



GovEnergy

www.govenergy.gov

The Premier Energy Training Workshop
and Trade Show for Federal Agencies

A River of Energy Solutions

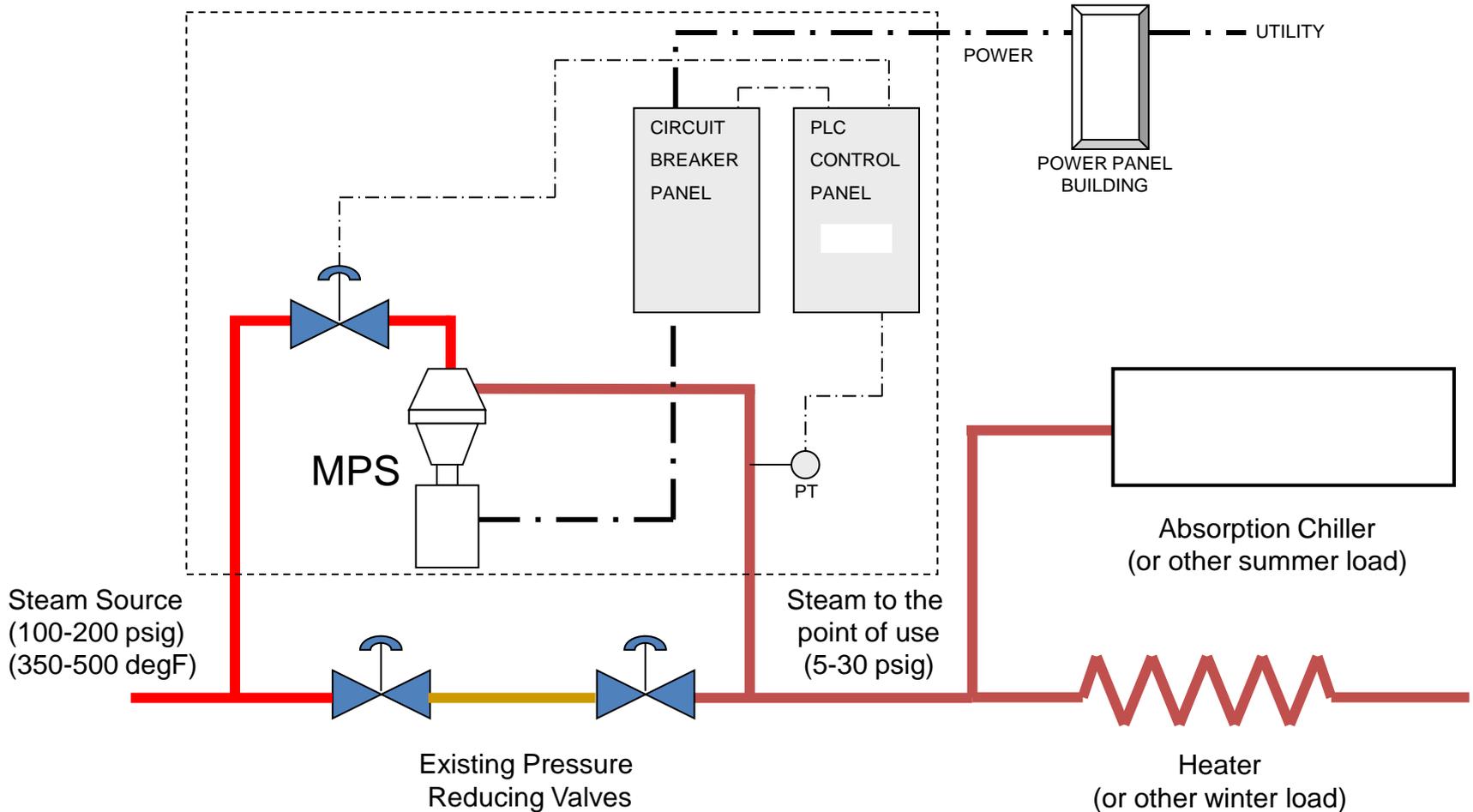
**Carrier Microsteam Turbine
Booth # 131**

Microsteam Power System

- What is it?
 - Self contained power system
 - Utilizes steam to generate where a microsteam turbine is the key element
 - Ideal solution for application which utilizes a Pressure Reducing Valve (PRV) for steam applications



