



Super Matroid Heater System
Comparative Chart of Processes

Standard Once Through Steam Generator (OTSG)	Standard OTSG with Outlet Steam Separator	NAKASAWA Super Matroid Steam Generator (SMSG)
<ul style="list-style-type: none"> • Generally limited to run with water of low (up to 1500 PPM) Total Dissolved Solids (TDS) to maintain 80% steam quality. • The steam quality may be increased but will require expensive demineralized treatment process similar to reverse Osmosis. • The effluent from the demineralization process will require additional cost to dispose off. • The injection of 80% quality steam is not ideal for the well located far (1 KM – 1.5 KM) from the steam generator due to heat loss hence lower quality steam. 	<ul style="list-style-type: none"> • Can deliver +95% steam but will separate 20% solids concentrated condensate hence less heat injected to the well. • The condensate will require additional cost to get rid off away from the field. • Loss of 20% expensive treated water approximately equivalent to: 25 MMBTU/Hr OTSG – 60 Ton/Day 50 MMBTU/Hr OTSG – 120 Ton/Day • Loss of heat in separated saturated condensate approximately equivalent to: 25 MMBTU/Hr OTSG 70.5 MM BTU/Hr. (equivalent to 74,250 SCFD Natural gas) 50 MMBTU/Hr OTSG – 141 MM BTU/Hr. (equivalent to 148,500 SCFD Natural gas) • Part of the heat (50% -60%) from the condensate may be recovered to heat steam generator feed water or any other heating application but will require additional heat exchanger installation. • Hot feed water over 80 °C will require high temperature booster and expensive feed water pump to handle hot water to avoid cavitation. 	<ul style="list-style-type: none"> • The SMSG can deliver 95% - 98% quality steam to the well. • Can tolerate high dissolved solids (6000 PPM – 8000 PPM) in the feed water. • Does not required any special demineralization process for the feed water. • No loss of any condensate (expensive treated water and fuel gas) • No need for additional heat exchangers to recuperate heat. • No need to dispose off condensate. • Requires 6% - 8% less water to deliver rated heat output. <p>Approximate water savings: 25. MMBTU/Hr OTSG – 18 – 24 Ton/Day 50. MMBTU/Hr OTSG – 36 - 48 Ton/Day</p>