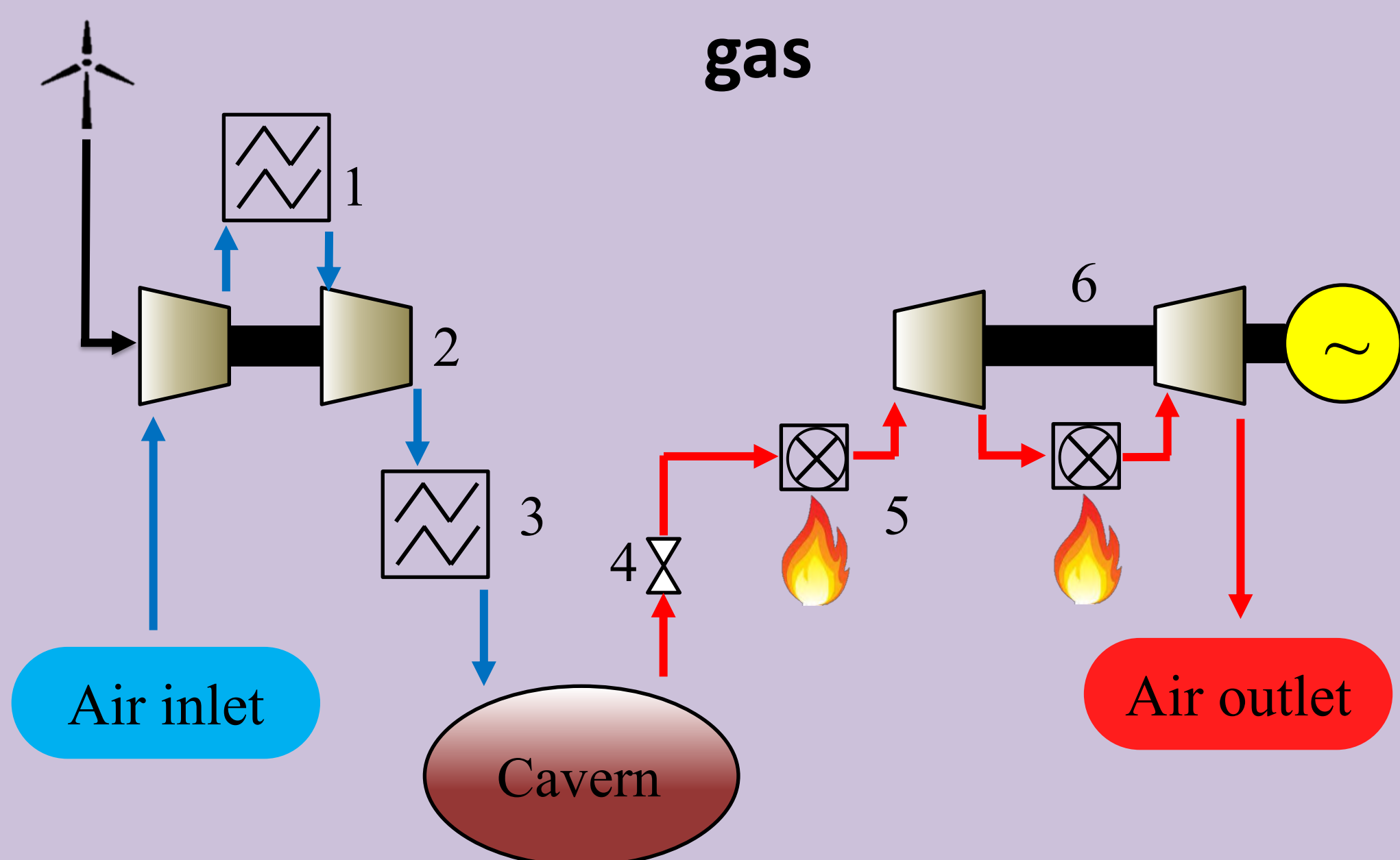


GRUPO INVESTIGACIÓN EN OPTIMIZACIÓN ENERGÉTICA, TERMODINÁMICA Y FÍSICA ESTADÍSTICA UNIVERSIDAD DE SALAMANCA

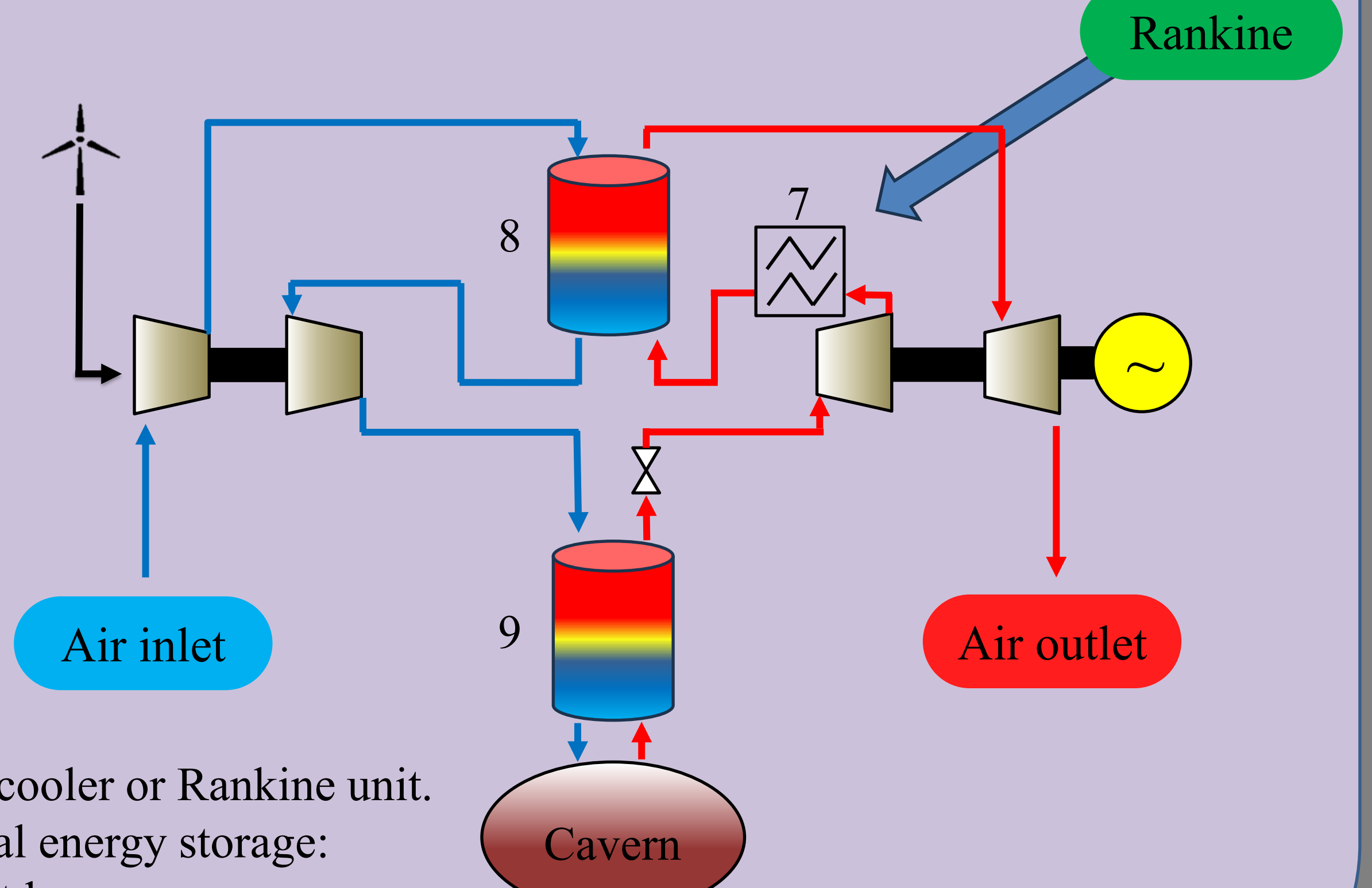
Compressed air energy storage

Huntorf plant in Germany: compressed air energy storage (CAES). However it uses natural gas



1-Intercooler. 2-Compressors. 3-Aftercooler.
4-Valve. 5-Combustion chambers. 6-Turbines.

