Microgrid 2.0

October 30th 2018 Baltimore, MD

INTERNATIONAL DISTRICT ENERGY ASSOCIATION

Incorporating Absorption Cooling Technology Into Microgrids

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Johnson Controls

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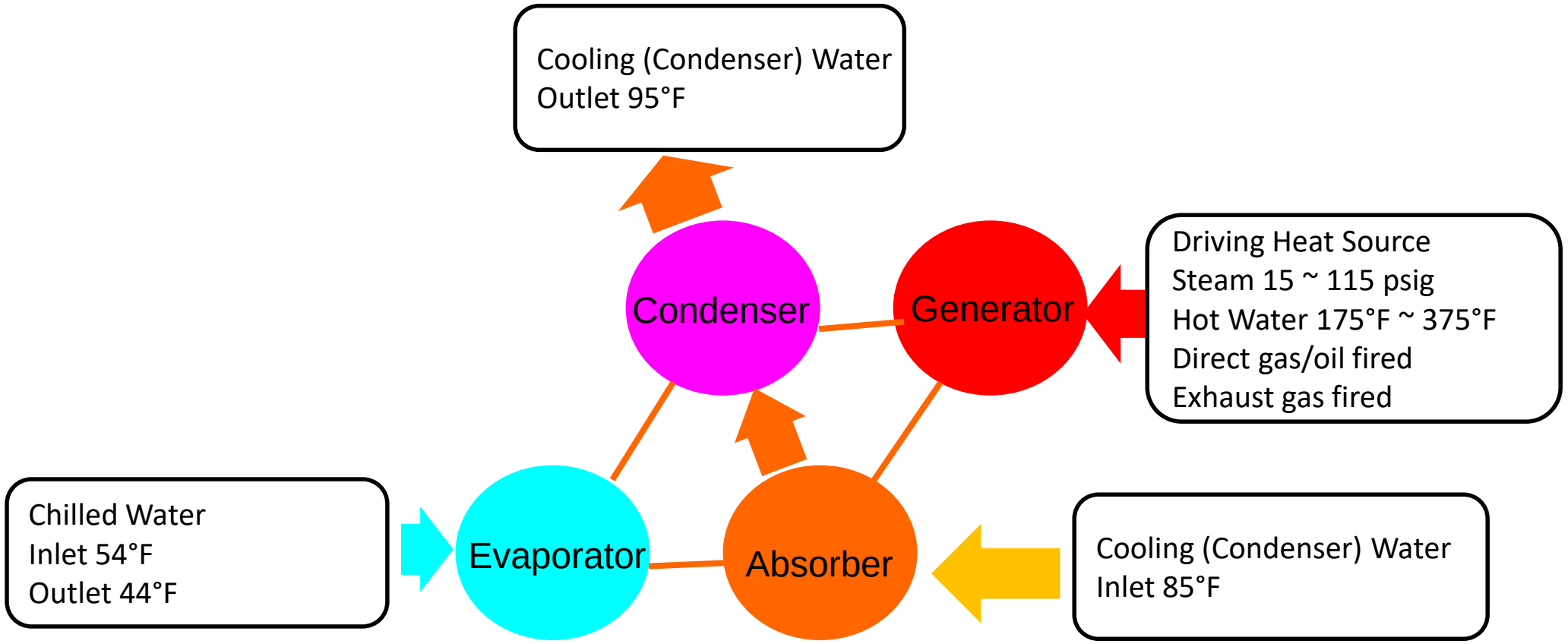
Learning Objectives

- Understand the application of absorption cooling technology

Outline

1. Overview – Absorption Cooling Technology
2. Solutions for Microgrid applications
3. Recap

Four Basic Components – Absorption Chiller
Refrigerant – Water, Absorbent – Lithium Bromide



