Technical Summary

Waste heat re-imagined

Product Highlights

With world-beating efficiency and by utilising free waste heat, lowest cost electricity.

Powers on when the sun's not shining and the winds not blowing.

Since the heat source that supplies thermal energy can be powered by virtually any kind of energy, the Barton engine is extremely versatile and has a wide range of applications.

Differentiation

- At a scale to fit in a shipping container, 33% of heat energy to electricity and a pathway to over 40%, compared to ORC typically 9 – 15%.
- Space required - 15m^2 for 75 kW compared to 620 m^2 for PV, <0.5% on a kWh basis.

Features

- Close-loop flowsheet gives high output from compact engine.
- Safe working gas (air).
- Modest temperatures and pressures allow standard materials.
- Process innovation - almost all components off-the-shelf.
- Air cooled – can provide heat up to 80ºC.
- No water required.

Technical

- Pressure range 9 – 17 bar.
- Temperature range 25 to 450ºC.
- Working gas air, 2.7 kg/s flowrate.
- Recuperation of heat in air stream from expander.
- Special features to reduce losses.

Applications

Any heat source over 400ºC including:

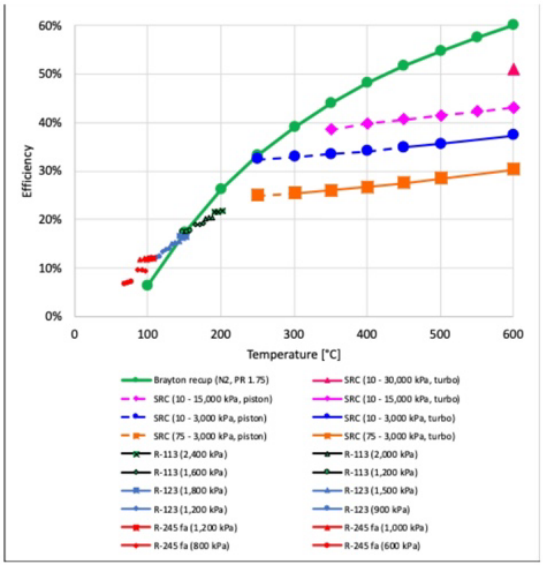
- Industrial (furnace) waste heat.
- Landfill gas.
- Biodigester gas.
- Exhaust heat from internal combustion engines.
- Biomass pyrolysis.
- Waste disposal.

Barton Engine - closed-loop recuperated piston-cylinder Brayton-cycle

The higher the temperature of the waste heat source, the greater the efficiency advantage.

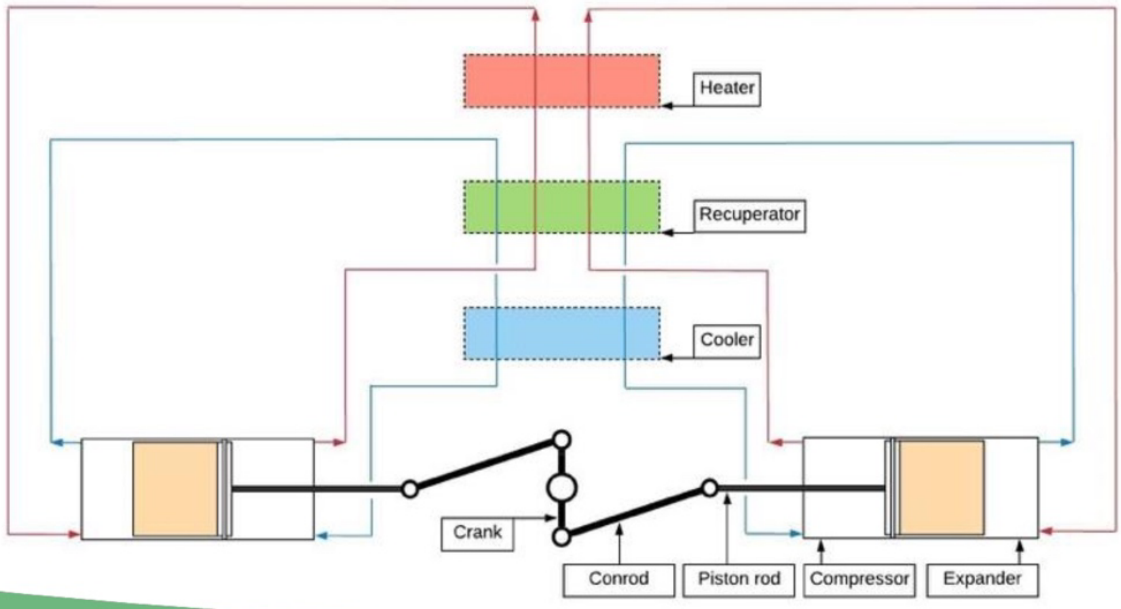
Carnot efficiency

Theoretical maximum efficiency of 60% at 600ºC compares favourably with Steam Rankine Cycle (SRC) and Organic Rankine Cycle (ORC) competitors. The graph shows Barton Engine with 100% recuperator effectiveness. SRC results are loss-free and ORC results have some losses.



The Flowsheet

The Barton engine is a heat engine; it converts heat (thermal energy) into mechanical energy. The heat source brings the air to the high temperature state. The air generates work (expander drives piston cylinder which then drives the generator). As the piston moves back in the exhaust stroke, hot air is pushed through the recuperator, which reclaims most of the heat, before being cooled to a low temperature state and compressed. The process then resumes.



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