GenSys Blue: Fuel Cell Heating Appliance
Fuel Cell Seminar 2009

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NASDAQ: PLUG
www.plugpower.com

plug power

Ilgaz Cumalioglu

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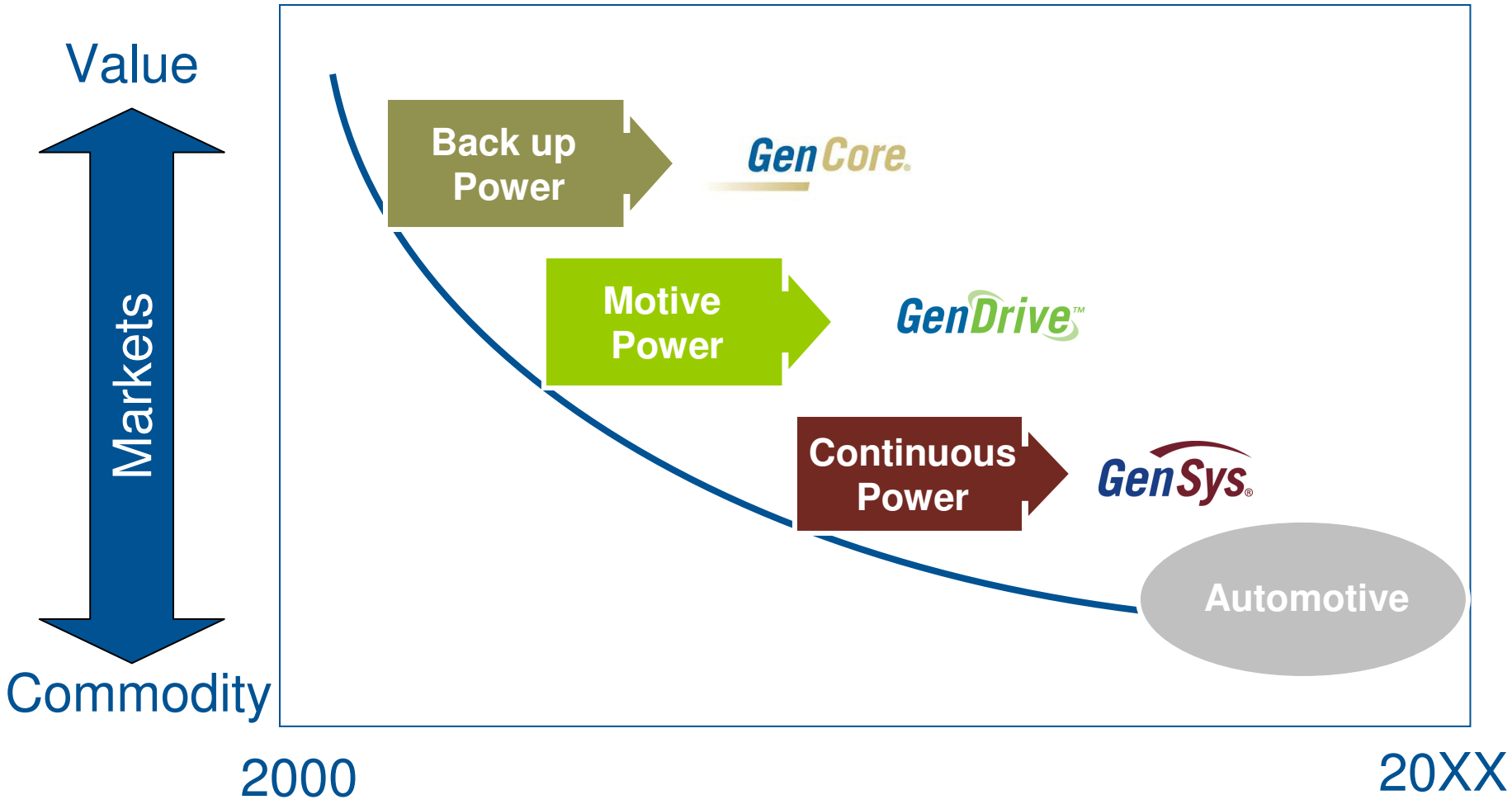
ADOPTION CURVE