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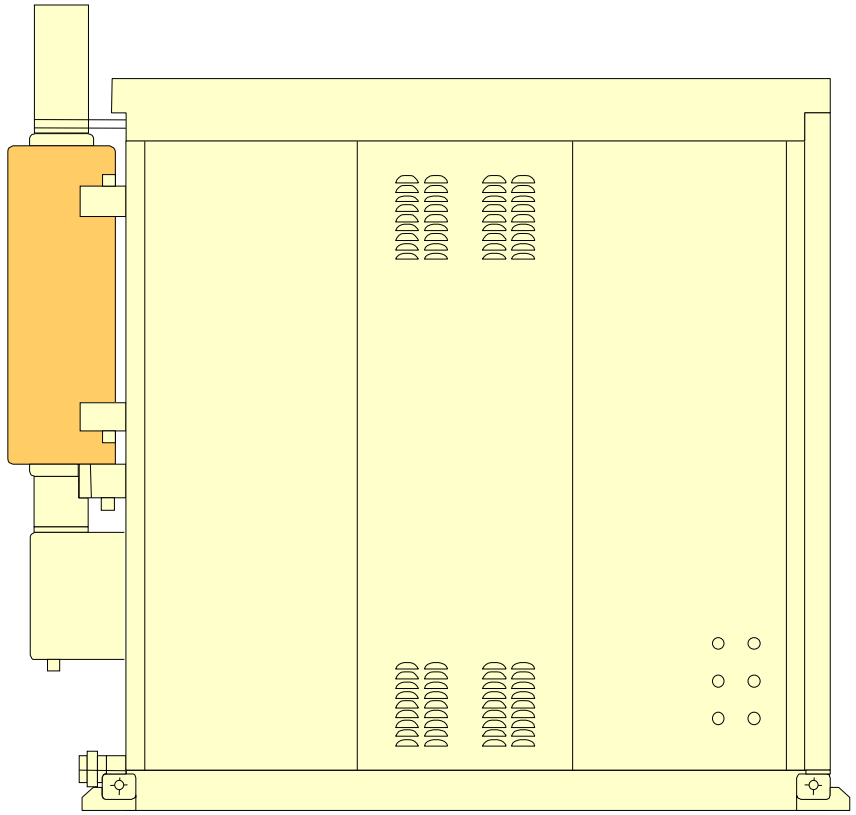
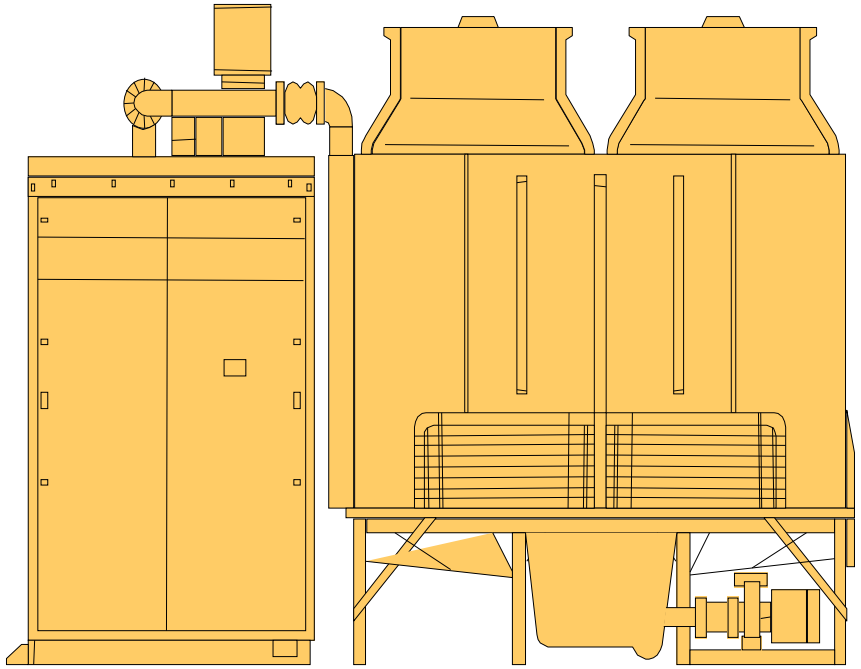
Overview of the Absorption Technology

1. Water as the refrigerant, Lithium Bromide as the absorbent
2. Driven by waste heat, low cost natural gas, renewable energy
3. Very less (negligible) electric consumption by the unit
4. Around ~ 75 years
5. Thousands of commercial, industrial installations worldwide