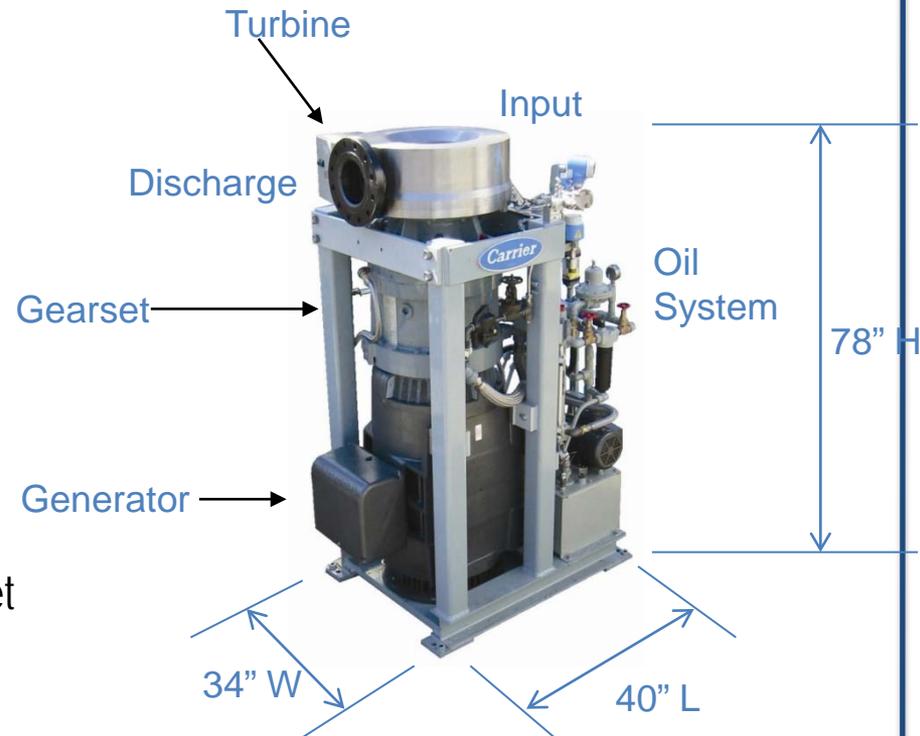
Microsteam Power System



MPS comes parallel... and delivers energy!!

Operational Parameters

- Energy Source:
 - Steam Flow Range: 4,000 – 20,000 lbs/hr
 - Pressures:
 - Inlet: 100 – 200 psig
 - Temperature: 400 – 500F
 - Outlet: 2 – 30 psig
- Output
 - Up to 275 kW
 - 480 volt / 3 phase / 60 hz
 - System Efficiency = 60%
- Sound
 - 85 dBa at 3 ft from unit at height of 5 feet
- High Efficiency Radial Outflow Turbine
 - 80% at Pressure Ratio 2.5:1
 - 70% at Pressure Ratio 5:1



Quality and Reliability

- Solid titanium alloy rotor with huskyt blades machined into the disc:
 - Very rugged compared to the usual steam turbine with sheet metal blades
 - Forgiving design for impure steam
- 20 years design life for major components:
 - No major overhaul expected in the first 10 years
- Pre-Wired, Factory Tested Instrumentation and Controls
- Carrier warranty and services support



Features & Benefits

- Environmental Appeal:
 - Zero emissions
 - Minimum disposal to be handled (only oil from gear box)
 - Potential extra LEED points for city buildings by providing a more efficient operation
 - No rejections or contaminants!
 - Generating energy that would be wasted anyway.
 - Each kWh of energy represents a potential of 0.96 ton of CO₂ in the atmosphere*
 - 275kW (one MPS) can avoid 264 tons of CO₂ going to the atmosphere!

*source: Department of Energy and Environmental Protection Agency:
http://www.eia.doe.gov/cneaf/electricity/page/co2_report/co2emiss.pdf

Features & Benefits

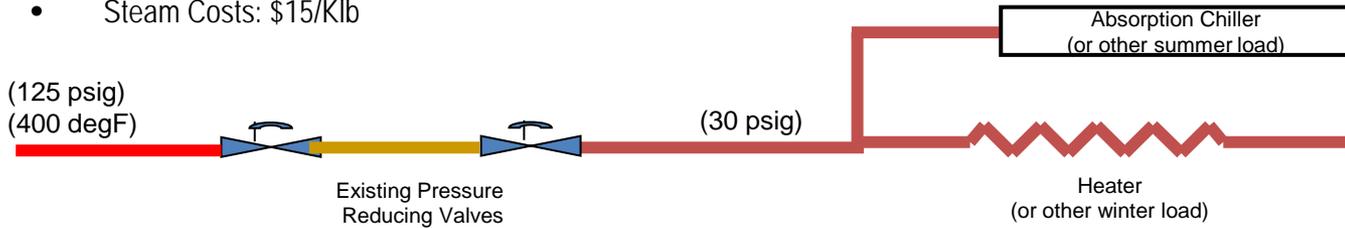
- Energy Savings:
 - Get something from nothing!
 - Maximize the usage of the steam being produced
- Peak Shaving
 - Lower the electrical demand during peak hours
 - Reduce the risks for demand charges
- LEED points
 - Less kW's required to execute the same operation in an existing building: this can drive LEED bonus points
 - Optimized energy management on new buildings
- Rebates
 - Some regions do recognize the effort through rebates

Return on Investment

Actual System

- Steam Load: 14,000lb/hr
- Inlet Steam Pressure: 125 psig
- Outlet Steam Pressure: 30 PSIG
- Steam Costs: \$15/Klb

