

Don't Freeze in the Dark

The University of Alaska Fairbanks CHP Story

Introducing University of Alaska Fairbanks



- Founded in 1917
- Located in Fairbanks Alaska
- Approximately 10,000 students at the Fairbanks campus
- 3,400,000 square feet of academic, research, administrative and housing space
- \$124 Million in Research grants per year
- Extreme temperature variation: -66° F to 99° F
- Approximately 14,000 degree heating days

Our foundation looks like this

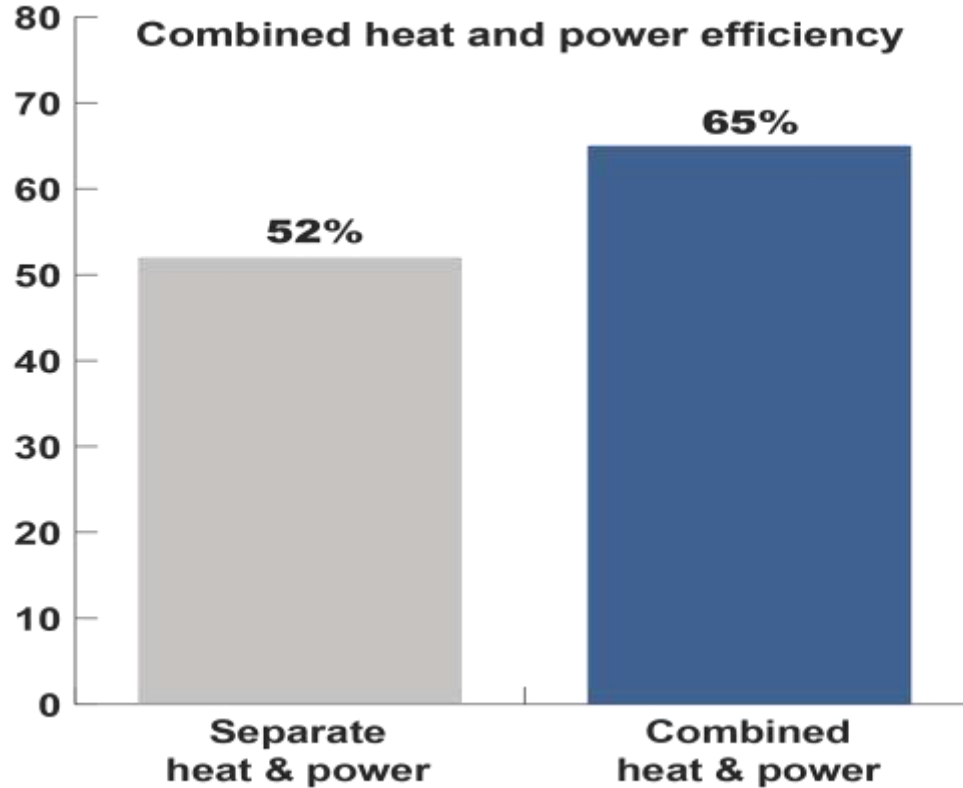


UAF's Project Objectives

- Increase capacity to meet 30 year growth
- Reduce emissions
- Natural Disaster Resistant
- Increase reliability and lower costs
- NO real Natural Gas
- Be permitted in an PM2.5 non-attainment area



