WELCOME TO THE CHP SUMMIT: WESTERN MISSOURI

Presented by the Missouri Division of Energy and Spire Energy

MISSOURI
Department of Economic Development
Division of Energy
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CHP for Mizzou
Reliability
Resiliency
Efficiency
Sustainability

2017 System of the Year!
University of Missouri

- Founded in 1839, the 1st public university west of the Mississippi River
- 30,000 students from all 50 states and 120 countries
- Member of the Association of American Universities
- Over 15 Million sqft of facilities including: hospitals and clinics, a research reactor, level 3 biocontainment laboratory, and numerous research buildings
MU’s History of Energy Innovation

- Held the first public demonstration of incandescent lighting west of the Mississippi River using a dynamo and lights donated by Thomas Edison

- The 2nd university in the nation to establish an electrical energy department, just behind MIT

- Among the first universities in the nation to electrify its campus with CHP, building its first central plant in 1892
MU Energy Management
a campus utility enterprise

Reliable!

Cost Efficient!

Sustainable!
MU Energy Management is a…

- District Energy System
- District Cooling System
- Co-generation Facility
- Tri-generation Facility
- Combined Cooling-Heat and Power System
- Power Plant
- Micro Grid
- Energy Conservation Company
- Building Automation Company
- Public Drinking Water System
- Smart Grid

Providing the MU campus with reliable, cost effective, and sustainable utility services!
MU’s Diverse Energy Portfolio

Yes, we do that!
Comprehensive Utility Micro-grid

- 66 MW electric generation capacity
- 40 MW 69KV transmission connection
- 1,100,000 lb/hr steam capacity
- 32,500 Tons chilled water capacity
- 4 Million gal/day drinking water capacity
- 110 miles of under-ground utilities
- Fully metered and automated
Reliable and Resilient

- Full on-site generation
- N+1 operational availability practice
- 40 MW 69kV electric grid tie
- Black start capability
- Multi-fueled energy plant
- Underground distribution and looping
- Proactive maintenance practices
- Over 99.9993% utility availability

24/7 monitoring and optimization to ensure highly reliable utility service
Combined Cooling Heat & Power at Mizzou

MU produces its utilities using highly efficient technologies dispatched with a focus of cost effectiveness!

A 2010 EPA CHP Award Winner!
Small Scale CHP
Pressure Reducing Turbine Generator

**Opportunity** – Pressure reducing valve used to drop 60 psig steam to 5 psi steam for boiler feed water deaeration resulting in lost steam work energy

**Solution** – Install a back pressure steam turbine generator to capture the work energy of the steam before sending the thermal energy to the deaerator.
**Enhanced CHP Efficiency!**

MU installed a 300 kw turbine generator Fall 2017

Captures steam work energy previous lost through control valve throttling

Producing about 2,250,000 kwh of electricity annually

Will return its investment within 5 years
Energy Optimization and Conservation

MU’s nationally recognized energy conservation efforts began in 1990!

- 21% Reduction in Energy Use (per GSF)
- $10.4 Million Annual Utility Cost Avoidance
- $92.8 Million Cumulative Utility Savings
Energy Intensity Continues to Drop

Current Initiatives:

- LED Lighting Conversions
- Improved HVAC Controls
- Automated Fault Detection
- Retro Commissioning
- Waste Heat Recovery
Renewable Energy for Mizzou

Biomass Combined Heat & Power
Grid Wind Energy
On-Campus Wind Energy
On-Campus Solar PV
On-Campus Solar Thermal

Our on-site renewable technologies are education resources for students!
Energy Sustainability Success!

- Over 40% total renewable energy portfolio of biomass, wind, and solar
- Over 51% reduction in greenhouse gas emissions since 2008
- EPA’s Green Power Partnership recognized MU as a national leader in the development and use of renewable energy
Value of CHP for Mizzou

- More reliable and resilient than grid power
- More cost efficient than being a rate payer
- Environmental stewardship
- Excellent resource for energy research and education for students and faculty
Considering CHP?

- Begin with understanding your annual thermal load profiles
- Do you let down steam to a lower pressure from your boiler with a regulating valve? Have any waste heat?
- Evaluate your fuel options and delivery capacities
- Consider your options for redundancy & resiliency
- Conduct a feasibility study which includes your interconnection capability with your utility
- Learn from others!!!
Questions?