Solar-assisted LiBr – H_2O Absorption Systems for Air-conditioning Applications

UNSW
THE UNIVERSITY OF NEW SOUTH WALES

Never Stand Still | Faculty of Engineering | School of Mechanical and Manufacturing Engineering

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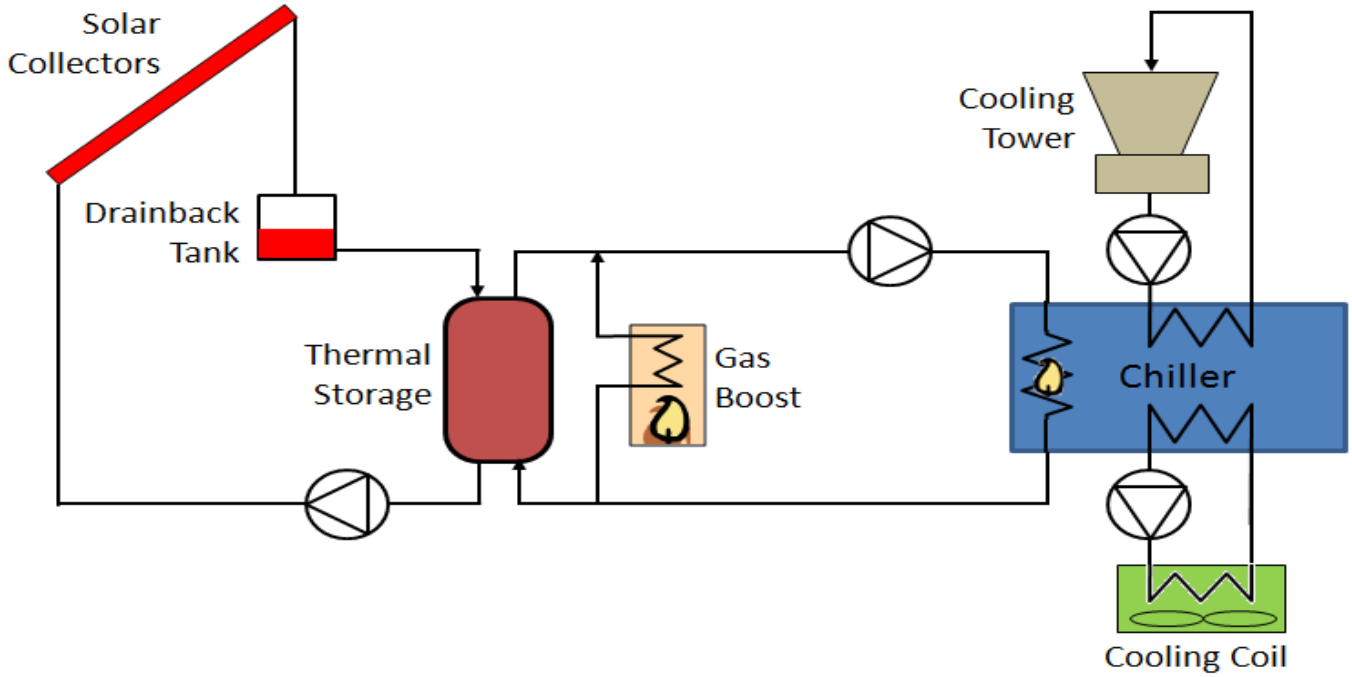
Why Solar Absorption Systems?