CHP is the Foundation



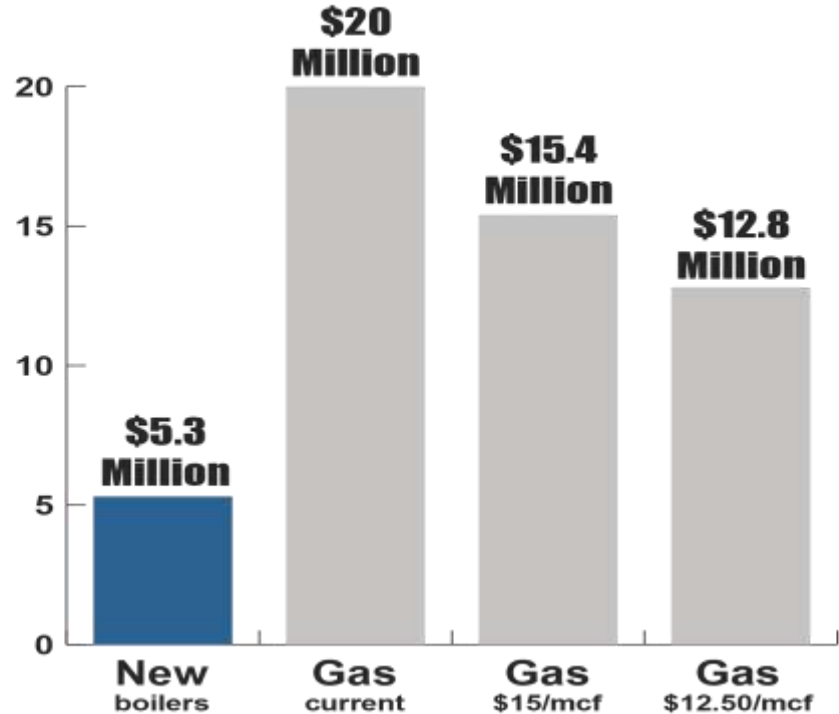
Options Considered

- Do Nothing
- Coal CFB w/ Steam Turbine = *Selected Option*
- Gas Turbine w/ HRSG
- Gas Boilers w/ Steam Turbine
- Coal/Biomass gasifier/boiler/steam turbine
- Electric boilers (using Susitna hydro electricity)
- Reciprocating Engines (Natural Gas) w/HRSG - boilers

Why don't you _____?

- Buy power from GVEA
 - *We need heat and electricity.*
 - *CHP more efficient*
- Build a natural gas plant
 - *A reliable supply of gas is not available*
 - *Lower capital cost*
 - *Double to more than triple the fuel cost*