$1.5B USD[1] MOTIVE BATTERY MARKET FOR THE MATERIAL HANDLING INDUSTRY

Class 1

Sit-down lift trucks:

- Handle heavy loads in large manufacturing operations

Class 2

Stand-up reach trucks:

- Provide flexibility and maximum floor space
- Utilization in large distribution centers

Class 3

Rider pallet trucks:

- Select goods within large distribution centers before delivery to retail stores

GenDrive™

1 Source: Enersys Corporate Info World Presentation, 9/2006

CONTINUOUS POWER MARKETS

- Wireless Telecommunications
  - Remote cell towers, microwave repeaters
  - Grid independence provides siting freedom
- Remote Residential
  - Off-grid & rural homes
  - Higher grid-like standard of living
- Residential Combined Heat and Power (CHP)
  - Replaces existing boiler/furnace
  - Provides electricity and heat to homes

GenSys™

LOW-TEMPERATURE GENSYS® PRODUCT

- Key features:
  - Continuous power
  - Independent operation – water balanced
  - LPG fuel
  - Load following up to 5kw of output

- Typical Applications
  - Remote primary power
    - No grid alternative
    - Grid outages of more than 8-10 hours / day
  - Lower loads where generators are particularly inefficient

LPG fueled prime power supply

Reliable remote prime power

GenSys™

HIGH-TEMPERATURE GENSYS: KEY ATTRIBUTES

Saves money, saves the planet.

- Targeted 20% – 40% reduction in home energy costs
- Easily integrates with existing home heating systems
- Reduce home carbon emissions by 25% - 35%
- Complete home heating solution with integrated burner
- Payback time for customer is 5-8 years

GenSys™

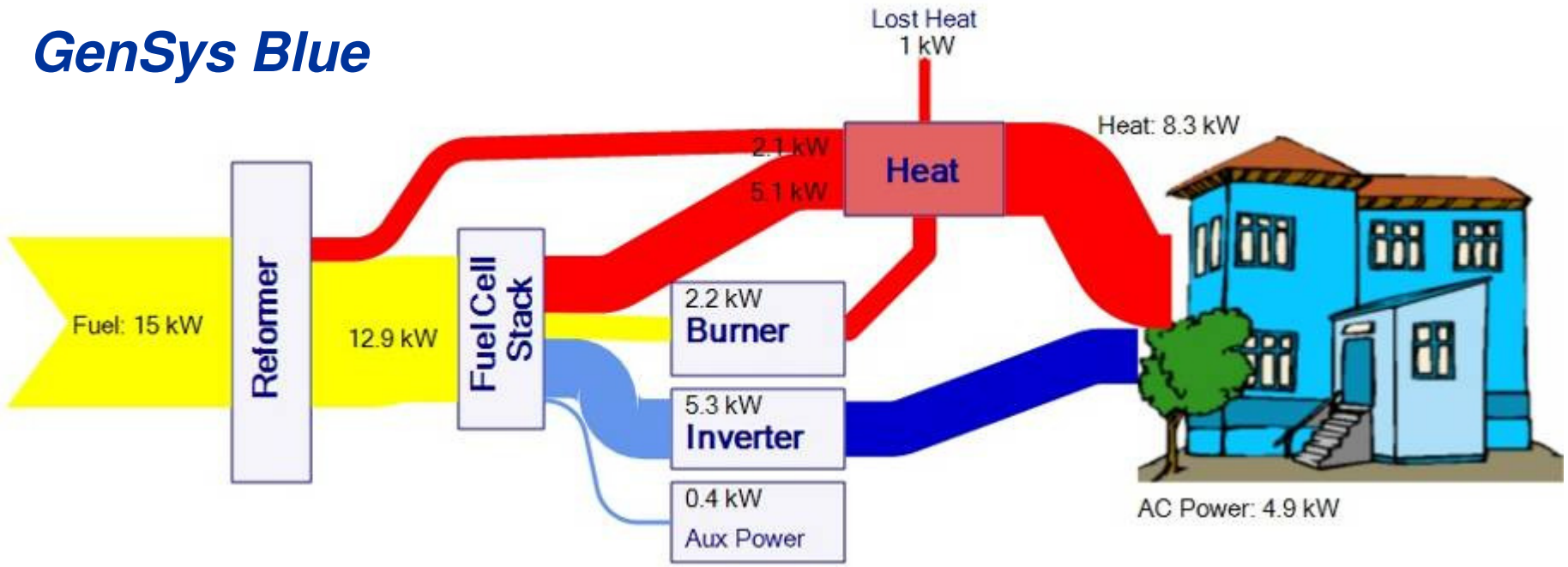
Combined Heat & Power (CHP)

