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One Year On – Transcritical CO₂ Heat Pump System Providing Lower Cost Heat Than Oil Boilers – Alaska

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Alaska SeaLife Center

YourCleanEnergy - Mission Statement

- History:** Providing clean energy consulting (financial evaluation & design) services to commercial and municipal clients in Alaska since 2006.
- Specialize in sea water heat pump evaluation & design.
- Successful clean energy projects are ones that are:
 - **Affordable** **Reliable** **Safe**

Your Clean Energy

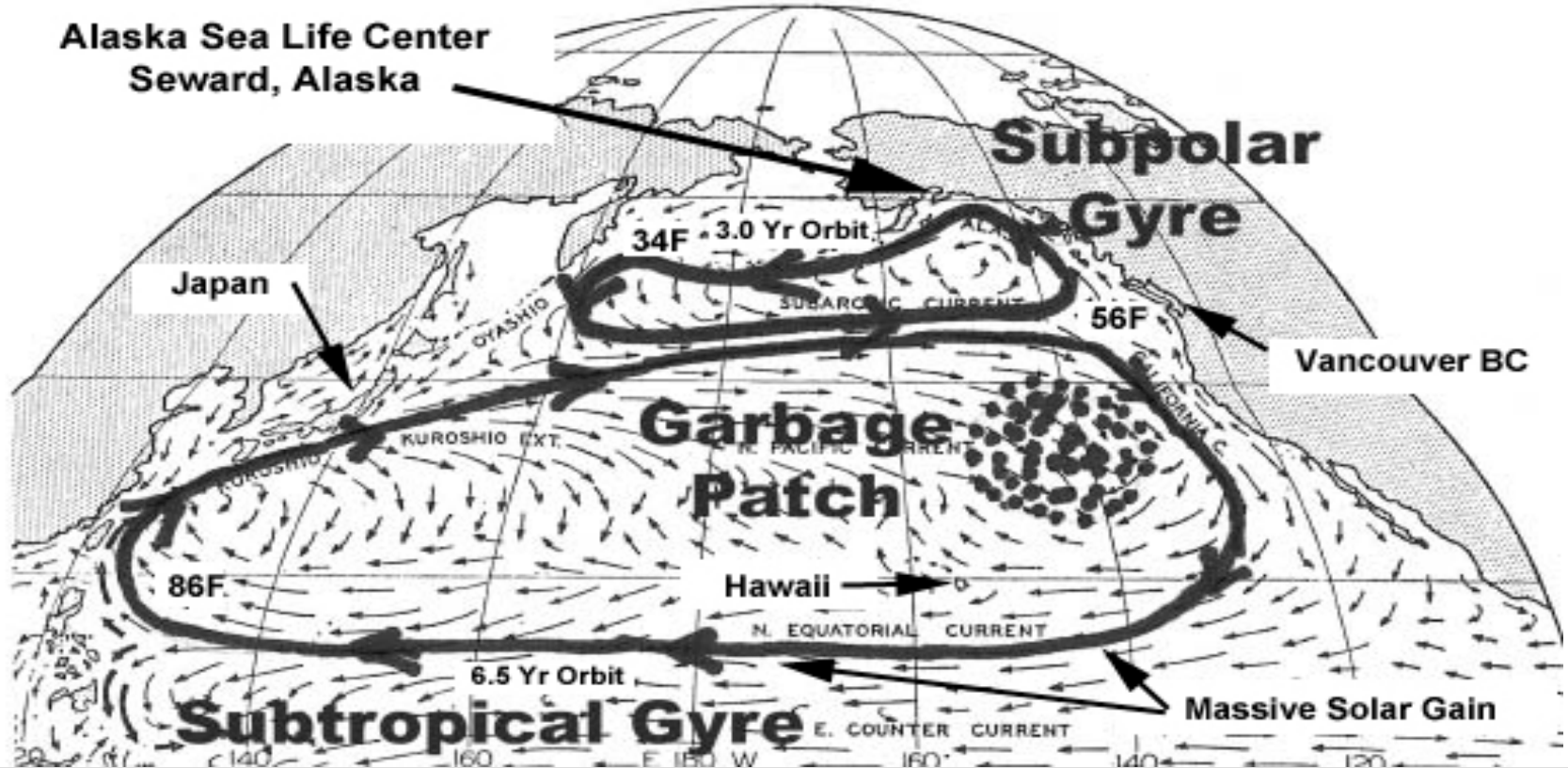


Celebrate the power of nature...™

Ocean Heat In Seward AK = Utility Grade Resource



Ocean Gyres Move Heat From Equator To Alaska



Transcritical Heat Pumps From Mayekawa Selected Due To High Load Side Output Temperature