- Operating Hours: 8000/yr
- Electricity Costs: \$0.15/kWh

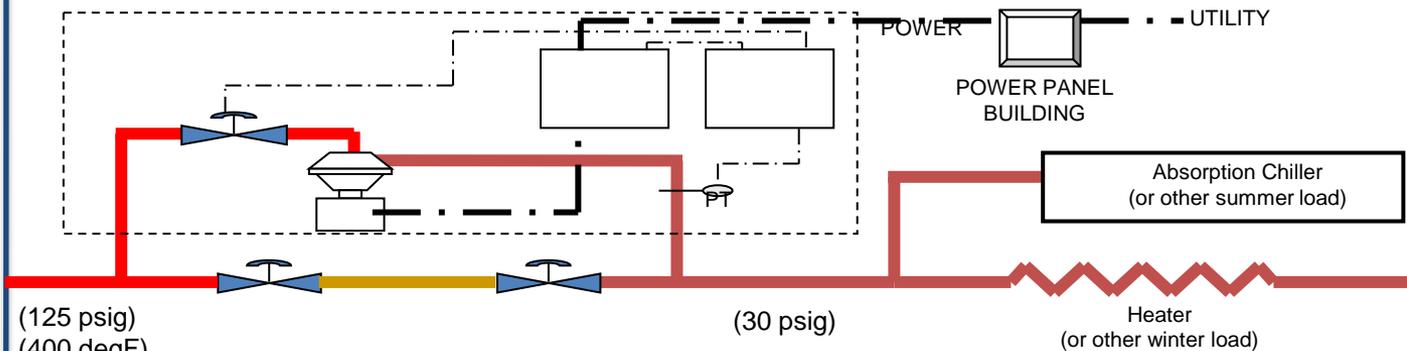


+ \$312k/year
on electricity
(260 kWe)

Microsteam Power System

- Electricity Costs: 15cents/kWh
- Steam Costs: \$15/Klb

- Power Generated: 260kWe
- Steam Consumed: 4lb/kWe



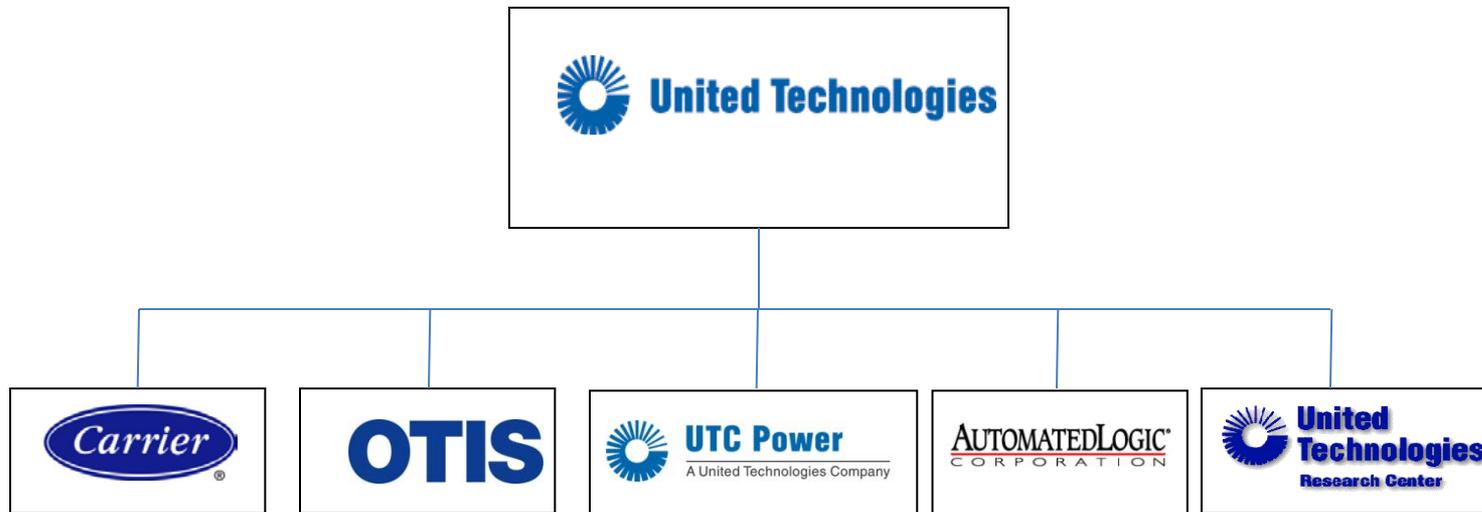
+ \$125k/year
on extra steam
(4lb/kWe)

Net Savings: \$187,200/year
Payback: ~ 2 years

Summary

- ✓ Environmental Benefit: Generating energy that would be wasted anyway, definitely a very positive impact to environmental goals every government, factory, building, hotel, hospital (among others) are fighting for!
- ✓ Payback: High efficiency yields good paybacks
- ✓ Size: Vertical design reduces unit size, fits through a doorway
- ✓ Simple Operation: Single button start stop
- ✓ Steam Quality: Pressure Vessel Carbon Steel Housing; Titanium Alloy Wheel; Radial Outflow Design address these concerns
- ✓ Maintenance: MTFB Testing demonstrated robust design
- ✓ Noise: 85dBa achieved
- ✓ Vibration: Less than 1 mil vibration measured

THANK YOU!!



Stop by and visit us at Booth #131