"CHP should be one of the first technologies deployed for near-term carbon reductions. The cost-effectiveness and near-term viability of widespread CHP deployment place the technology at the forefront of practical alternative energy solutions such as wind, solar, clean coal, biofuels and nuclear power."

- Oak Ridge National Laboratory

Combined Heat and Power, Effective Energy Solutions for a Sustainable Future, December 2008

GenSys Blue



- Increase household efficiency from ~45% to 85%
- **30%+** reduction in ultimate fuel usage and carbon footprint:

  3 - 7 tons/year (Equivalent to NOT driving for 6 months)
- Secure distributed generation with assured power

Why is GenSys Blue better ?

1. Understand inefficiencies of centralized generation
2. Understand benefits of Combined Heat and Power (CHP)
3. Why this is the right technology
    1. Robust Operation
    2. Heat / Power Ratio
    3. Zero Water Consumption

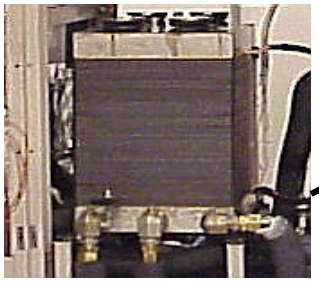
HIGH TEMPERATURE TECHNOLOGY BENEFITS

❖ Fewer parts	>>	***Lower capital cost***
❖ Simpler system	>>	***Increased reliability***
❖ CO tolerant MEA	>>	***Increased life***
❖ Water independent	>>	***Market acceptance***
❖ High quality heat	>>	***Increased comfort***

High temperature fuel cell technology offers significant improvements over low temperature PEM technology and allows penetration of the residential, micro-CHP market.

