APOLLO ENERGY SYSTEMS, INC.

48kW Apollo Power Plant Model 101-B

SPECIFICATIONS
May 2002

EQUIPMENT REQUIRED

1. Control Panel and Cabinet with Lighted System Schematic and Measuring Instruments

2. 11.5 kW Alkaline Apollo^{TM} Fuel Cell – 360 cells x 0.8 volts @ 40 amps = 11,520 watts (Fuel Cell includes replaceable Stacks, Pumps, CO^2 Air Scrubbers, Fans, KOH Tanks, etc.)

3. 48 kWh Lead Cobalt Battery – 240 volts @ 200 ampere discharge for 1-hours

4. 288 Watt Photovoltaic Cell with Battery Conditioner (optional) -- 288 volts @ 1 amp

5. 11.5 kW Ammonia Cracker for Anhydrous Ammonia, **OR**

6. 11.5 kW Reformer for Natural Gas, LPG, Ethanol, Propane, Butane, Methanol

7. DC to AC Inverters

8. Measuring instruments: Ammeters, voltmeters, ampere hour meters, watt hour meters, gas flow meter, thermometers

9. Microprocessor for system control

10. Smart chip for switching to electric power grid with 99.9999% reliability

11. Electric Vehicle Power Supply Receptacle for supplying EV power to electric power grid

12. Fuel Cell Cabinet for housing fuel cells

13. Battery Cabinet for housing battery cells

14. Hydrogen sensors

15. Exhaust system for Power Plant

16. Fire extinguishers (or Argon gas saturation system)

17. Fuel supply: Ammonia, natural gas, LPG, ethanol, propane, butane, and methanol

18. Fuel tank meter

19. Cable, conduit, wiring and plumbing

APOLLO ™ POWER PLANT MODEL 101-B

Concept of Hybrid Model 101-B. This power plant is designed to be operated by a battery and a fuel cell. The battery does most of the work, operating 24-hours a day. The fuel cell is simply a battery charger, keeping the battery charged at various rates of charge during the day as directed by the microprocessor which controls the entire system.

The system size (276 kWh x 30 days = 8,280 kWh), produces enough power for seven 3-bedroom homes. Our studies show that a typical 3-bedroom condominium in Florida uses around 1,200 kWh per month.

Excess capacity can be sold back to the local electric utility company during peak hours, generally two hours in the morning and three hours in the late afternoon or evening. Electric Energy Brokers are in the business of selling power to utilities in peak hours.

Model 101-B also includes equipment which makes it possible for an electric vehicle to send power to the grid through the electric system installed in the home. In this way, the electric vehicle owner could possibly sell power during peak hours at high enough rates to cover the cost of replacement batteries.

FUEL CELL OPERATING COST - PRELIMINARY
for Apollo Power Plant Hybrid Model 101-B

FUEL >	**Hydrogen**	**Hydrogen**	**n-Butane**	**Methanol**	**Ammonia**	**Ammonia**	**Methane**	**Natural**	**LPG**
	(Liquid)	**(Liquid)**			**Anhyd.**	**29.0%**		**Gas**	**(Propane)**
Chemical Symbol	H	H	C_4H_{10}	CH_3OH	NH_3		CH_4	96% CH_4	96% C_3H_8
Power consumption	131.3	131.3	131.3	131.3	131.3	131.3	131.3	131.3	131.3
(kWh/day)									
System efficiency	66.0	66.0	40.0	42.0	50.0	45.0	40.0	40.0	40.0
(%)									
Fuel consumption	199.0	199.0	328.3	312.7	262.7	291.8	328.3	328.3	328.3
(kWh/day)									
Fuel consumption	716.3	716.3	1182.0	1125.7	945.6	1050.6	1182.0	1182.0	1182.0
(MJ/day)									
(1 kWh = $3.6x10^6$ J)									
High Heat Value (HHV)	143.4	143.4	49.5	21.8	20.9	5.8	56.1	56.1	48.0
(MJ/kg)									
Fuel (kg)	5.0	5.0	23.9	51.6	45.2	181.0	21.1	21.1	24.6
Fuel (ft^3 as gas)	2114.2	2114.2	338.8		2075.0		1096.6	1096.6	468.0
Fuel (liters as liquid)	72.8	72.8	41.5	65.3	74.3		49.5	49.5	49.5
								Values =	Values =
								Methane	Propane
Fuel Cost Information	$0.320	$1.00-$1.40		$0.185	$0.09-$0.10	$0.04-$0.06		$5-$10	$0.90-$0.95
	per lb.	per lb.		per liter	per lb.	per lb.		per 1000 ft^3	per gal.
				($.70/gal)					
Source	H2 Info Net	H2 Info Net		Methanex	CF Ind.	LaRoche		EIA Charts	Teco
	as Liquid	as Liquid		Barge	in 40,000	in 44,000		Ave. Resid.	Bulk
	at producer	delivered		Price	lb. Tanker	lb. Tanker			undelivered
	site	and stored		FOB port	FOB dist	FOB dist		96% CH_4	96% C_3H_8
Calculation	$0.32	$1.20		$0.185	$0.095	$0.05		$7.50	$.925
Cost Per Day	**$3.52**	**$13.20**		**$12.08**	**$9.45**	$19.95		**$8.23**	**$12.10**
Cost Per 30-Day Month	**$105.60**	**$396.00**		**$362.42**	**$283.50**	$597.30		**$246.74**	**$363.00**