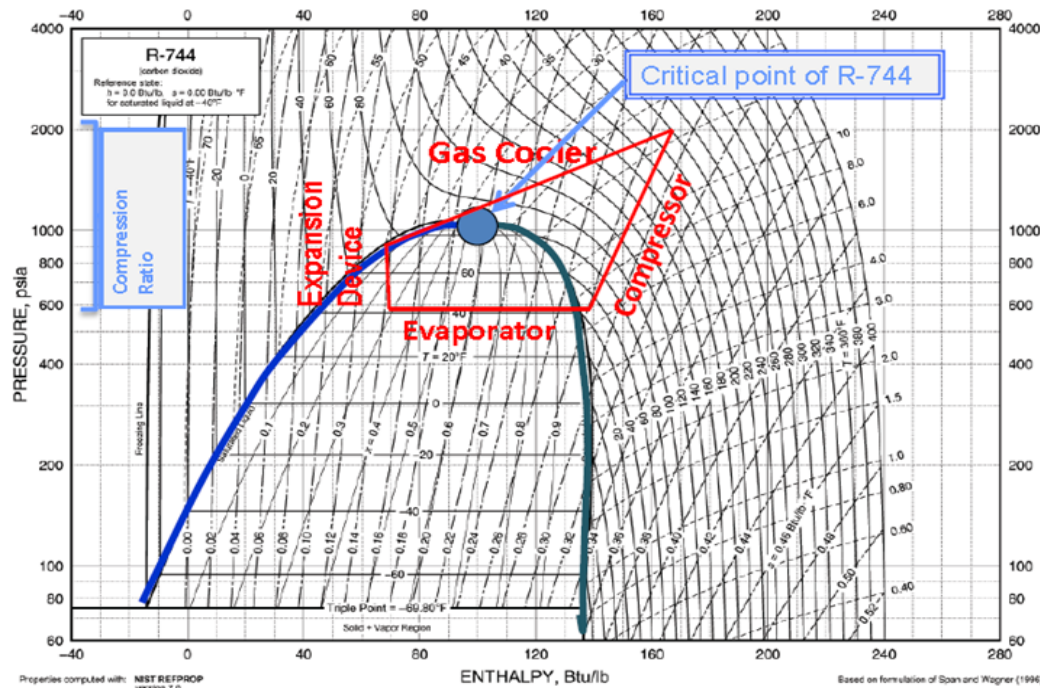


Fig. 18 Pressure-Enthalpy Diagram for Refrigerant 744 (Carbon Dioxide)

30.38

2009 ASHRAE Handbook—Fundamentals

- Heat rejection occurs above critical point of refrigerant
- No condensation of CO₂ in the Trans-critical cycle
- Gas cooler temperature decreases throughout entire heat rejection process
- High temperature difference across gas cooler achieved for hot water heating purposes