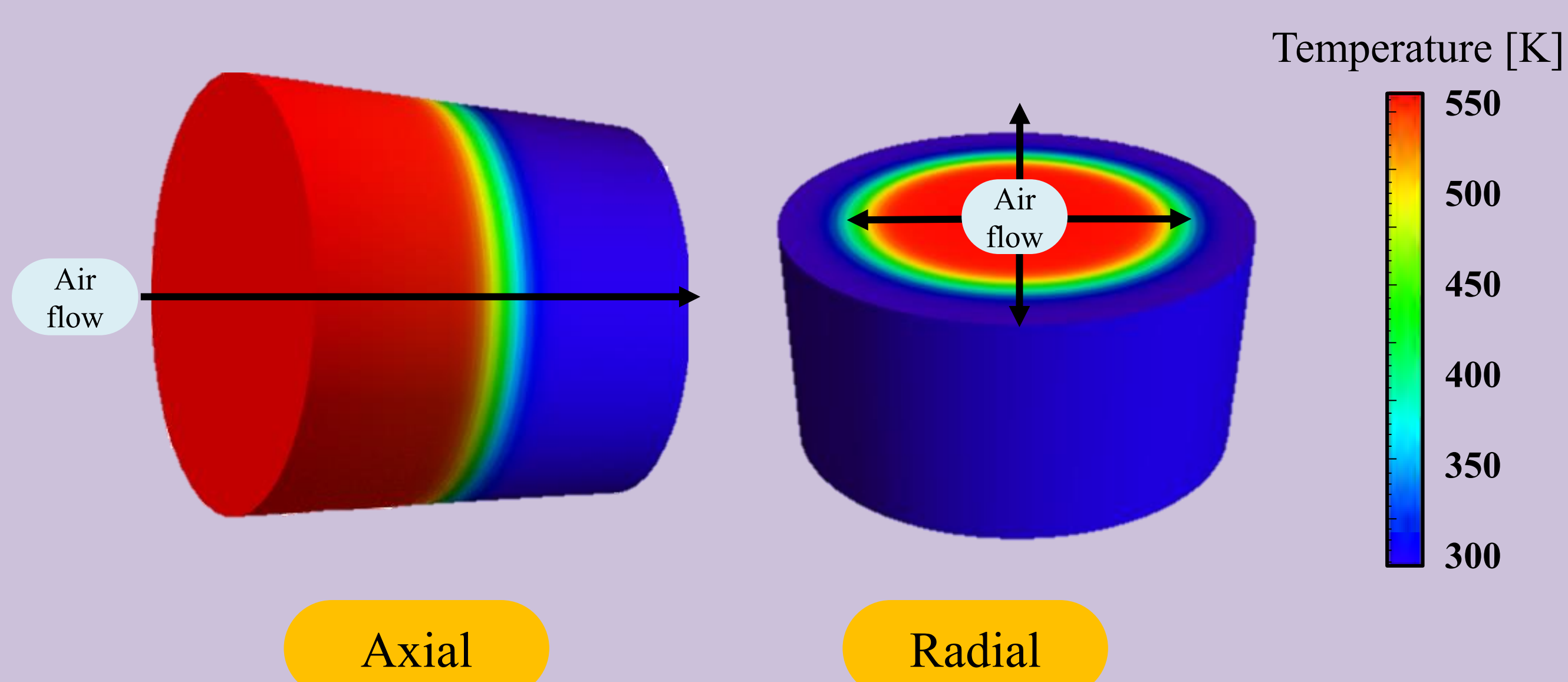
Use of thermal energy storage to avoid natural gas in combustion chambers: adiabatic CAES (ACAES)



7-Intercooler or Rankine unit.
Thermal energy storage:
8-At low pressure.
9-At high pressure.