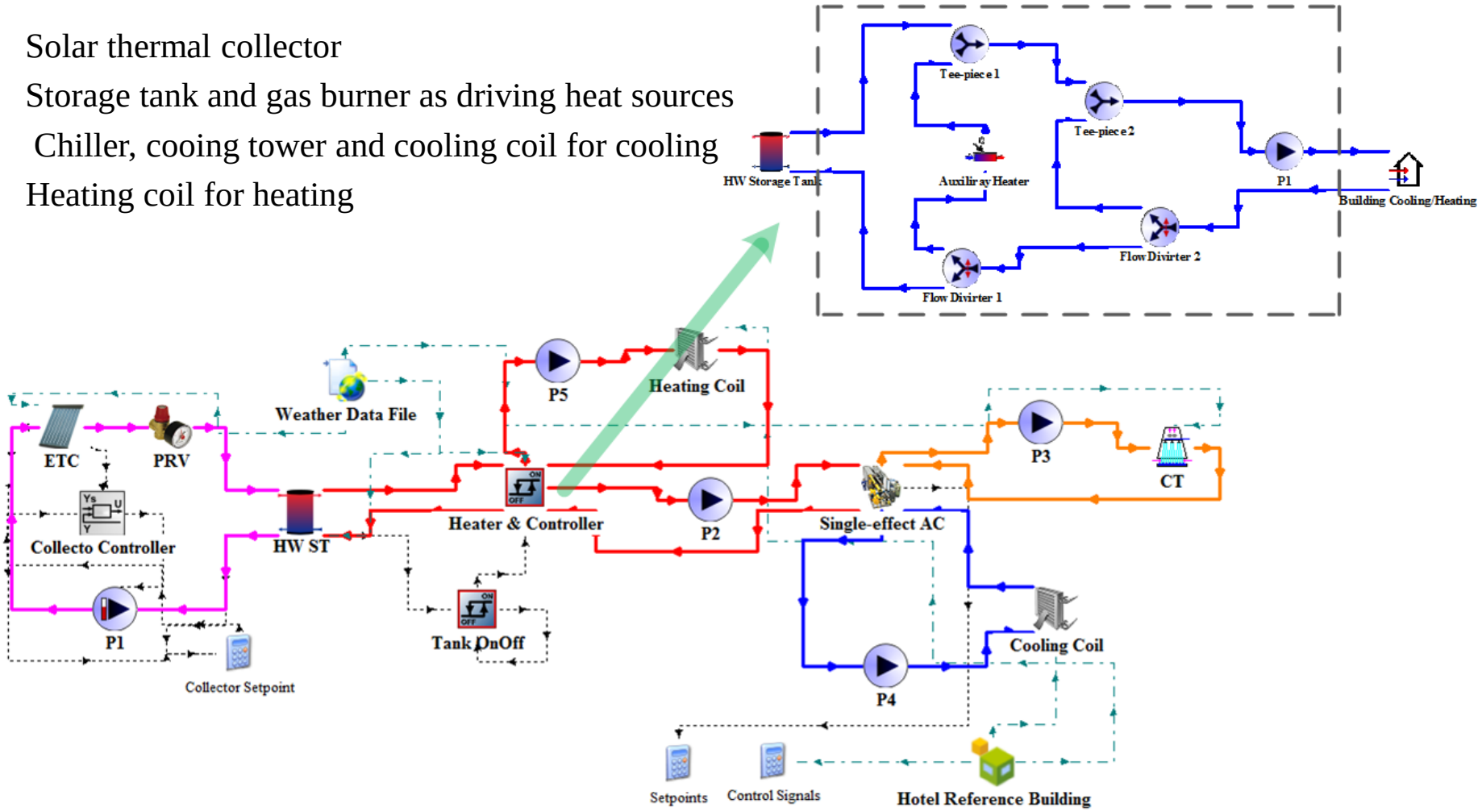


✓Absorption cooling technology is mature, low cost and supplied by numerous manufacturers.

✓Absorption chillers are more efficient than other thermal cooling processes, which means that less solar thermal energy is required to supply a given amount of cooling.

