Regenerators for Super Critical CO2 Brayton Cycles

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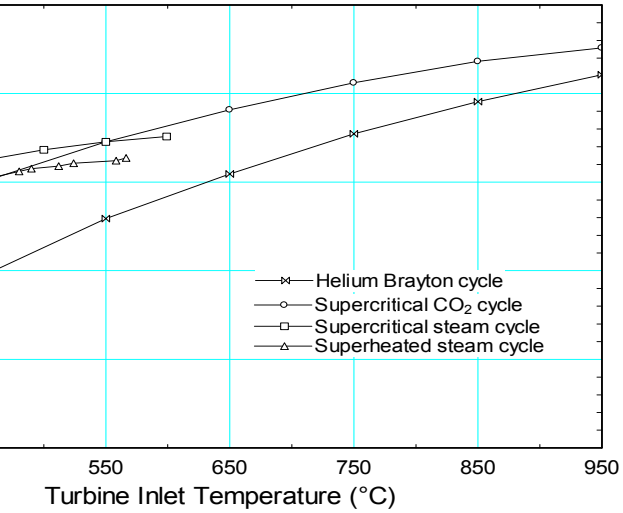
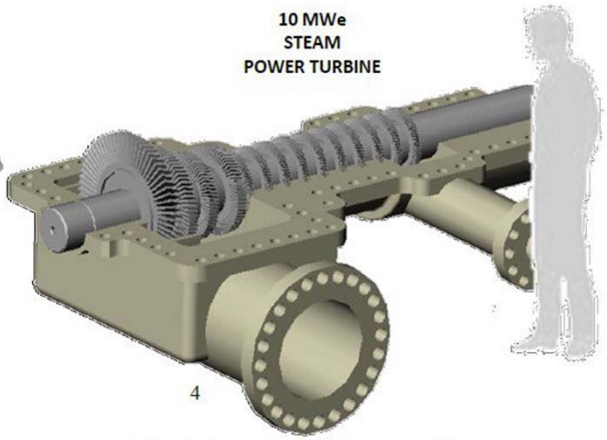
Supercritical CO_2 Brayton Cycle



At high temperatures the sCO_2 cycle can achieve very high efficiency

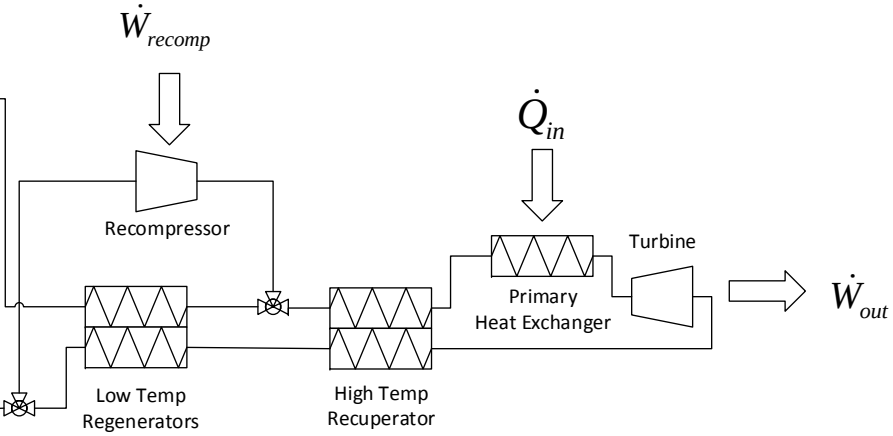
High efficiency, compact operatio means the sCO_2 is ideal for concentrating sol nuclear, and ship power



e sCO_2 power turbine compared to a 10 MWe steam turbine.