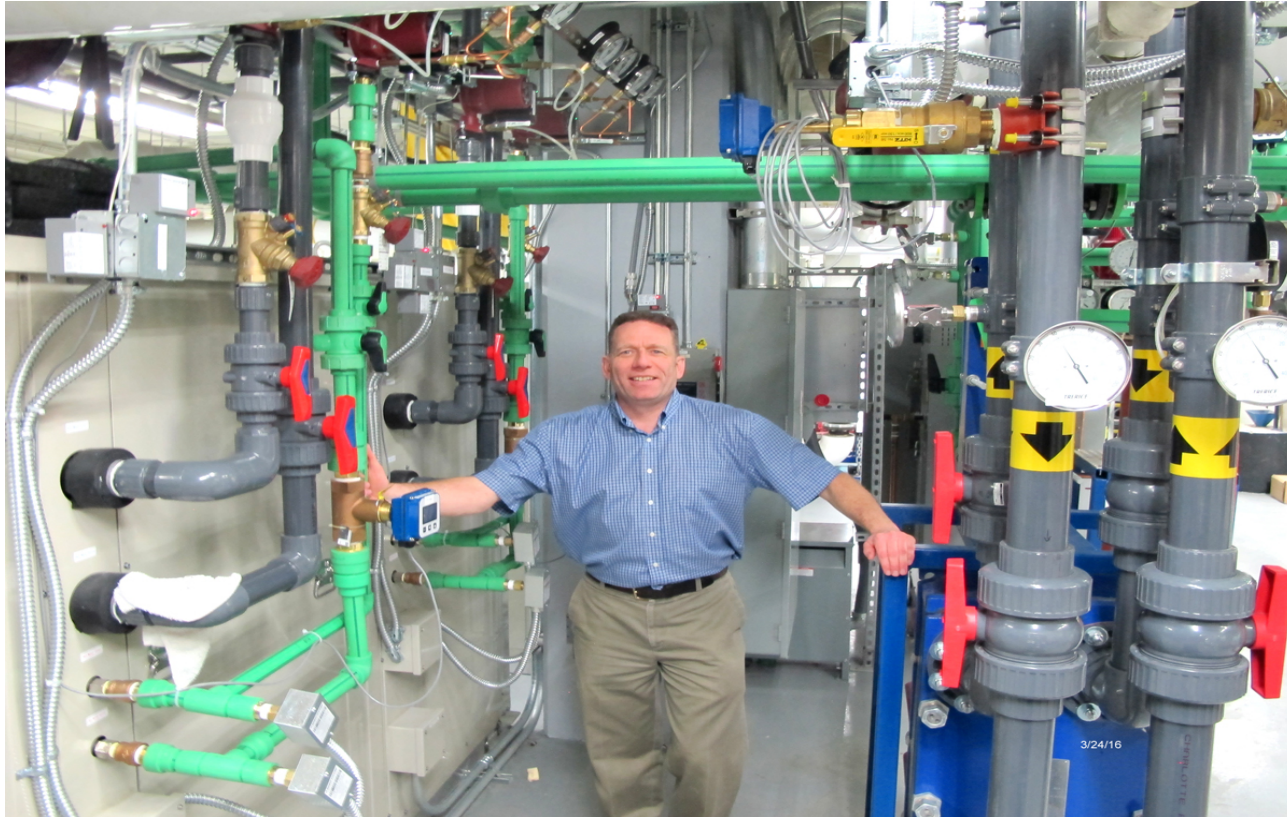
Compression & Gas Cooling Occur Above And Below Critical Point