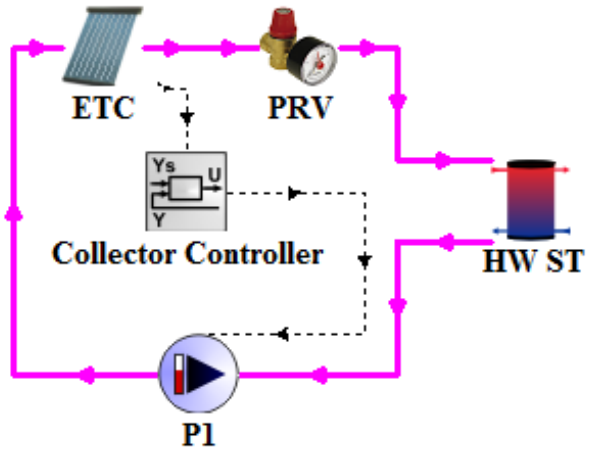
System layout in TRNSYS (Configuration 1)

1. Solar thermal collector
2. Storage tank and gas burner as driving heat sources
3. Chiller, cooing tower and cooling coil for cooling
4. Heating coil for heating



Control Strategy: solar collector

Variable Speed Pump to achieve a fixed set-point temperature at the SC outlet

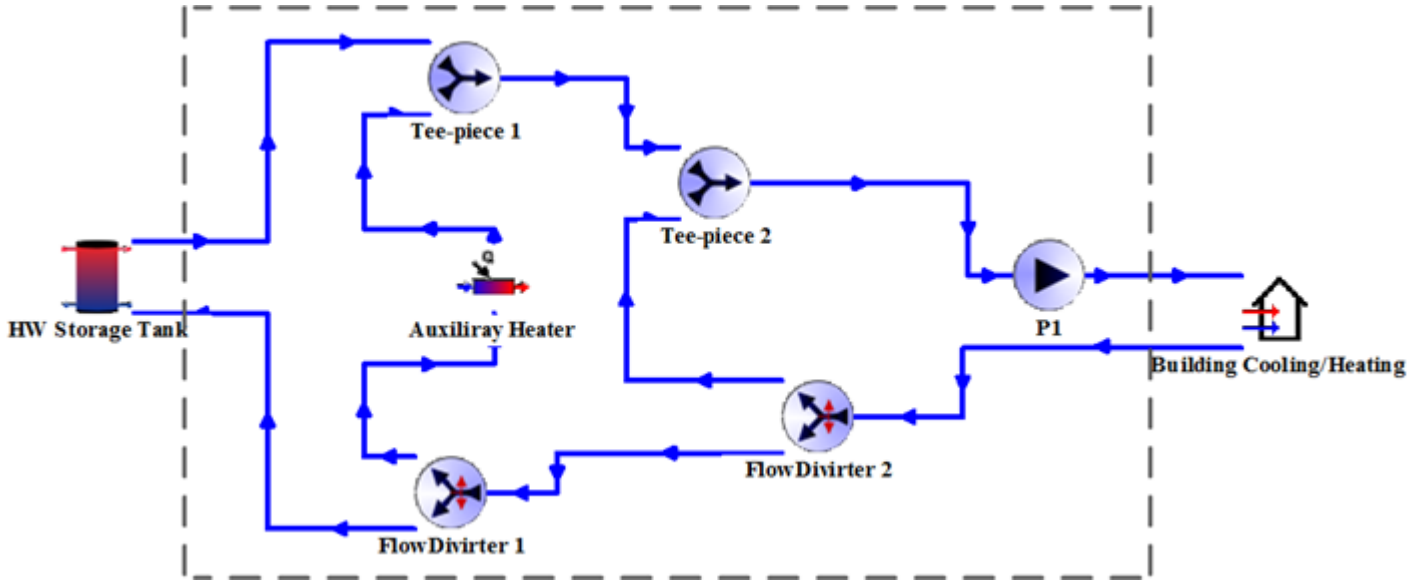


Creating relatively smooth operation because both the gas burner and the solar storage tank deliver hot water to the chiller at the same temperature

Preventing the risk of SC overheating in case of high solar radiation or low cooling load

