CCSE) on behalf of San Diego Gas and Electric (SDG&E). Who is Eligible for SGIP Rebate? The customer must be interconnected to the grid to be eligible. Must be installed by a licensed California Contractor The unit's application must meet minimum operating standards (site must use more than 2,300 BTU's / hour per unit).
ITC Federal Investment Tax Credit	 Business Property Owner (Section 103) Credit of 30% of the cost up to \$3,000 per kW Minimum 0.5 kW capacity Valid until December 31, 2016 Electricity-only efficiency of more than 30% Eligibility extended to all utilities and telecommunications firms Allowance of credit is permissible against Alternative Minimum Tax. This allows persons subject to AMT to take the credit against that portion of their tax liability Non-Business Property Owner (Section 106)

- Credit of 30% of the cost up to \$1,000 per kW
- Minimum 0.5 kW capacity
- Valid until December 31, 2016
- Electricity-only efficiency of more than 30%
- Eligibility extended to all utilities
- Allowance of credit is permissible against Alternative Minimum Tax. This allows persons subject to AMT to take the credit against that portion of their tax liability.

Net Metering

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- This program allows a customer with an electric generation system to receive credits for any overproduced kWh .
- The customer is required to switch to a Time-of-Use (TOU) tariff as an "Otherwise Applicable Tariff" (OAT).
- Credits are tracked by using an interval-capable bi-directional meter.
- Credits are given as a dollar amount not a kWh credit.
- Any credit balance on an account will not roll-over after a 12 month period of time (beginning on the date of NEM tariff implementation).

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Initial Focus for Residential - California

Residential market in California:

- 12 million housing units in State
- Significant number of luxury homes over 4,000 square feet

Favorable legislation and incentives

- AB32 and AB811 enabling CO₂ and energy efficiency improvements
- \$2.50 per watt SGIP fuel cell rebate available through 2012
- Federal tax credit of 5% to 15% available through 2016

Use of a ClearEdge5 system in luxury homes with high electricity tier rates can achieve significant cost savings

Identification of pockets of opportunity within California

Initial Results of ClearEdge Power GIS-Based Customer Identification Model



Market Size in California at the Highest Tier Rates

Tiered Rate Structure Creates Opportunities for ClearEdge5!



Use of a ClearEdge5 system can help a customer completely eliminate all high tier rates and reduce his/her utility bill significantly

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Potential Cost Savings for Residential Customers

Significant savings in Utility bills allow a rapid payback period for a ClearEdge5 system





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Commercial Market & Channels





Compelling Economics for Commercial Customers



CE5 Operating Cost vs. Natural Gas

- Major natural gas shale deposits in the Appalachians, Michigan and elsewhere in North America coming online make natural gas close, available, and inexpensive
- Increasing reserves and a proven distribution system suggests the price of natural gas will increase at a slower rate than the price of electricity

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Value Proposition for Commercial

- Payback range 5-6 years
- Low and stable operating cost
- \$0.09 per kWh LCOE versus California small commercial rates of \$0.17 - \$0.19 per kWh
- Minimal impact of gas price volatility

¹ Average total rate in California reflects the average estimated by PG&E across tiers, as of November 2010. See current tarrifs on PG&E website for full information regarding rates.



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Major Product Cost Reduction Underway





Appendix



ClearEdge5 versus Solar

	5kW Fuel Cell	5kW Solar	27kW Solar
Annual Electric	43,800 kWh	8,000 kWh	43,200 kWh
Annual Heat	51,000 kWh	None	None
Space Required	6 sq. ft.	500 sq. ft.	3,000 sq. ft.
Net System Cost	\$53,850	\$22,855	\$114,240
Compared to Grid	5kW Fuel Cell	7kW Solar	
CO2 lbs reduced / year	79,200	27,000	~3.0x reduction
SOx lbs reduced / year	560	160	~2.5x reduction
NOx lbs reduced / year	275	70	~3.0x reduction

5kW Solar Panel Array

Relative Size

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5kW Fuel Cell

Source: PVwatts1 Performance Calculator (San Diego Site)

27kW Solar Panel Array





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