WESTERN TECHNOLOGICAL SOLUTIONS
BLRT GRUPP

Usable thermal energy stored in stratified Thermal Energy Storage Tanks as a function of temperature difference (ΔT)

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Typical Heating regime (Tsupply / Treturn)	ΔT (Tsupply - Treturn), K	Net water volume of the Thermal Energy Storage Tank, V_{net}							
		50 m³	80 m³	100 m³	150 m³	200 m³	300 m³	400 m³	500 m³
45 / 35 °C (low-temp buffer for heat pump) **50 / 40 °C** (low-temp buffer for heat pump) **55 / 45 °C** (low-temp buffer for heat pump) **60 / 50 °C** (low-temp buffer for heat pump)	10	522.5	836	1045	1567.5	2090	3135	4180	5225
50 / 35 °C (low-temp buffer for heat pump) **55 / 40 °C** (low-temp buffer for heat pump) **60 / 45 °C** (low-temp buffer for heat pump) **65 / 50 °C** (low-temp buffer for heat pump)	15	783.8	1254	1567.5	2351.2	3135	4702.5	6270	7837.5
50 / 30 °C (low-temp buffer for heat pump) **55 / 35 °C** (low-temp buffer for heat pump) **60 / 40 °C** (low-temp buffer for heat pump) **65 / 45 °C** (low-temp buffer for heat pump) **70 / 50 °C** (boiler based heating system) **75 / 55 °C** (boiler based heating system) **80 / 60 °C** (boiler based heating system) **85 / 65 °C** (boiler based heating system) **90 / 70 °C** (boiler based heating system) **95 / 75 °C** (boiler based heating system)	20	1045	1672	2090	3135	4180	6270	8360	10450
55 / 30 °C (low-temp buffer for heat pump) **60 / 40 °C** (low-temp buffer for heat pump) **65 / 40 °C** (low-temp buffer for heat pump) **70 / 45 °C** (boiler based heating system) **75 / 50 °C** (boiler based heating system) **80 / 55 °C** (boiler based heating system) **85 / 60 °C** (boiler based heating system) **90 / 65 °C** (boiler based heating system) **95 / 70 °C** (boiler based heating system)	25	1306.2	2090	2612.5	3918.8	5225	7837.5	10450	13062.5
60 / 30 °C (low-temp buffer for heat pump) **65 / 35 °C** (low-temp buffer for heat pump) **70 / 40 °C** (boiler based heating system) **75 / 45 °C** (boiler based heating system) **80 / 50 °C** (boiler based heating system) **85 / 55 °C** (boiler based heating system) **90 / 60 °C** (boiler based heating system) **95 / 65 °C** (boiler based heating system)	30	1567.5	2508	3135	4702.5	6270	9405	12540	15675
65 / 30 °C (low-temp buffer for heat pump) **75 / 40 °C** (boiler based heating system) **80 / 45 °C** (boiler based heating system) **85 / 50 °C** (boiler based heating system) **90 / 55 °C** (boiler based heating system) **95 / 60 °C** (boiler based heating system)	35	1828.8	2926	3657.5	5486.2	7315	10972.5	14630	18287.5
75 / 35 °C (boiler based heating system) **80 / 40 °C** (boiler based heating system) **85 / 45 °C** (boiler based heating system) **90 / 50 °C** (boiler based heating system) **95 / 55 °C** (boiler based heating system)	40	2090	3344	4180	6270	8360	12540	16720	20900
		Stored / Usable thermal energy (kWh)							

Assumptions:

1. Water as heat carrier, density ρ = 1000 kg/m³, specific heat capacity c = 4.18 kJ/kg·K, closed pressurized system.
2. Stratification efficiency factor η_s = 0.9 is assumed for well-designed stratified thermal energy storage tanks with low internal mixing.
3. Usable thermal energy calculated as: $\mathbf{Qusable = \rho \cdot Vnet \cdot c \cdot \Delta T \cdot \eta_s}$
4. For a given TES tank volume, usable thermal energy depends on temperature difference ΔT only;
   different supply/return regimes with the same ΔT result in the same stored energy.
5. Listed regimes represent typical design examples.