High SC outlet temperatures can be achieved, even in case of low solar radiation

Control Strategy: hot water source controller

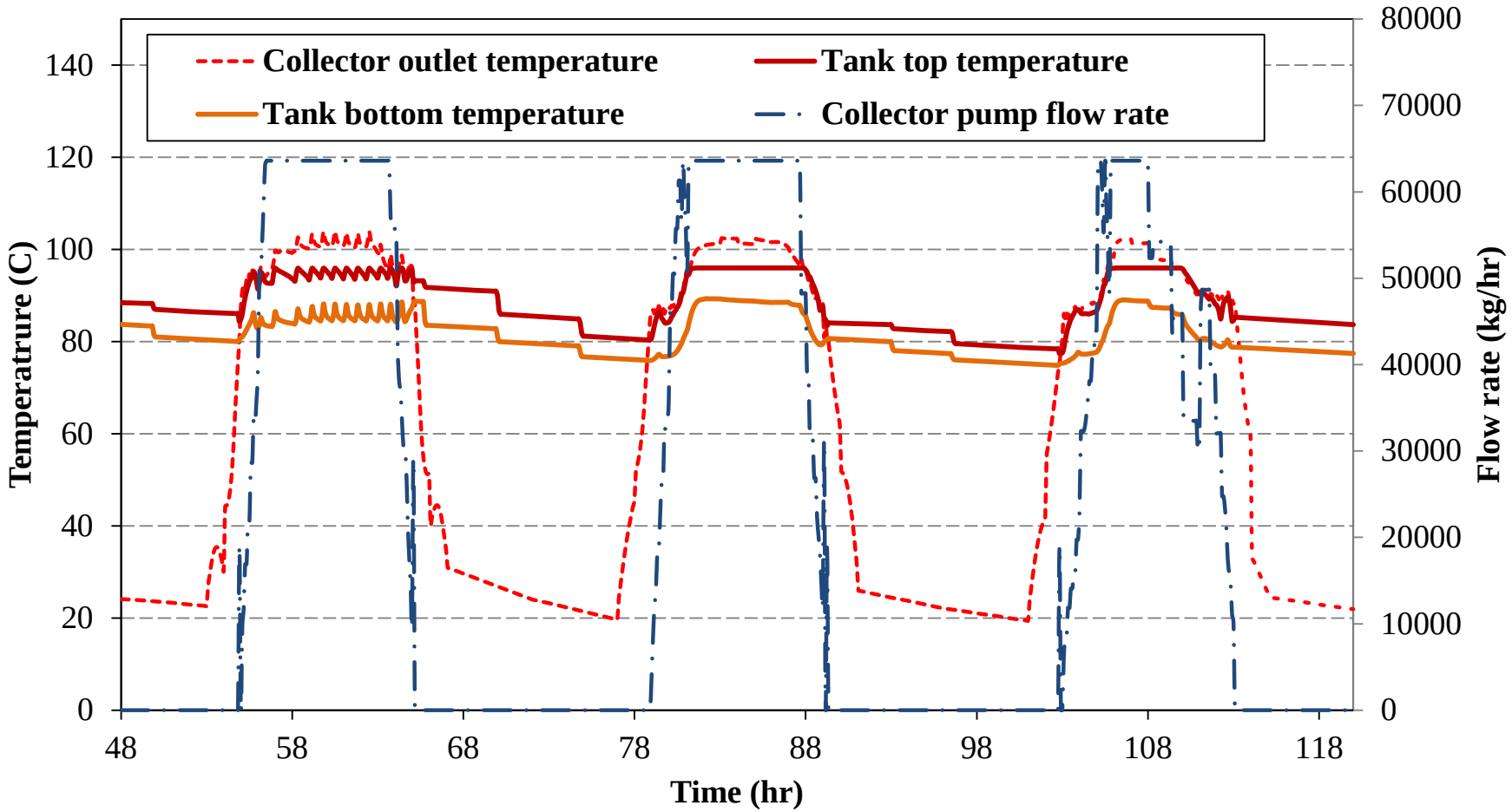


Good thermal stratification effect within the tank, so the cool water can be drawn off from the tank bottom to the SC