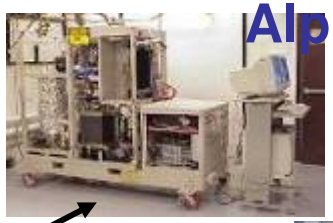
HISTORICAL CONTEXT

1999



Stack PBI MEA

Alpha



2002

Burner 1 and Reformer 1
Stack PBI MEA

Beta

2004

Gamma

Improvements to
Reformer
Stack

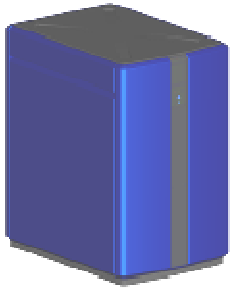
2006

Delta

2008

Continued Improvements to
Reformer, Stack, Packaging

GenSys Blue



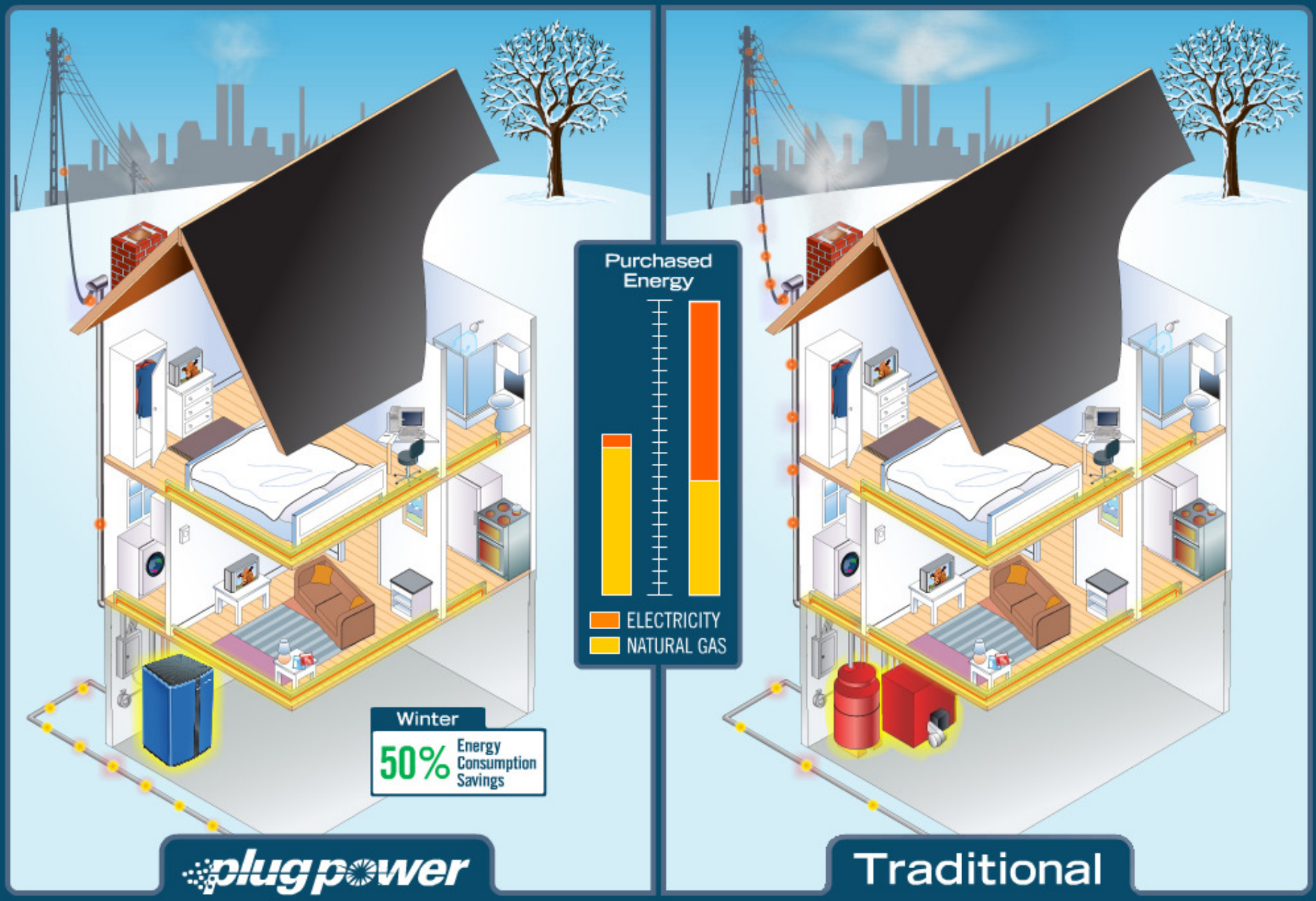
FUEL CELL HEATING APPLIANCE INSTALLATION

Low temperature technology requires prohibitive additional infrastructure to be used as a residential, micro-CHP appliance.

High temperature system at Union College demonstration

Low temperature system installation during the Euro II program in Germany.

High Temperature Fuel Cell System for Residential Micro-CHP. Saves Money. Saves the Planet.