Small Direct Gas Fired Absorption Chiller
30 ~ 100 Tons



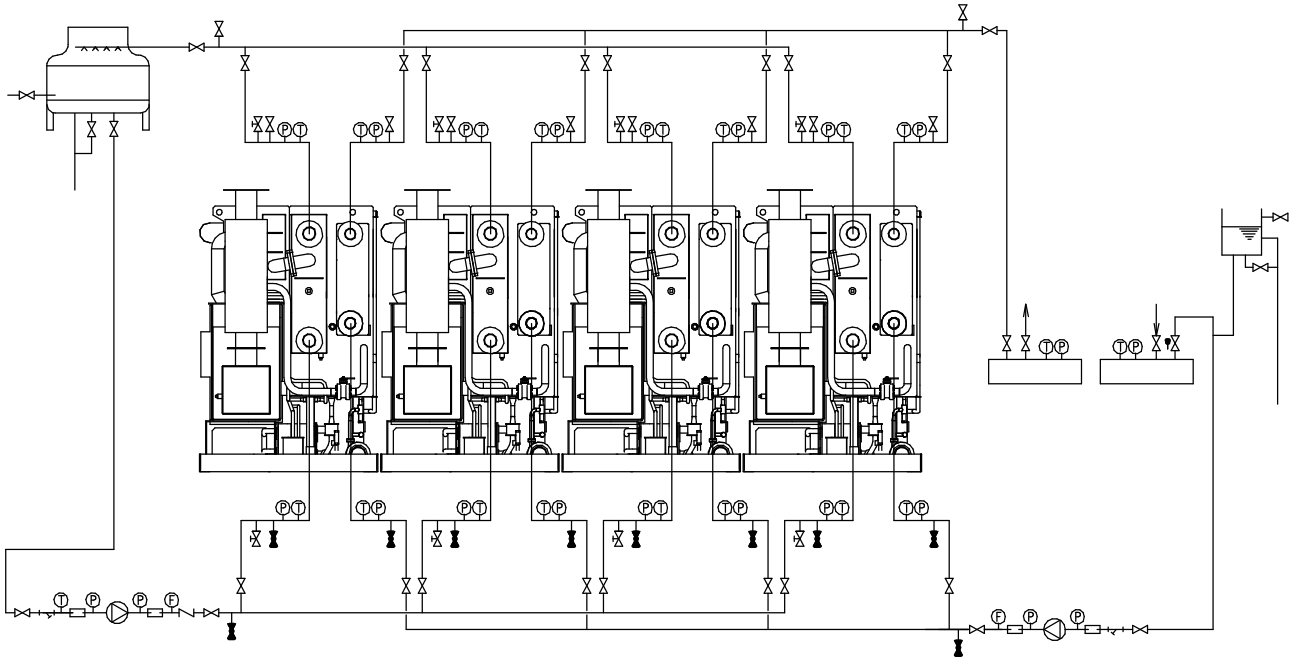
Outdoor Installation



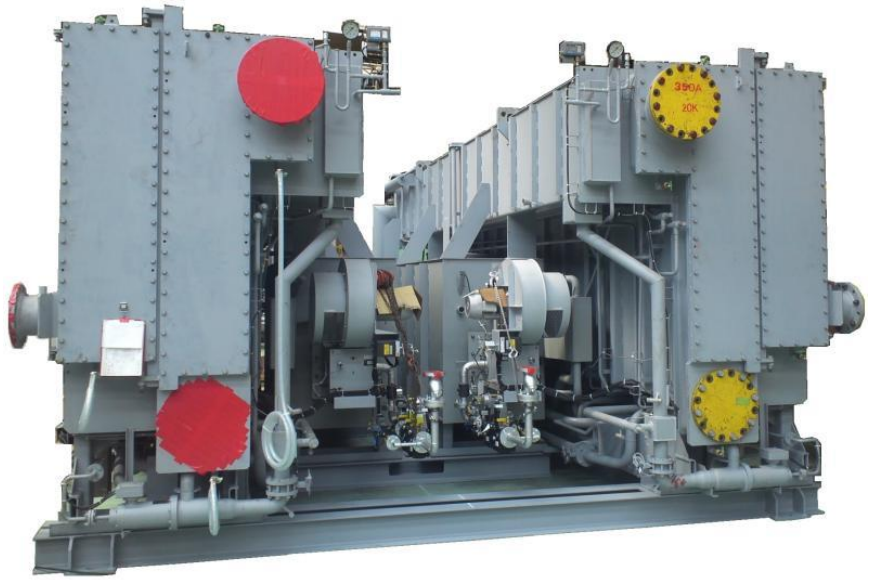
Packaged with pumps and cooling tower

Small Direct Gas Fired Absorption Chiller
30 ~ 100 Tons

Small Direct Gas Fired Absorption Chiller
30 ~ 100 Tons, Multiple Chillers



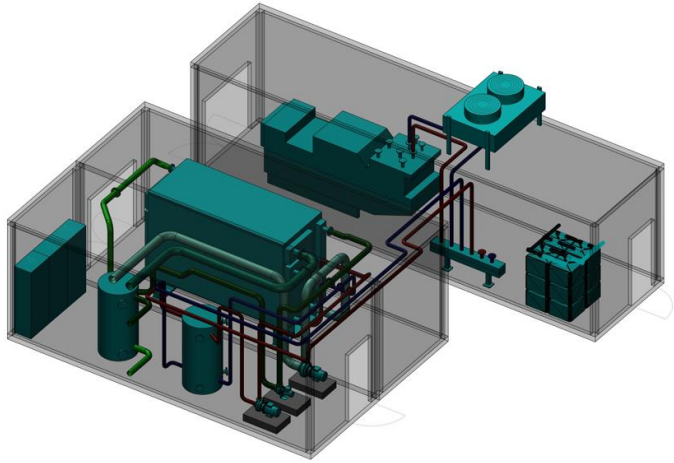
Large Direct Gas Fired Absorption Chiller Ultra Low NOx Emissions



Chiller, Heater, Simultaneous Cooling and Heating

Hot Water Driven Absorption Chiller
30 ~ 2000 Tons

- Driving hot water source from CHP (Combined Heat and Power)
  - Gas Engine
  - Micro-turbine