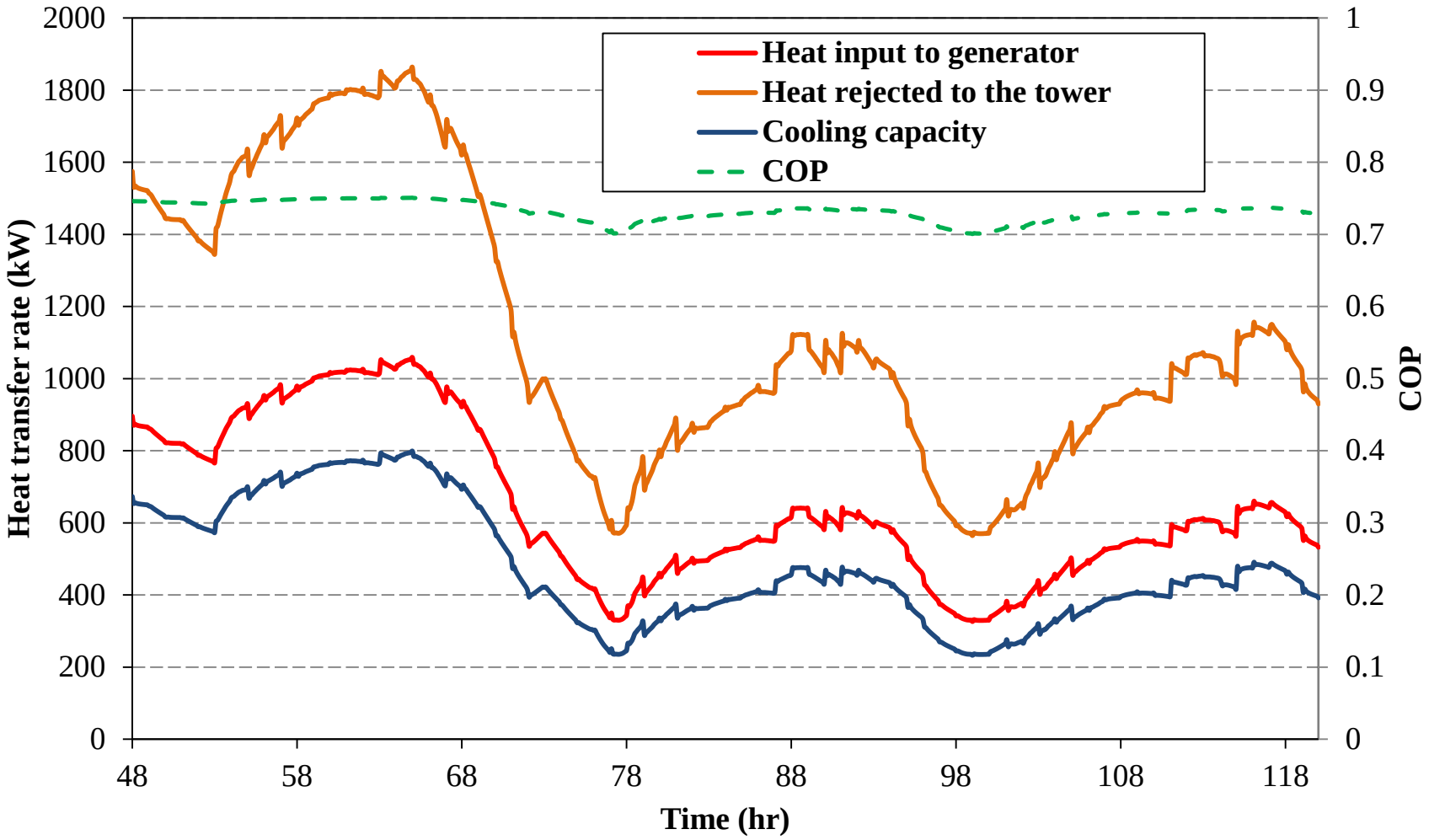
Higher collector efficiency, higher solar fraction, and lower heat losses at the tank

Simulation Results (for three summer days)

- **Collector and tank temperatures**



- **Heat transfer rates at the chiller**



- **The tank and burner on/off signals (Summer)**