Fuel costs — Natural gas



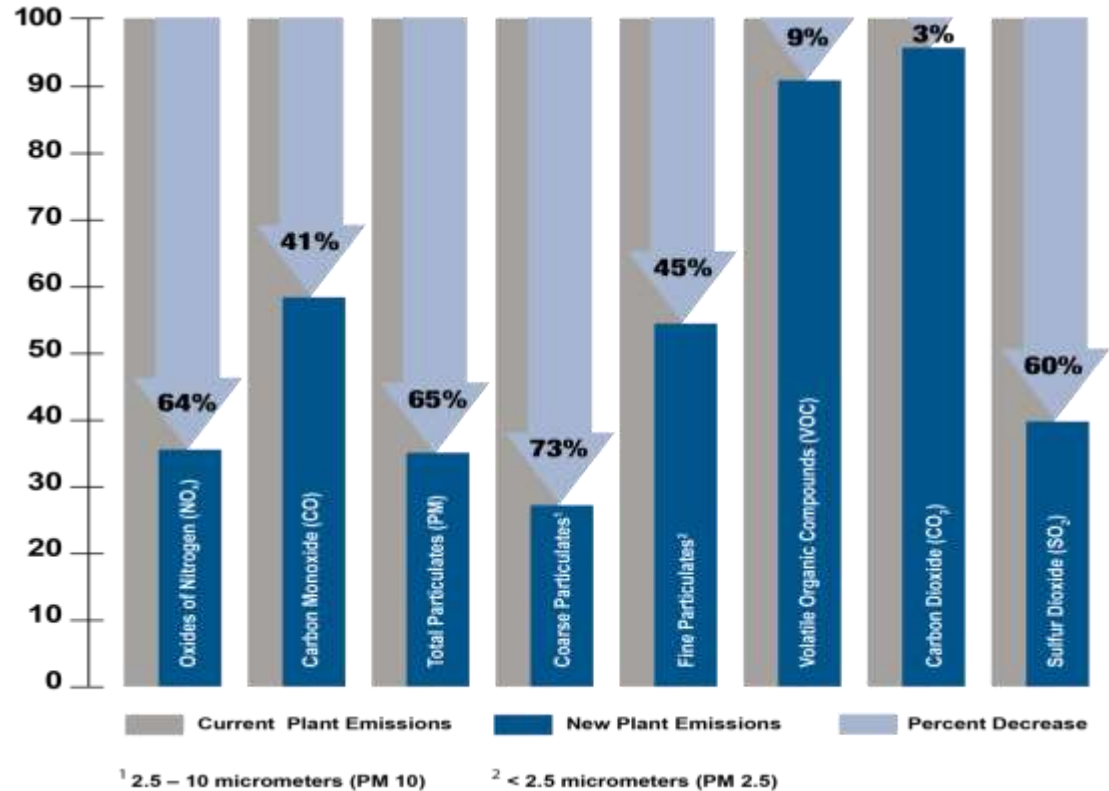
Solution: Major plant upgrade

- Circulating fluidized bed boiler 240,000 lbs/hr
- 17 MW Steam turbine
- Use condensing water for campus heat
- 3 Cell ACC
- Baghouse with DSI system
- Common steam header with existing plant



Environmental benefits

- Current main boilers are 1890's technology
- Plant burns coal, diesel and gas
- Newer technology is more efficient



Permitting

- Modification to existing permit
- Lowest PM2.5 ever guaranteed
- Almost 3 years to get permit
- No major opposition



Fishing for Funding

- \$245M Total Project Cost
- Champion in the Legislature
- Statewide Community support
- Hire a Marketing Team !!!



The Boilers

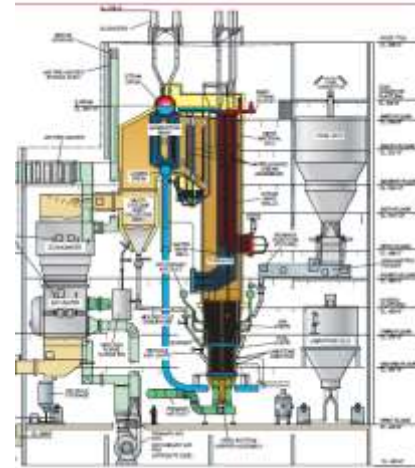
Old Boilers from 1964



1 ton of coal makes 10,012
lbs of 600 psi steam

New CFB boilers

20% more
efficient !!

