Comparison of Gas Reactor Designs and Westinghouse PWR

Parameter	PBMR (S. Africa)	HTGR (GA's reference design)	GT-MHR (GA, France, OBMK)	AVR (Germany)	THTR (Germany)	Ft. St. Vrain	Westinghouse PWR, 4-loop
Gross Power Level (MWth)	267	3000	600	46	750	829	3411
Net Power Level (MWe)	114	1170	280	15	300	330	1150
Efficiency %	42.7	39.0	48	37.5	40.0	39.8	33.7
Fuel Type	TRISO particles, UC balls	TRISO particles, Graphite Sticks	TRISO, Graphite compacts	TRISO particles, U/Th C balls	TRISO particles, U/ Th C balls	U/Th Graphite compacts	UO2
Coolant	Helium	Helium	Helium	Helium	Helium	Helium	Light Water
Moderator	Graphite	Graphite	Graphite	Graphite	Graphite	Graphite	Light Water
Active Core Height (cm)	< 100	634	793	260	600	475	366 (12 ft.)
Active Core Volume (Liter)	–	354,000	55,000	18,400	125,000	132,000	32,800
Average Core power density (kw/l)	3.8 (always < 4.5)	8.4	6.5	2.5	6	6.2	104
Fuel Weight (kg)	2,790	39,000	750 kg, Pu initial load	n/a		237 kg/yr HEU + 2660 kg/yr Th	90,200
Burnup (GWD/MTU)	~ 80 - 100	98	120 - 150	n/a		85	>40~~,000~~
Fuel Type, array, material, number of assemblies,	TRISO kernels, in each 60 mm diam. ball @ 9 grams U, 310,000 balls	TRISO, Hexagonal graphite prism blocks, 3944	TRISO, Hexagonal graphite prism blocks, 1020	TRISO kernels, in each 60 mm diam. ball with U/Th	TRISO, 60 mm diam. ball, 0.96 g U, 10 g Th-232, 675,00 balls	Hexagonal blocks, packed fuel particles	Square lattice Zircalloy clad, 193 assemblies Zirlo
System Pressure (bar)	~~60~~ 70	50	70	10.8	39	40	155
Coolant flow 10^6 kg/hr	n/a	5.0	1.152	n/a	1.034	1.53	62.0
Inlet temperature (°C)	540	337	491	275	250	401	300
Outlet temperature (° C)	900	755	850	950	750	775	332
Maximum fuel temperature, during operations (° C)	~~1650~~ 1250	~~1410~~ 1250	1250	n/a	n/a	n/a	1788
Thermodynamic cycle	Direct gas, Brayton	Direct gas, Brayton	Direct gas, Brayton	Rankine, indirect steam	Rankine, indirect steam	Rankine, indirect steam	Rankine, indirect steam
Fuel Enrichment	~ 9	93.5	19.9		93% Uranium, Thorium	93.4 Uranium, Thorium	2.5/3.0/3.5 batches