Energy Price Ratio

Low Cost Fuel

Natural Gas	$/KwH
WYOMING	$ 0.029
ALASKA	$ 0.030
UTAH	$ 0.032
COLORADO	$ 0.035
MONTANA	$ 0.038
NORTH DAKOTA	$ 0.039
IDAHO	$ 0.040
SOUTH DAKOTA	$ 0.040
NEW MEXICO	$ 0.042
CALIFORNIA	$ 0.042

$ for Electric

$ of Fuel

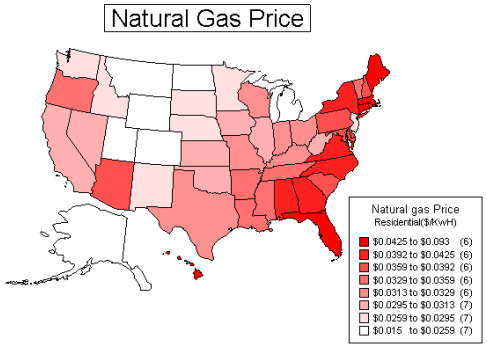
Energy Price Ratio	
ALASKA	5.025829
CALIFORNIA	**3.468478**
CONNECTICUT	3.328619
NEW YORK	**3.224948**
NEW JERSEY	3.031303
MASSACHUSETTS	2.879698
WYOMING	2.796448
COLORADO	2.746325
UTAH	2.702216
TEXAS	2 681441

Best Fuel Cell Economics

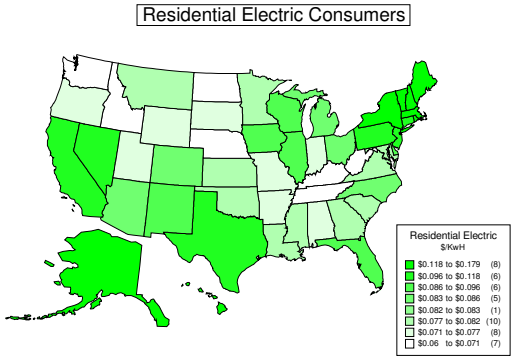
Expensive Electricity

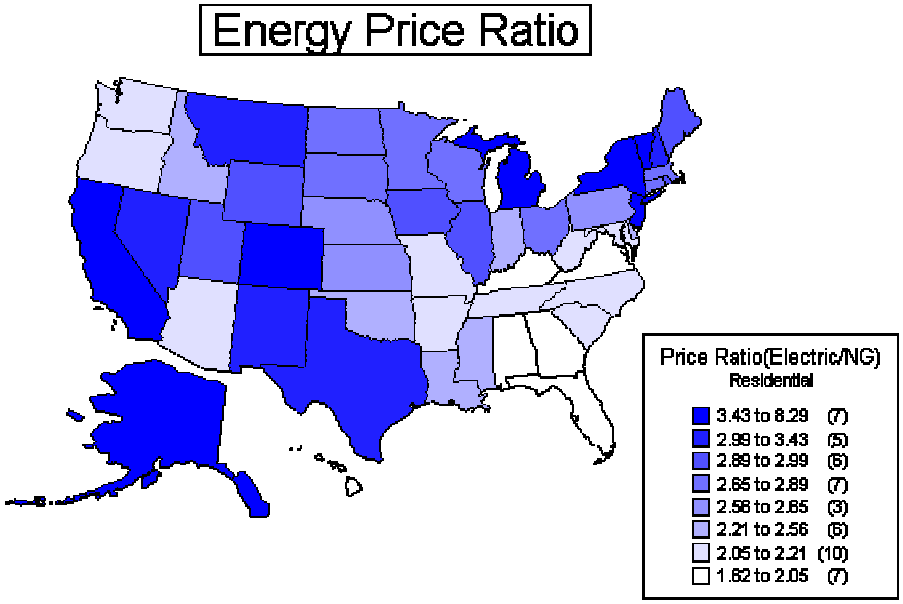
Electric	$/KwH
HAWAII	$ 0.235
CONNECTICUT	$ 0.194
NEW YORK	$ 0.181
MASSACHUSETTS	$ 0.165
NEW JERSEY	$ 0.159
ALASKA	$ 0.153
MAINE	$ 0.151
NEW HAMPSHIRE	$ 0.150
CALIFORNIA	$ 0.146
VERMONT	$ 0.146

