Rankine Cycle Working Fluids for CC-OTEC Application

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CC-OTEC plant

- Boiler, condenser, turbine
- Initial cost
- Size of the equipment
- Working fluids
  - Toxicity
  - ODP
  - GWP
  - Vapor pressure
Refrigerant Shift

- **Before 1930s** – mainly natural fluids
  - Hydrocarbons, CO2, NH3 etc.

- **After 1930s** - Man made chemicals
  - CFCs
  - HCFCs
  - HFCs

- **After 2000** – Natural and low GWP fluids
  - Hydrocarbons, NH3, R152a, R32, R1234yf etc.
Vapor pressure

Sat. Pressure at 30°C

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Efficiency

Theoretical Rankine Cycle

Condition
Boiler Temp. = 28 °C
Condenser Temp. = 7 °C
Turbine Efficiency = 80 %

Efficiency (%)
0 1 2 3 4 5 6
R152a R134a R1234yf R290 R22 R1270 R32

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Equipment size

Volumetric Capacity at 30°C

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R32/R290

- Similar efficiency
- High pressure
- Smaller volume
- Good size reduction

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