  - Fuel Cells
- Solar Thermal Collector
- Driving Hot Water 175˚F ~ 375˚F



Gas Engine Based CHP System

1.5 MW ~ 4.5 MW Electrical Output, 350 Tons ~ 800 Tons Cooling Output

Natural Gas
Input 4,649 KW

Gas Engine

Electrical Power Output 1,999 KW

Thermal Output 1,925 KW

> 85% Total System Efficiency

Absorption Chiller

Cooling Output 1,348 KW

Gas Engine Based CHP System Packaged Solution

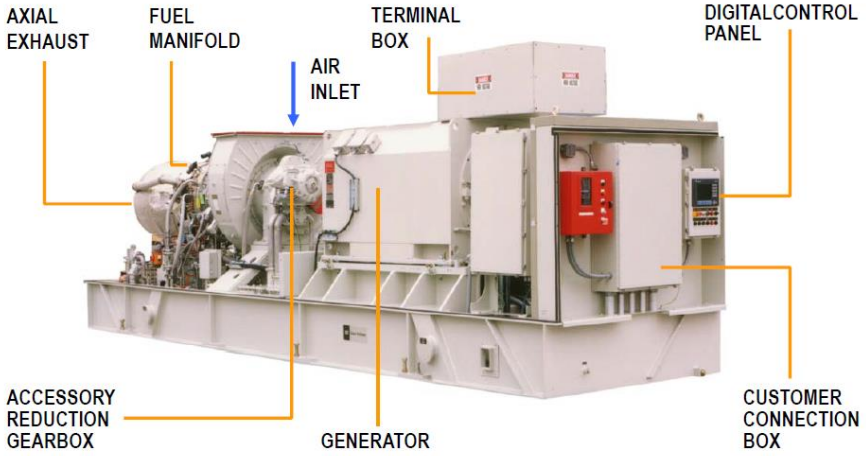
Micro-Turbine Based CHP System

65 KW ~ 950 KW Electrical Output, 25 Tons ~ 265 Tons Cooling Output

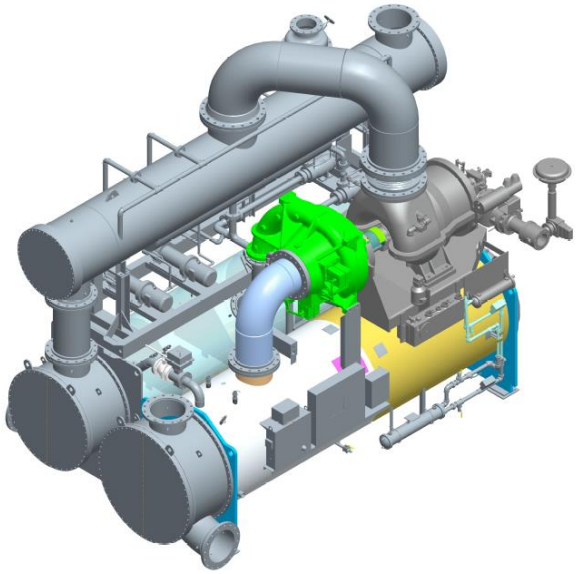
Typical Driving Hot Water Inlet/Outlet For Absorption Chiller 201˚F ~ 175˚F