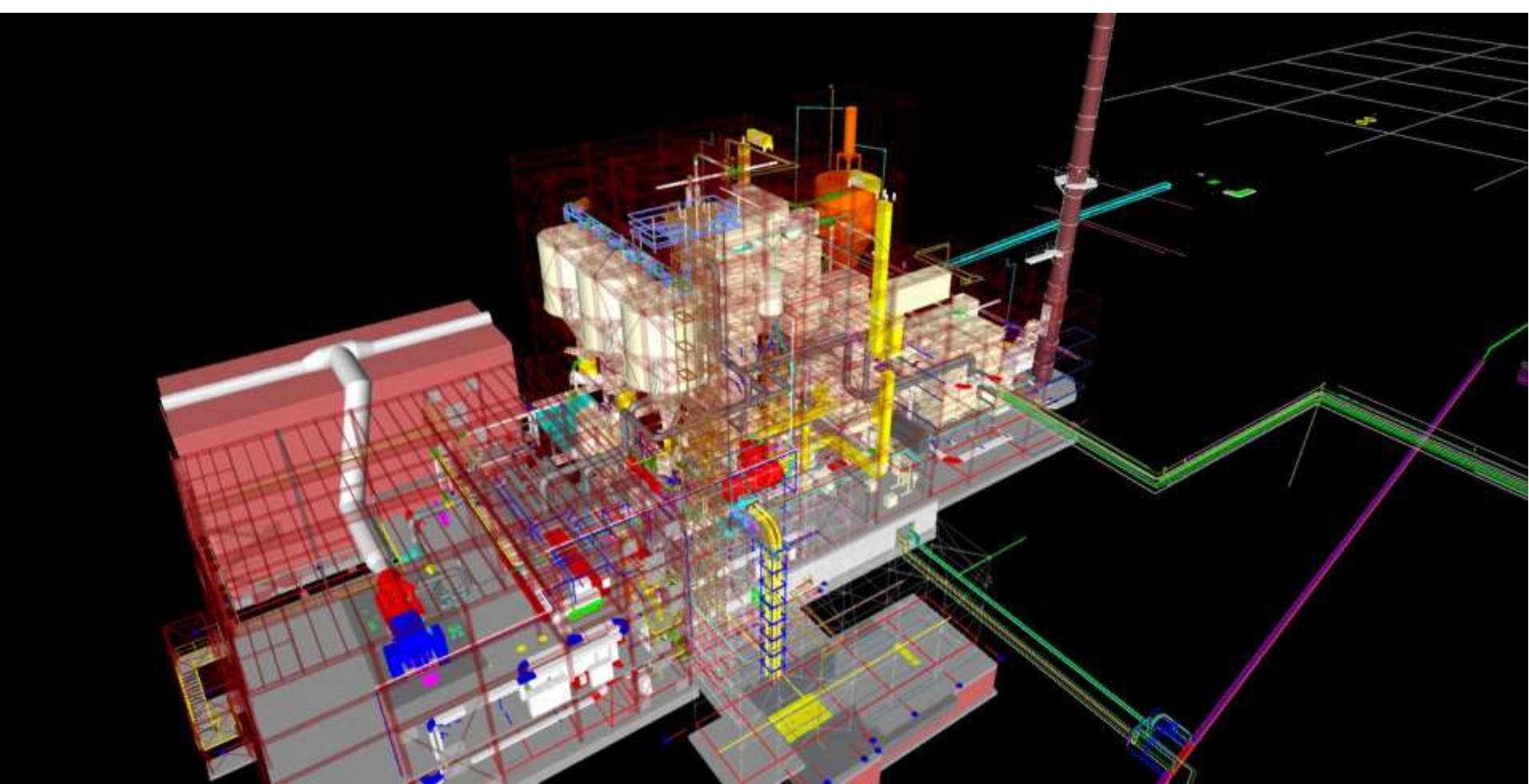


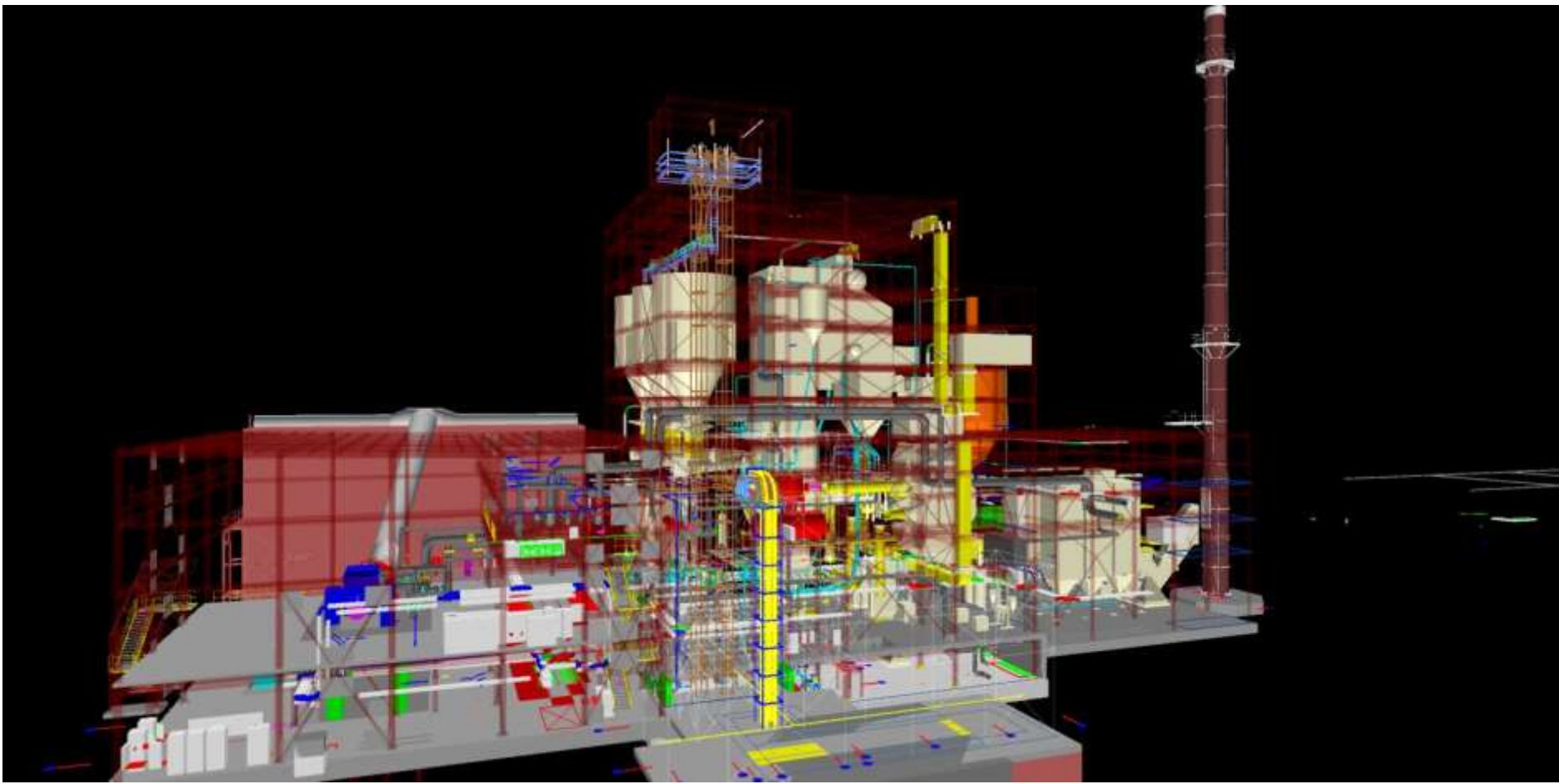
1 ton of coal makes 12,174
lbs of 600 psi steam

