

Technical Summary

waste heat re-imagined



Product Highlights

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

Controlled by a real-time smart energy platform.

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 shipping container scale, 33% of heat energy to electricity and a pathway to over 40%, compared to 9-15% typically from ORC.
- Space required - 15m² for 75 kW compared to 620 m² 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 – provides heat up to 80°C
- No water required.

Technical

- Pressure range 9 – 17 bar.
- Temperature range 25 to 450°C.
- Working gas air, 1.6 kg/s flowrate.
- Recuperation of heat in air stream from expander.
- Special features to reduce losses.

Applications

Any heat source over 300°C including:

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

Technical paper

See N G Barton, "Ericsson's 1833 'caloric' engine revisited", Paper #32, World Engineers Convention, Melbourne (20-22 November 2019).

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

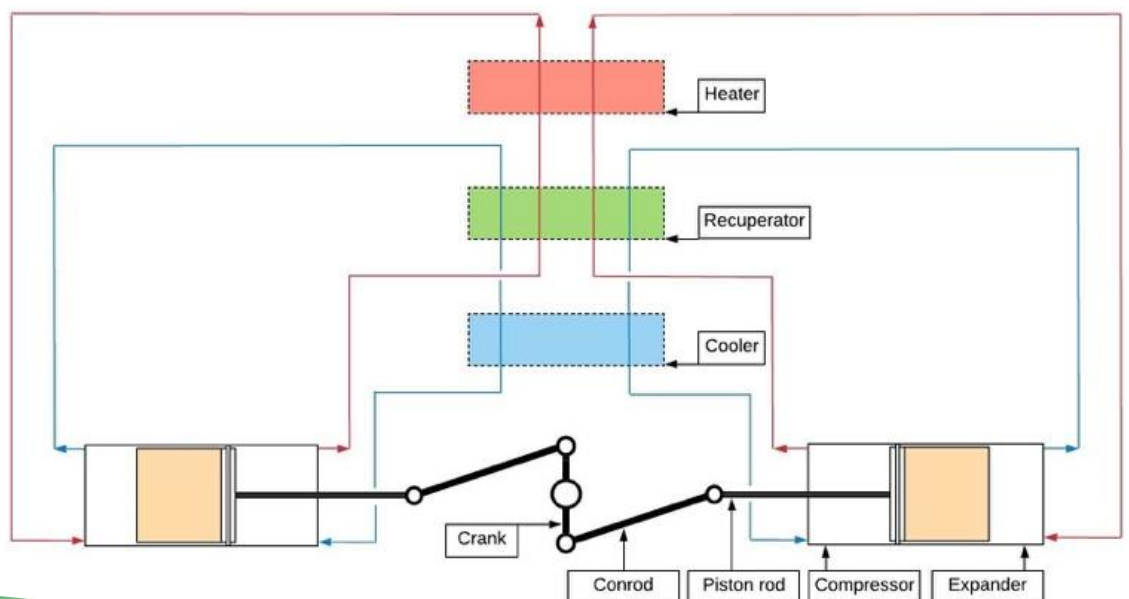
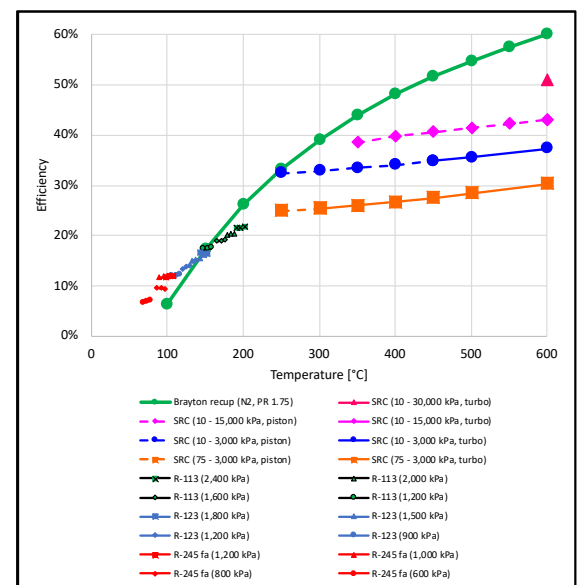
The higher the temperature of the waste heat source, the greater the efficiency advantage.

Excellent thermodynamic efficiency

Theoretical maximum efficiency of 60% at 600°C 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 (patent pending)

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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