Gas Turbine Based CHP System

1 MW ~ 22 MW Electrical Output, 1000 Tons ~ 10000 Tons Cooling Output



Gas Turbine

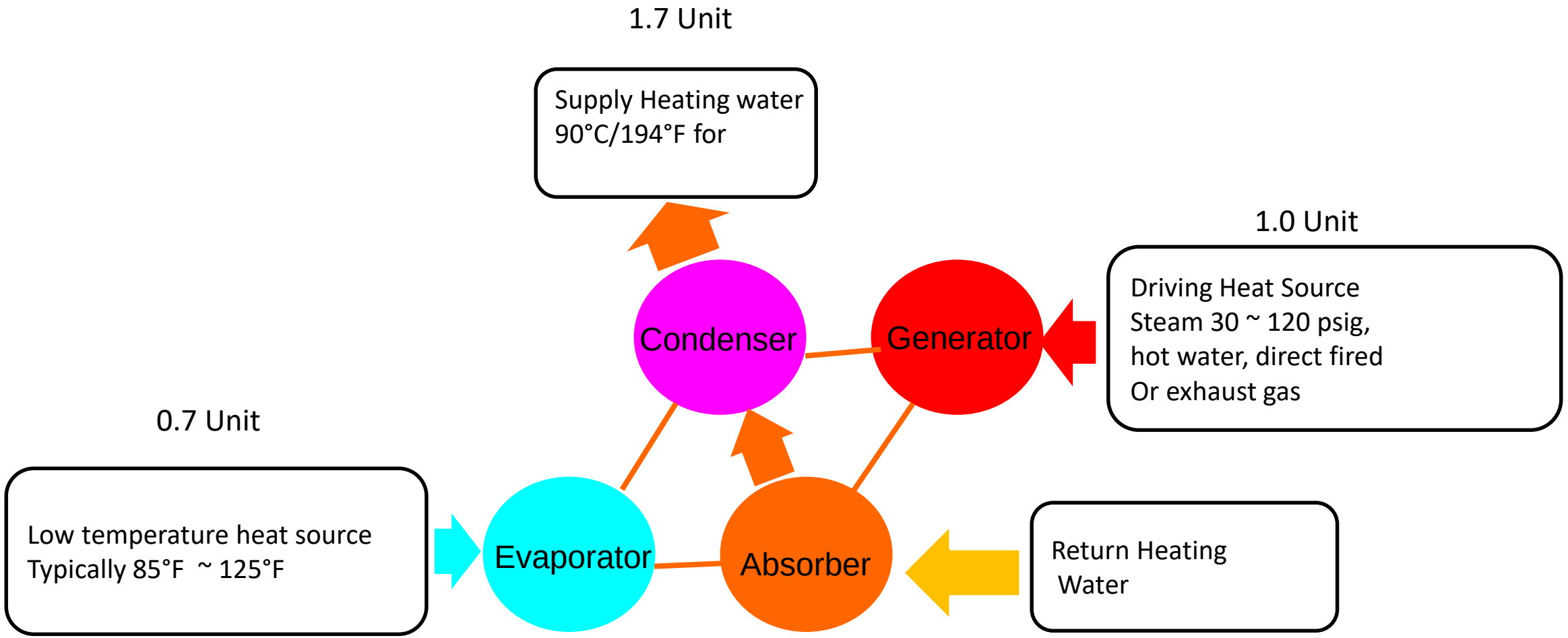


Steam Turbine Chiller

Double Effect Steam Absorber

Medium To High Pressure Steam Driving A Two Stage Absorption Chiller or a Steam Turbine Centrifugal Chiller

Innovative Absorption Heat Pump (Type I) Application Heating COP 1.7



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Recap – Don’t waste the waste heat

1. Driven by waste or low cost heat
2. Water as the refrigerant
3. Ideal for CHP (combined heat and power) system
   – gas engine, fuel cells, gas turbines, micro-turbines
4. Save energy, water and cut emissions
5. Increase resiliency, reduced dependence on the grid
6. Truly green sustainable solution

Acknowledgements

- Hitachi-Johnson Controls A/C Japan
  - Shuichiro Uchida
- AB Energy
- CEFLA
- Solar Gas Turbines
- eFinity (Capstone Micro-turbines)

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Thank you for attending

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http://york.com/absorption-chillers

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