Contracting

- Advance Purchase of major equipment
- Construction Manager at Risk
- Early Contractor involvement
- Real Time cost estimating during design
- Requires active Owner involvement







Project Budget Challenges

- Original Scope \$50M over budget !!!
- Team Effort to rescope
(UAF/Engineer/vendors/contractor)
- Maintained capacity but sacrificed flexibility (2 - 50% boilers to 1 - 100%)
- 4 month delay

Project Schedule

- 2011 - Preliminary Engineering and Permitting
- 2014 - Obtain permit, funding and start Design
- 2015 - Site Preparation and Re-scoping
- 2016 - Foundation, steel and boiler erection, install steam turbine
- 2017 - 2018 - Complete boiler erection and Balance of Plant scope
- 2018 - Commissioning (starts in April)
- Fall 2018 - Commercial Operation





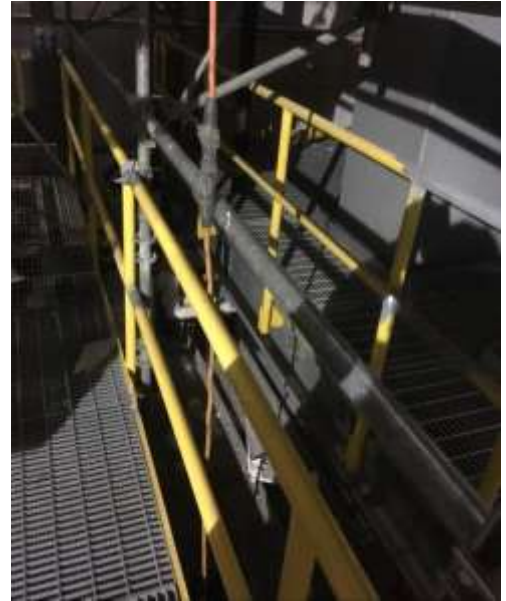
+ Lessons learned

- Use of DCS simulator
- Early Contractor Involvement
- Early Site Preparation
- Robust Document Management System



- Lessons learned

- Pay Attention to Contract Interfaces
 - Especially structural
 - Vendor/Engineer/Contractor
- Commissioning Costs
- Procure equipment early
- Model Everything!



Questions?