Natural Gas Price



Energy Price Ratio





California Energy Prices

$0.219 $/kWh Electric

$0.042 $/kWh Natural Gas

23.8 kWh of Fuel

Cost: $1.00

5.5 kWh Electricity

Value: $1.89

10 kWh of Useful Heat

Value: $0.60

Every dollar spent yields:
$2.41 worth of energy
saves our customer ~40%

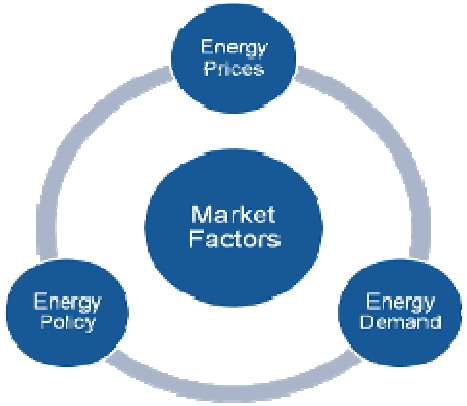
The Customer Value Proposition

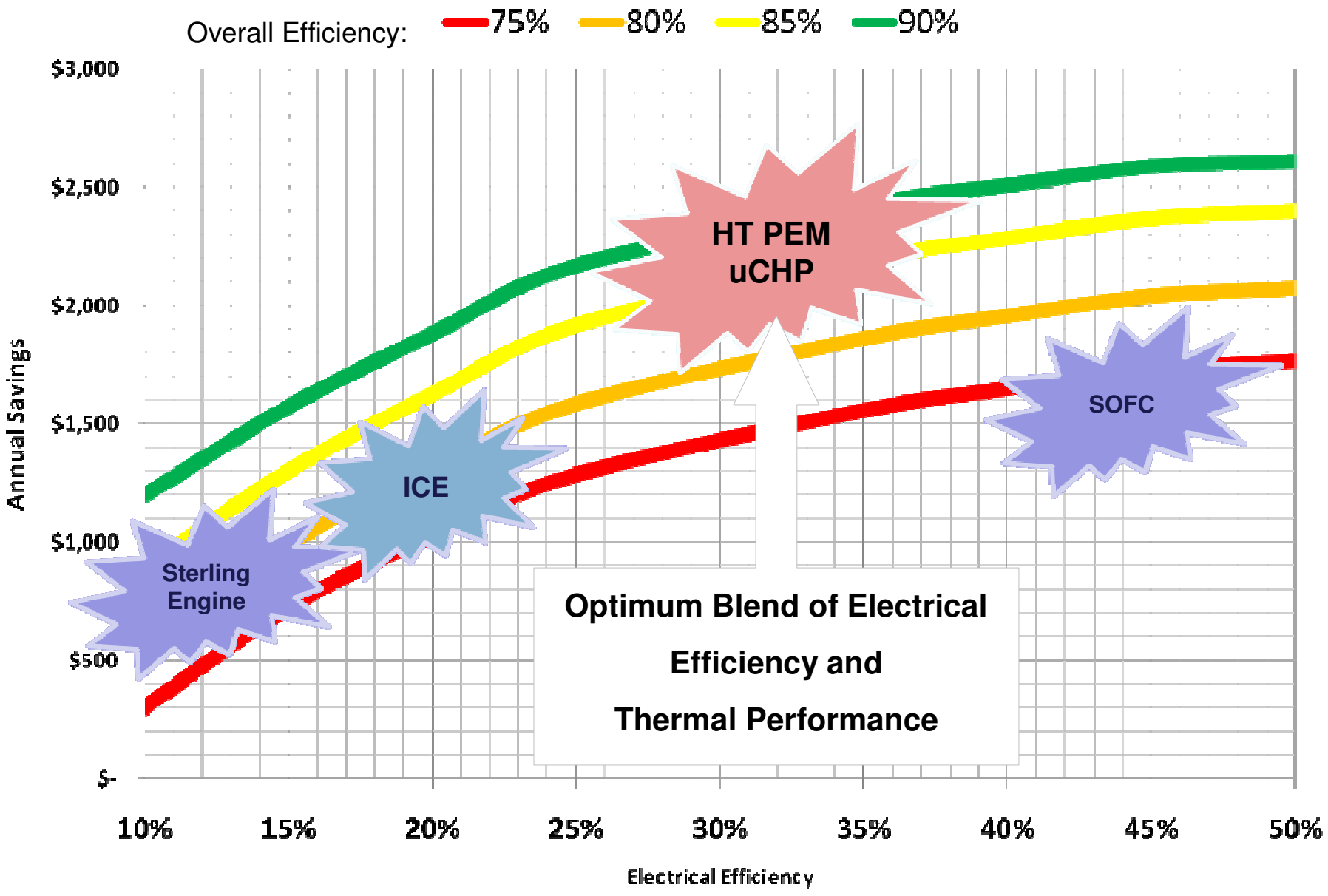
	GenSys Blue	Traditional
Electric	-	$ 3,532
Natural Gas	$ 3,752	$ 2,761
Service Plan	$ 742	$ 150
Total Operating	$ 4,494	$ 6,444
Annual Savings	$ 1,950	
System Price	$ 16,178*	$ ~5,500
Price Difference	$ 10,678	
Payback		
Annual Payment (4%,15 Year)	$ 1450	