Four 20 Ton Trans-critical CO2 Heat Pumps Installed Jan 2016



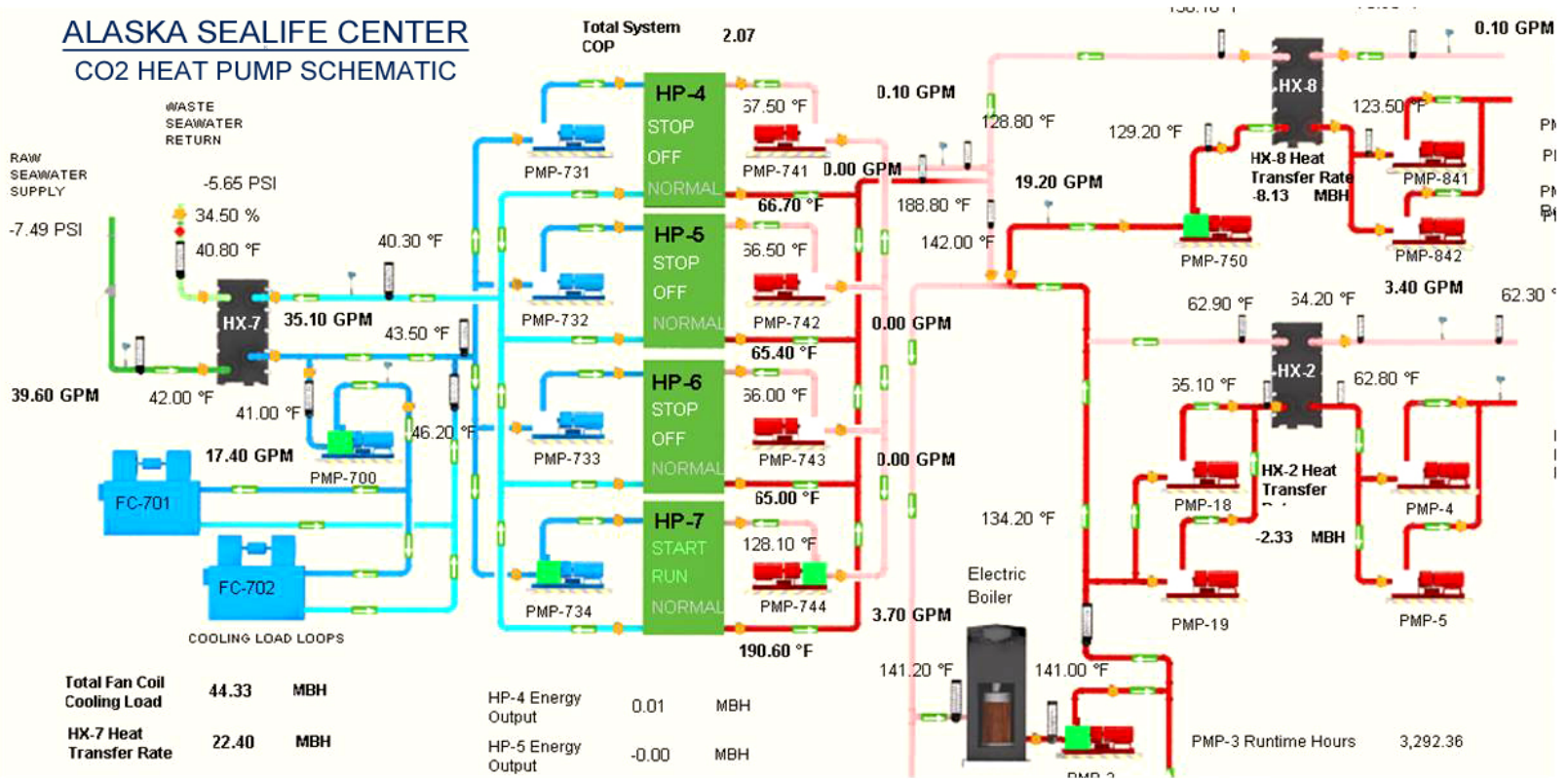
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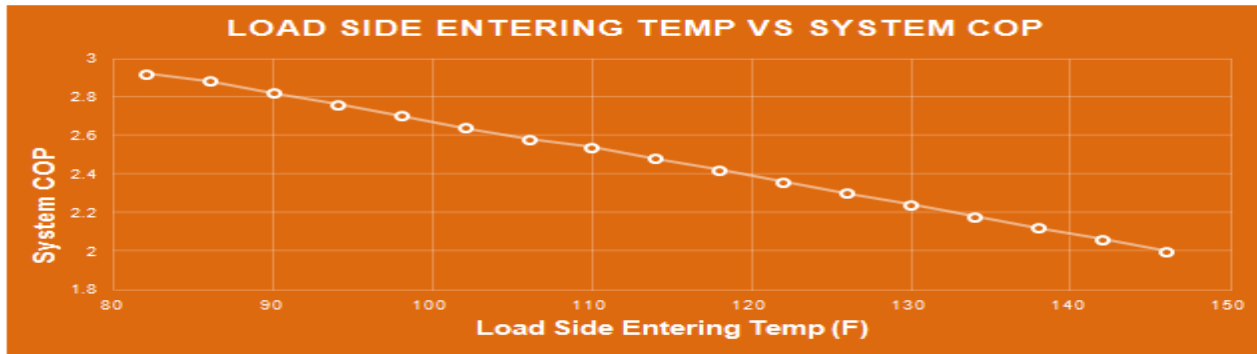
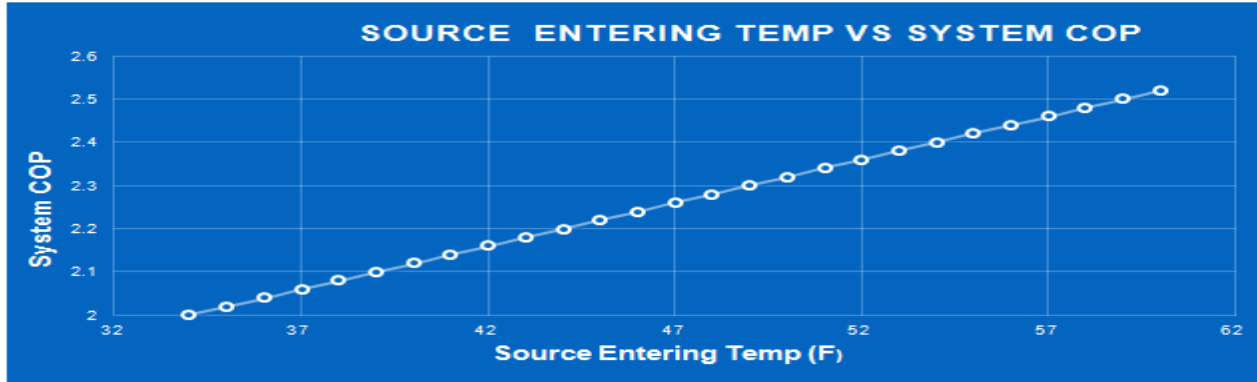
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ALASKA SEALIFE CENTER CO2 HEAT PUMP SCHEMATIC



Data From Winter Season 2016/2017

Source & Load Temps vs. System COP





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Thank you very much!

