Performance Analysis of a High Temperature Heat Pump for Compressed Heat Energy Storage System using R-1233zd(E) as Working Fluid

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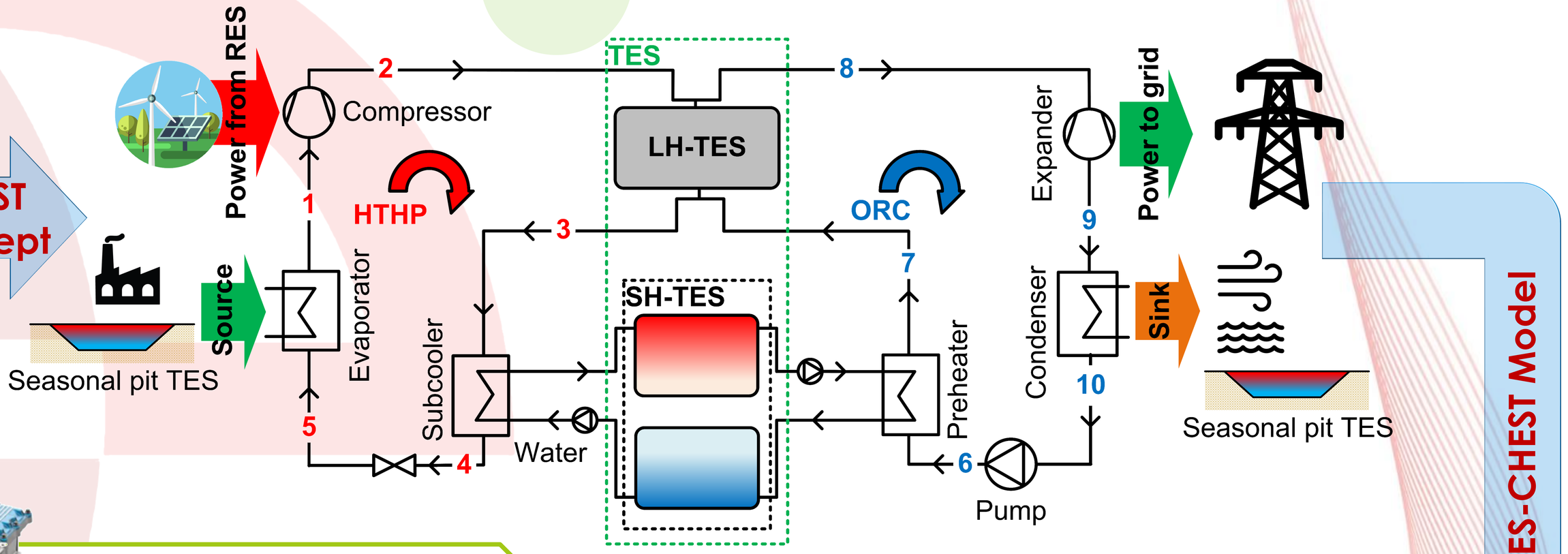
CHEST Concept



IMST-ART© Simulations

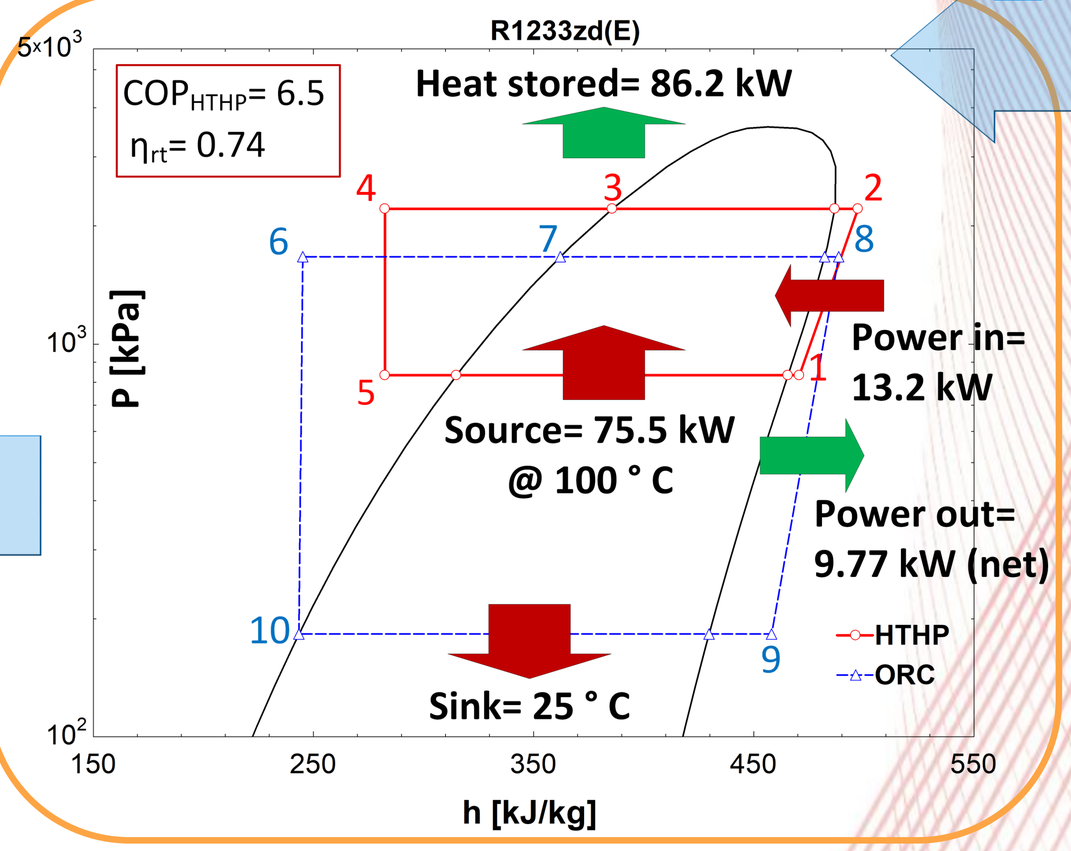
VHE's HBC-511 Compressor
(**1-cyl with V_{swept}=511 cm³**)

SWEP's V120T Evaporator
(**60 plates with A_s= 7.66 m²**)

SWEP's B200T Condenser
(**106 plates with A_s= 13.4 m²**)

SWEP's B86 Subcooler
(**62 plates with A_s= 3.6 m²**)

EES-CHEST Model



HTHP's Components Selection

Compressor speed= 1500 rpm and HTHP's sink temperature= 133 °C

Component	Source [°C]	100	85	70	55
Compressor	Power input [kW]	13.21	**10.43**	7.89	5.86
	Ref. mass flow rate [kg/s]	0.39	**0.25**	0.15	0.081
Condenser	Capacity [kW]	41.98	**26.66**	16.27	9.13
	T_{cond} (bubble) [°C]	137.83	**136.76**	135.92	135.36
Subcooler	Capacity [kW]	38.85	**24.02**	14.12	7.19
	Total subcooling [K]	70.50	**67.38**	64.34	61.54
Evaporator	Capacity [kW]	71.31	**43.17**	24.72	12.13
	T_{evap} (dew) [°C]	89.08	**74.70**	61.05	47.07
Global Performance	Total heat provided [kW]	80.83	**50.68**	30.40	16.33
	COP_{HTHP} [-]	6.12	**4.86**	3.85	2.79

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