30%

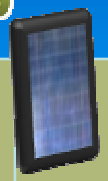
5 ½ Year Payback

* After incentives




Overall Efficiency:
75%
80%
85%
90%
$3,000
$2,500
$2,000
$1,500
$1,000
$500
$-
Annual Savings
HT PEM uCHP
ICE
Sterling Engine
SOFC
Optimum Blend of Electrical Efficiency and Thermal Performance
10%
15%
20%
25%
30%
35%
40%
45%
50%
Electrical Efficiency

uCHP vs PV Array



4800 ft² Home in NewYork Demands: ~20,000 kWh Electric ~40,000 KwH Thermal	GenSys Blue with Net Metering	Solar (PV) w/ 93% Efficient Boiler
System Price	$ 32,000	$ 43,000
Incentives	$ 12,000	$ 23,000
Effective Price	$ 20,000	$ 20,000
System Capacity (kW AC)	3.6	5.4
Annual Electric Produced (kWh)	19495	6745
Monthly Energy Cost	$ 328	$ 397
% CO2 Reduction	35.1%	23.7%
CO2 Reduction (Tons/Year)	8.43	5.7
CO2 Production (Tons/Year)	15.58	18.3

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Reliability Growth Program- Durability Tests

Next Steps:

- Reliability & Service Cost characterization
- Real application performance & reliability demonstration
  - Failure and service call rate
  - Electrical efficiency
  - Thermal efficiency
  - Performance degradation
  - Emissions
- Initiation of service strategy development
  - List of failure modes
  - Preventive Maintenance plan
- House heating system interface
  - Controls development
  - Optimum system utilization for maximum savings

HEADQUARTERS
968 Albany-Shaker Road
Latham, New York 12110
Phone: (518) 782-7700
Fax: (518) 782-9060

CANADA
13120 Vanier Place
Richmond, British Columbia V6V 2J2
Phone: (604) 303-0050
Fax: (604) 231-0400

www.plugpower.com