



## TECHNOLOGIES SUPPORTED BY APPLICATION: DISTRIBUTED GENERATION

1. Photovoltaic concentrator with Fresnel lens 25 Kw increment 20 w/ft. 2 \$6 to \$8 /watt . 700 Kw system field tested by Arizona Public Service at Phoenix.
2. Photovoltaic concentrator with low temperature sterling engine 5 Kw increments \$5 /watt . Second (2<sup>nd</sup>) generation ready to be field tested by early 2005.
3. PEM fuel cell: 1.5 Kw, 3 Kw, 6 Kw, 12 Kw, 24 Kw modules. Polymer fluid cools and supports membrane. System and Anode LIFE: 5000 hours.

Future designs will use an electric motor powered by PEM fuel cell using glucose to hydrogen reformer.

Extensive field tests of PEM powered electric system received. Awards were awarded for alternate vehicle performance by Michelin competition. The types of Nissan vehicles modified to hybrid or fuel cell propulsion were

Pick up truck, SUV, station wagon, utility carts, and boats City or highway design profiles get 50 mpg .

4. Bio-diesel ICE/electric 2 seater hybrid passenger car.

Prototype 2700 lbs., 70 mpg designed and built by San Diego State University. Simulation of other designs are also available. Resale cost estimated in 500 quantity \$50,000.

5. Bio-diesel /or ethanol 85 fuel, 3 seater vehicle, 1000 hp 3200 lbs. 150 mph, 30 mpg, hybrid designs are available for 70 mpg. 165 hp ICE motor weighs under 200 lbs. can be designed to run on compression diesel or sparks.



**TimesOne**™

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Quantity 200 build of 500 hp class 6 years ago.

Light weight frame design and construction capabilities.

Support from Vector Performance Car ,Long Beach, CA.

6. Static Power Converters dc to ac, designs switching at 30 kHz and 50 kHz. Achieving 98% efficiency at power level up to 250 Kw per module. Systems deliver up to 8 MW of real or reactive power.

Reactive power is needed on wind farms which are designed to connect to the utility grid.

Input voltages can be 40 Vdc to 100 Vdc for photovoltaic or fuel cell application.

Remote status and control capability.

Output voltages up to 590 Vac. Multilevel bus designs up to 2160 Vac. Modules can be stacked for medium voltage up to 12 KV using a superconducting magnetic field from American Superconductor ,or using a transformer.

Strategic relationships with Tier Electronics, Amtech electronics. At times design input was used from 3 universities in USA, Canada , and Chile.

New applications are using fuel cell or photovoltaic dc input., these are designed for output loads such as motors, variable speed drives, active filters, and VAR compensation.

PWM to sine wave filters used at interface from power converter to load.

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TIMES ONE™ has been involved in design and application for 24 years. Power Correction Systems, Inc. have built their own custom designs and also modified existing power electronics. These products are available from strategic partners who produce them internationally.

In the last 20 years, I was also involved in linear class ab1 designs for the space station, power distribution system. Power levels were 20 Kw, 240 vac , 20 kHz, 90 degree load, phase margin, 50 degrees at 500 kHz.

7. Magneto hydrodynamic power source developed by Dr. Herman Branover, PhD. with support from John Hopkins University.

The superiority of the efficiency of the process was estimated at producing energy at 3.5 cents/Kw compared to a turbine at 5 cents/Kw. This is due to the state of entropy used to operate the system. The system uses no moving mechanical parts only liquid metal.

Arthur D. Little recommended the project to Congress. A budget was passed for \$27 million in 1998 to build a 1 mw demonstration system. The money was never allocated due to priorities about USA - Israel programs and the engineering staff was laid off.

Dr. Herman Branover, PhD. would like to have Brahm Segal, President of Power Correction Systems, Inc. restart the activity to build a new demonstration system for future implementation.



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### ENERGY EFFICIENCY PRODUCTS

8. Ceramic paint developed by NASA for shuttle nose heat rejection. Now, being produced in Arizona and established use in Japan by Sony for “cool roofs “ program.

Reduction of radiant heat from the sun will reduce size of cooling systems in ships and buildings up to 30%.

Material has a 5 year life, and can be waterproofed, applied on corrosive surfaces using additional special coatings.

Thermal resistance of r19 achieved in 20 mil thickness.

Useful on hot surfaces to reduce radiant heat

Power Correction Systems, Inc. is introducing this product to the Self Defense Test Ship project in Point Hueneme, California with a CRADA contract this year.

The thermal image is reduced and radar profile is not affected.

The paint cycle on ships is increased from 5 months to 5 years using this ceramic paint. It can be brushed on or sprayed on. The material dries in 1 to 2 hours and cures in 1 to 2 days. Any color can be matched.

9. Active harmonic filters reduce extra frequencies from non linear loads carried by electrical distribution systems.

Transformers loose from 1% to 9% of the power delivered in the form of heat from winding losses.

K factor transformers spread out the heat by over sizing the core, but still have the same winding losses.



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### ENERGY EFFICIENCY PRODUCTS CONT...

The winding losses can be reduced by an active harmonic filter. The measurable heat energy saved reduces energy costs on any transformer. A transformer loaded to 90% of rated Kva loses up to 9% of delivered power in heat. At 25% loading the losses are approximately 2.5%. Economic payback is 3 to 5 years under certain load profiles.

Brahm Segal has been involved in designing and building these active filters. They are available from production from only 5 factories world wide. I have 2 factories producing analogue and digital control versions. Up to 300 amps of harmonic canceling at below 560 vac. Custom versions can be made up to 2160 volts ac

### WATER PURIFICATION TECHNOLOGY

9. "ROBOC" wastewater treatment for sewage process. Rotating Biological Oxygenator Contactor System.

Quality performs" beyond compliance".

10. "Quad Pac", a non chemical treatment for drinking water supply systems.

Drinking Water Treatment technology uses vapor ions, in a magnetic field for filtration and then a plasma field to complete process.

Capacity: 1 million gallon per day modules.

Approximately 30% smaller space used than on existing techniques.

11. Cooling Tower fluid purification process is similar to drinking water and will increase efficiency of cooling systems by improved thermal transfer through pipes. This process eliminates the need for treatment chemicals in the water or fluid in the cooling tower.



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### ENERGY EFFICIENCY PRODUCTS CONT...

#### 12. Biomass Collection and Storage Process, Prolitic Steam Reform Gas "PSRG", and thermal Decomposition Catalytic Conversion.

New plant to produce 60k gallons/day of ethanol from corn stalks (the stem not the yellow part).

Estimated cost \$1.75/gallon.

The heat rate of 2 gallons of ethanol equals 1 gallon of gasoline.

#### 13. Glucose to hydrogen production on board vehicle.

Process is 60% more efficient than burning ethanol. No pressure tank needed.

Near zero emissions of water and CO<sub>2</sub>.

FUEL USED: "Sugar water "Glucose, Glycerol, Sorbitol, or Ethylene Glycol.

Cost per kg of hydrogen \$1.75 using c-5 sugar;

\$2.20 using Brazil sugar;

\$3.25 using sorbitol.

(Note: Natural gas reforming cost \$3,25/kg)

Source: National Academy of Sciences

Rate of Production 300 gms per hour of hydrogen. Size 24" x 18" x 10"