Milestones in Fuel Cell History

Year	Individual/organization	Fuel Cell Type
1838/42	Sir William Grove, Wales	Sulfuric Acid & Nitric Acid
1893	Friedrich Ostwald	Acid
1930	Emil Buar/H. Preis, Switzerland	Molten Carbonate
1939	Francis Bacon, UK	KOH alkali electrodes
1958	Francis Bacon, UK	KOH
1959	Bacon/Allis Chalmers	Alkali/Nickel Electrodes
1961	Francis Bacon, UK	Alkaline
1961	G.V. Elmore/H.A. Tanner	Phosphoric Acid
1964	NASA/Pratt & Whitney	Alkaline
1965	Allis-Chalmers	Phosphoric Acid
1965	Texas Instruments/US Army	Molten Carbonate
1967	General Motors	Alkali
1967	NASA	Alkali
1996	Westinghouse, Japan	Solid Oxide
1997	M-C Power Corp.	Molten Carbonate
1997	Fuel Cell Energy Corp.	Molten Carbonate
2000	NASA	Alkali
2002	Westinghouse, Netherlands	Solid Oxide

Comments/Applications	Unit power
“Gas Battery” telegraph battery	high current
Physical chemist refined threory of fuel cell	
First significant experiments	
First practical application of fuel cell	
Created a 40 cell unit that could power a welder	6kW
Installed 1008 fuel cells in a farm tractor	60V/20Hp
Cambridge University research	6kW
First intermediate temperature fuel cells/US Army tested	
Gemini Space Program/supplied electricity	2.16kW ea.
Army field tests	6kW
Earliest high temp fuel cells/ran on “combat gasoline”	100W - 1kW
Demonstration/Electrovan passenger van/150 miles range	160kW peak
Stacks run 70% efficiency/Apollo Space Program	
13,000 hours (6,500 non-stop)	25kW
Miramar Marine Air Station	250kW
Santa Clara demonstration	2MW
International Space Station	
Cogeneration, 20,000 hours operation, 95% availability	1000kW