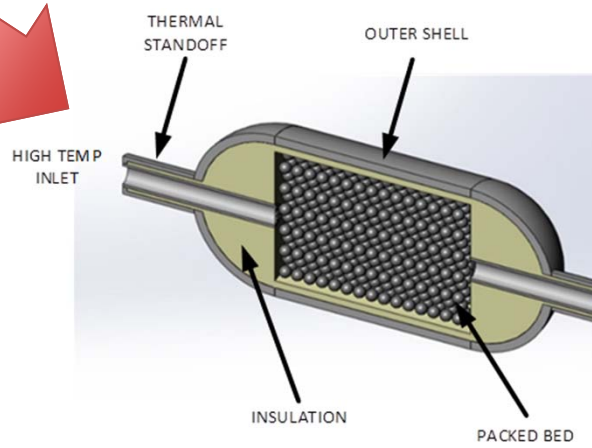
Supercritical CO2 cycle turbo machinery is much smaller than steam turbomachinery

sCO_2 Brayton cycle recuperation



Recuperator

Regenerator

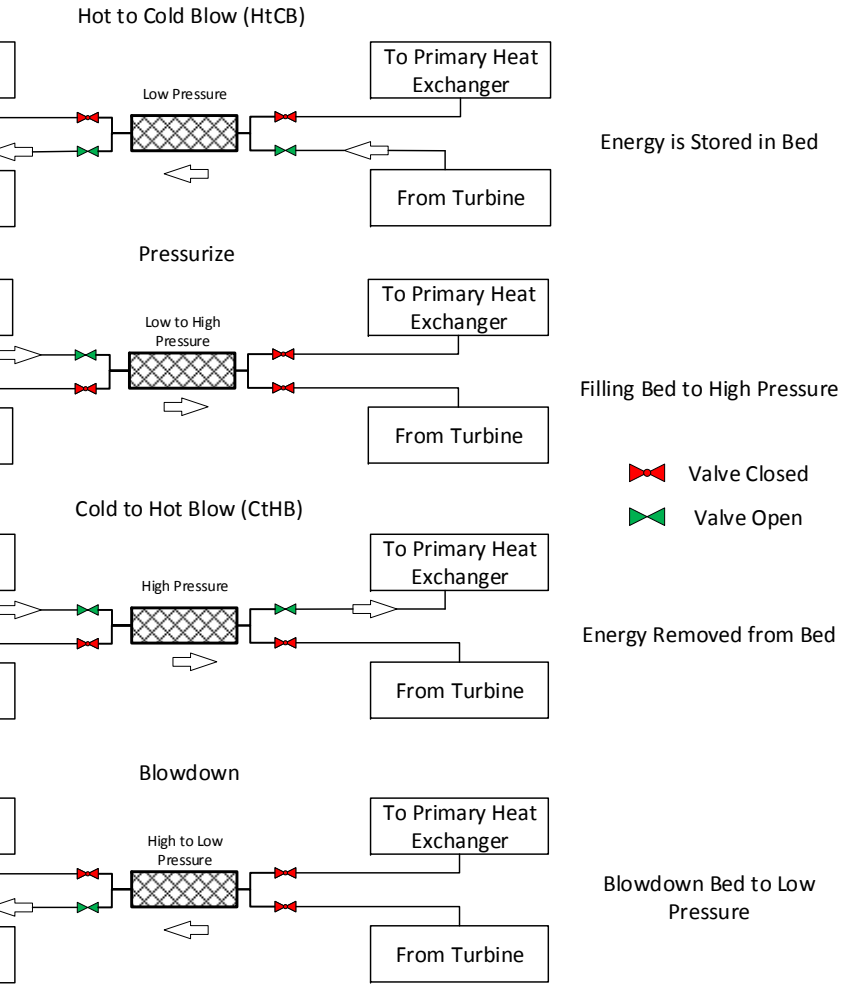


High effectiveness (>90%) recuperation required for efficient operation

Current state of the art are high cost Printed Circuit Heat Exchangers (PCHE)

This research looks at replacing the PCHEs with periodic flow regenerators

urrent Regenerator experimental and cost resul



	Thermal Efficiency	LCoE ($/kWh)	Recuperator/regenerat + valves cost (k$)
Recuperators	51.76%	0.01957	4177
Regenerators	52.27%	0.01542	1897

- Cost analysis shows a ≈20% reduction in LCoE by switching to regenerators
- Regenerator effectiveness model matches within 10% experimental results
- Future tests will increase the temperature and pressure of the regenerator