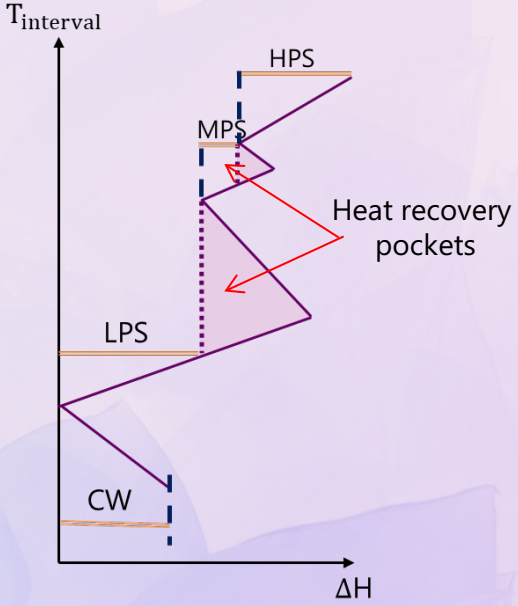
Grand Composite Curves (GCC)

- GCC obtained by using cascade from PTA
- Shows hot and cold utility requirements in enthalpy and temperatures
- Multiple utilities can be combined
- Pockets show total heat recovery



Typical utility levels

- Flue gas = 1800°C
- Hot oil ≥ 350°C
- High Pressure (HP) Stream = 220-260°C
- Medium (MP) Stream = 180-220°C
- Low Pressure (LP) Stream = 120 - 180°C
- Boiler feedwater / Air preheat ≤ 100°C
- Cooling water = 20-30 °C
- Refrigerant ≤ 10°C

Combined heat & power generation (CHP)

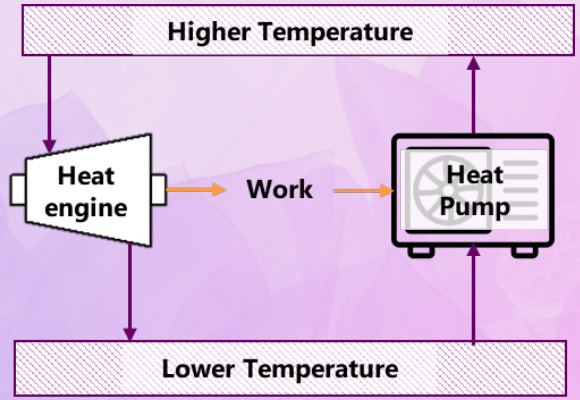
- CHP is an energy efficient technology that generates electricity & captures wasted heat to be used as hot utility
- Typically located where both electricity and thermal energy are required
- Can utilize heat engines and heat pumps

CHAPTER 5
Process Integration
Process Utility Systems

Determining the best utility placements for a specific process.

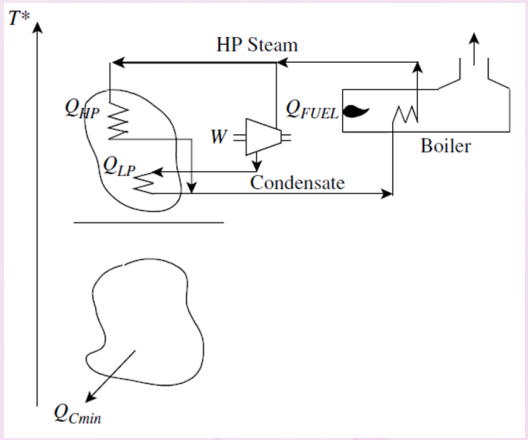
Heat engine & heat pump model

- Heat engines converts heat into power
- Common heat engines: Steam/gas turbines
- Heat pumps uses power to upgrade heat



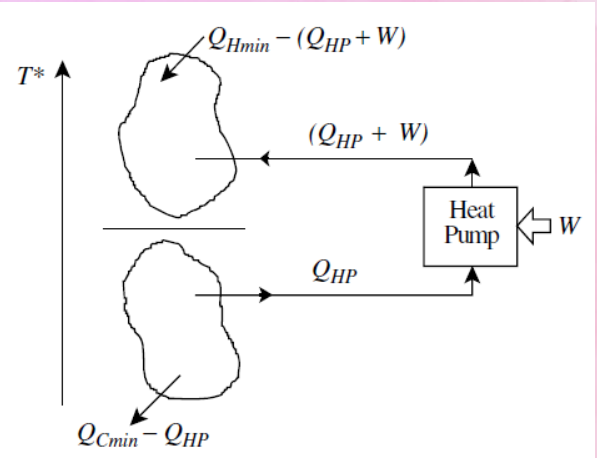
Heat Engine Placement

- Usually integrated above pinch
- Heat produce can become hot utility
- Heat converted to work



Heat Pump Placement

- Usually integrated across pinch
- Pumps from process source to sink
- Can save hot and cold utility



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