Radial vs axial sensible TES

Air-rock thermal energy storage (TES). Radial geometry can achieve lower pressure drops



PTES with reciprocating compressors

Pumped thermal energy storage (PTES)

Ongoing work

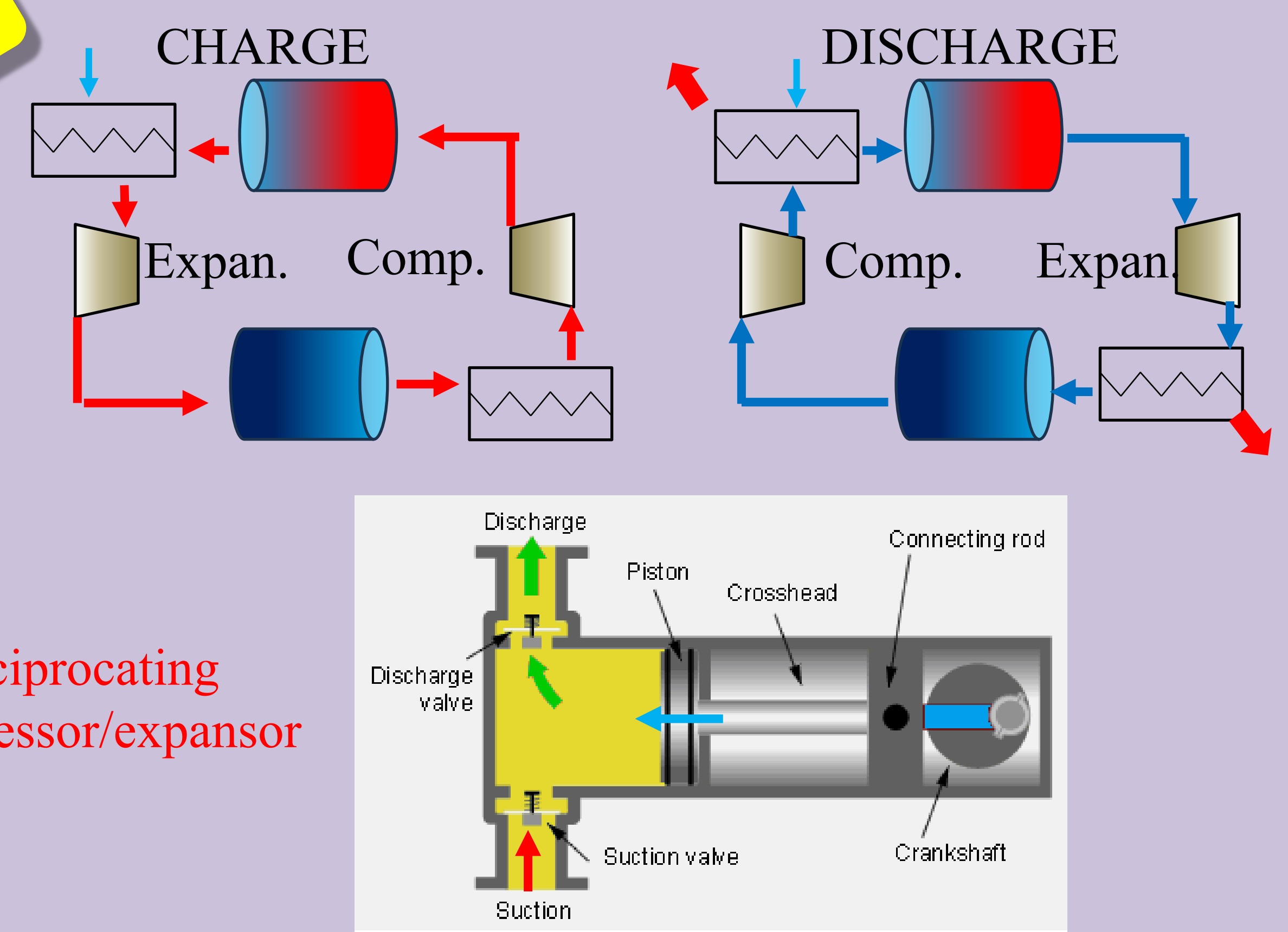
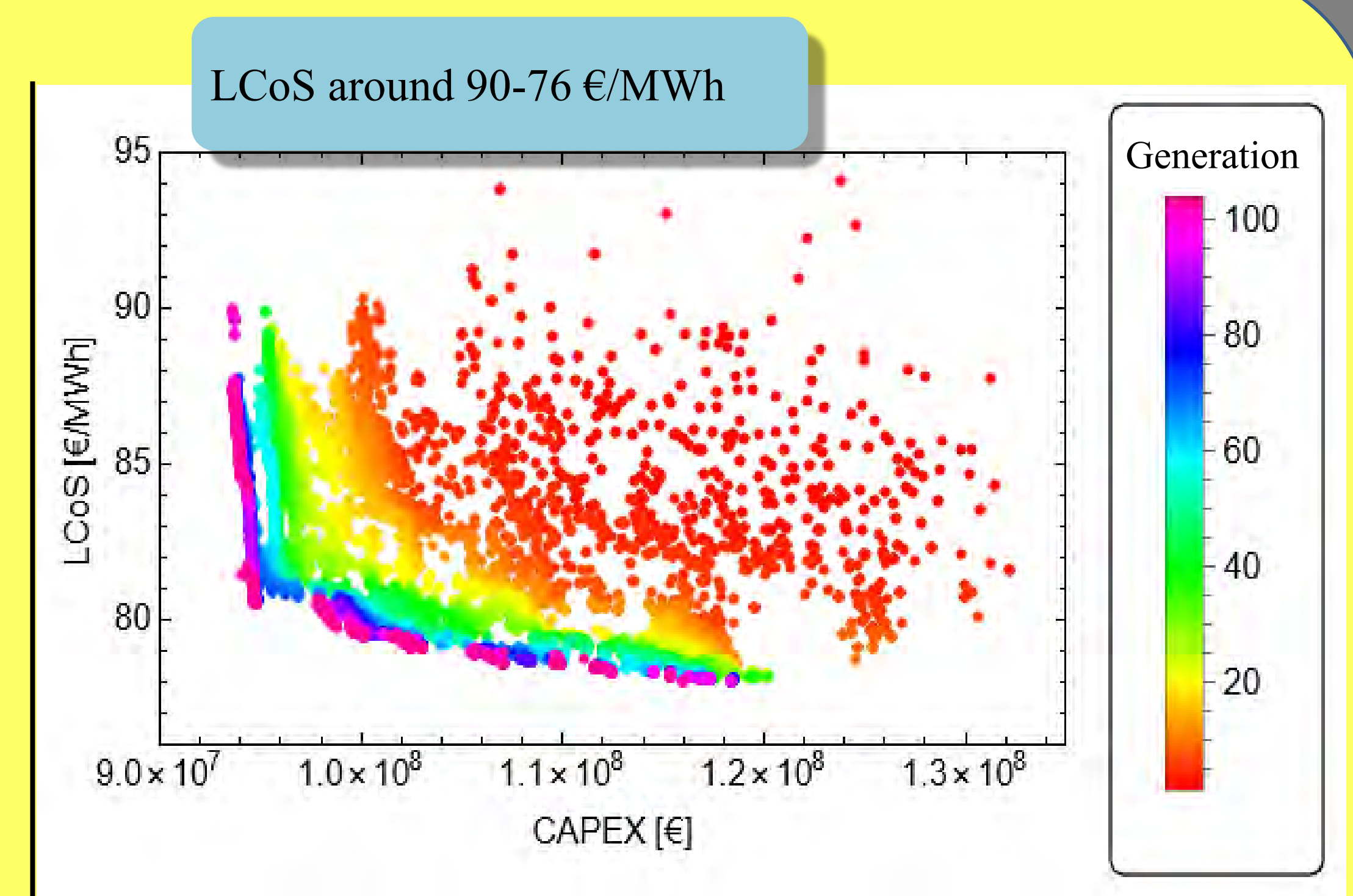
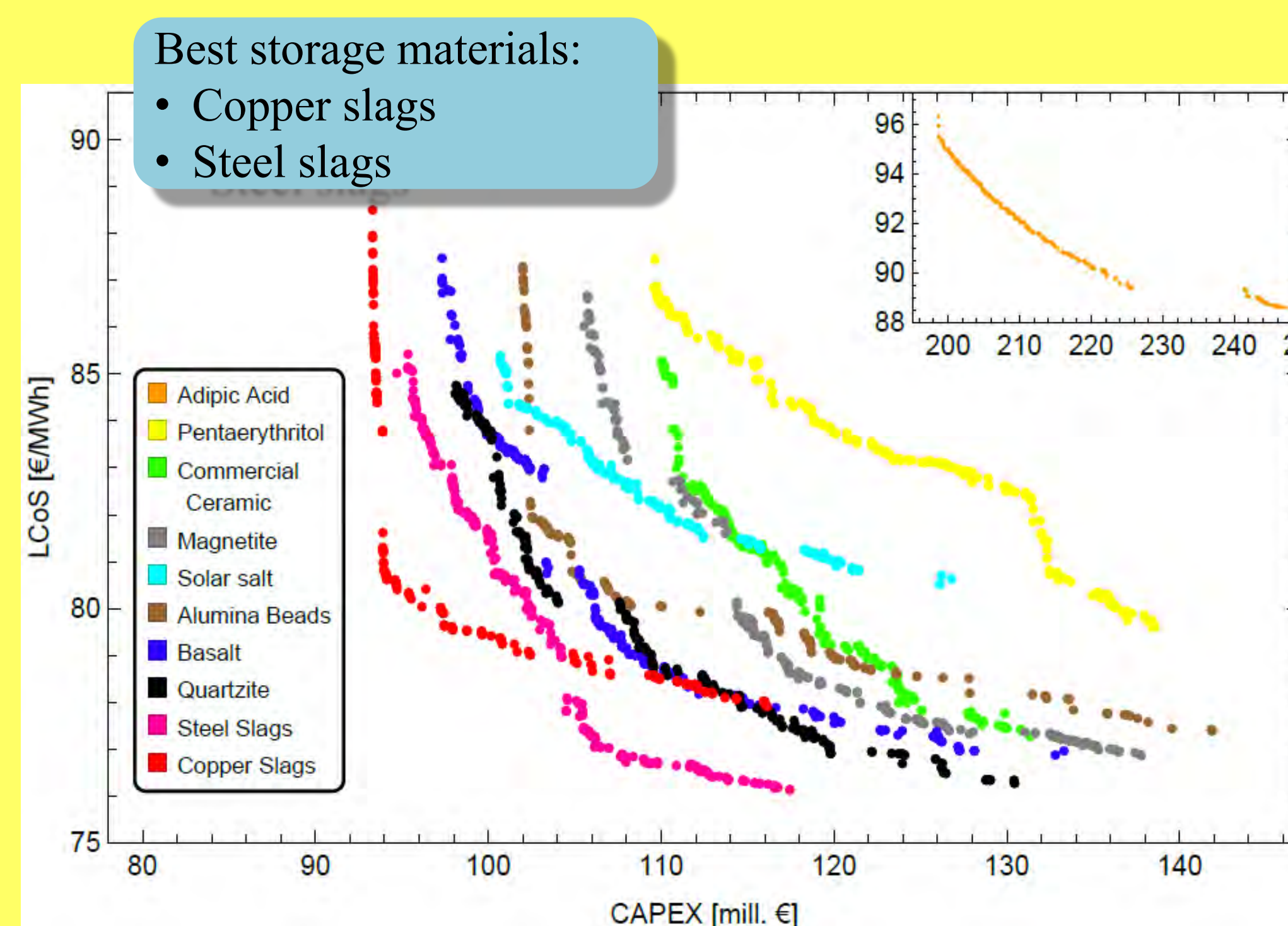


Image: www.dycompressorparts.com

Results

The round-trip efficiency (RTE) improves when TES is incorporated:

- RTE in Huntorf = 0.42
- RTE in adiabatic-CAES = 0.79



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