



MICRO-GRIDS

**USING THE DISTRICT HEATING SYSTEM AS
THE GRID TO REDUCE COSTS**

Presentation to: IDEA 2019
June 25, 2019

CONTENTS

01 .

The Problem (Opportunity)

02 .

Existing System

03 .

The Proposal

04 .

Pros & Cons

05 .

Use in Campus Locations

06 .

Questions



THE PROBLEM (OPPORTUNITY)

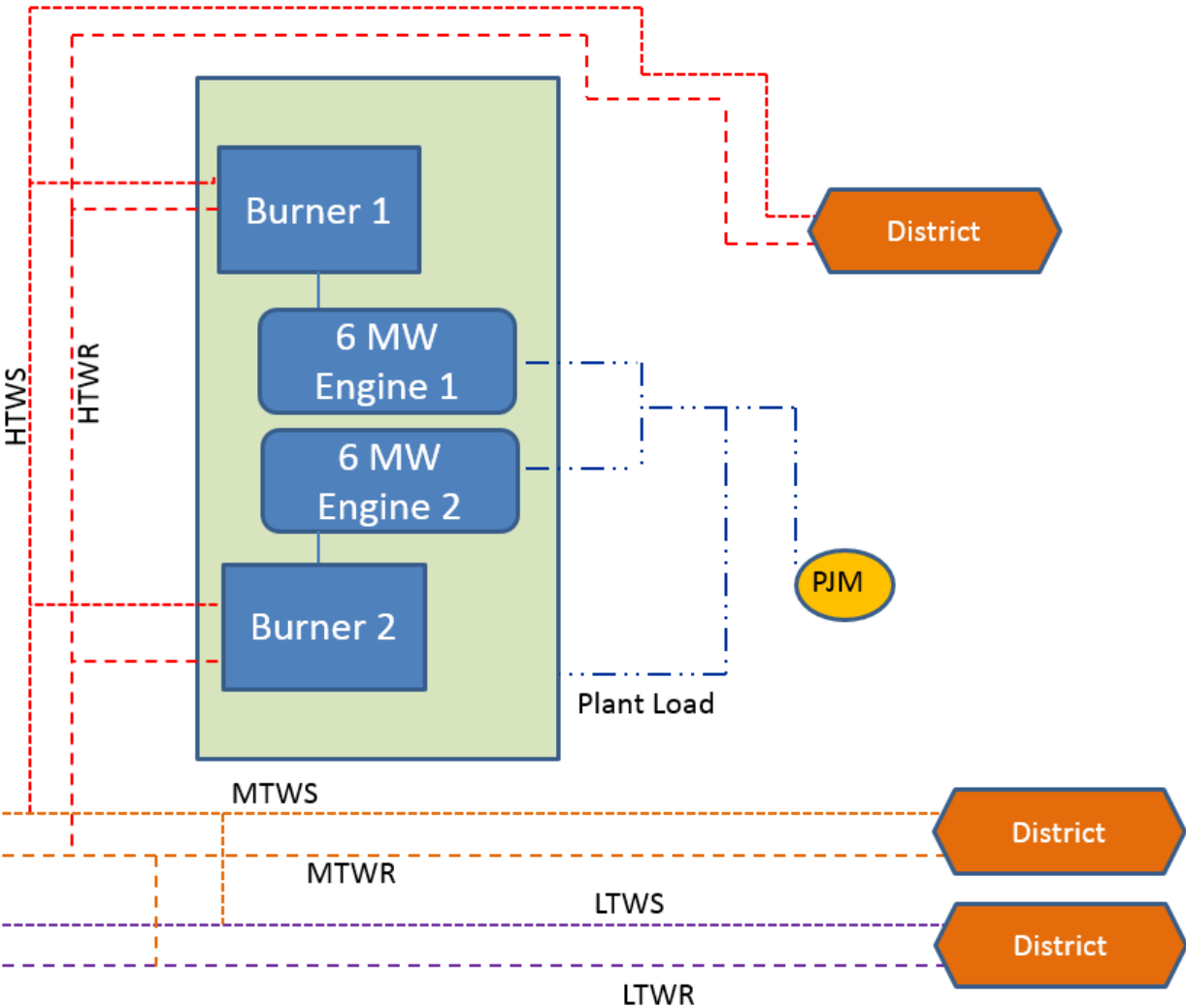
THE PROBLEM (OPPORTUNITY)

- Build a micro-grid to serve the State of New Jersey office buildings located in Trenton New Jersey
- Minimize costs associated with construction
- Minimize costs associated with operating the system
- Take advantage of existing assets associated with the District Energy system
- Lower emissions and reduce carbon footprint



EXISTING SYSTEM

EXISTING SYSTEM





PROPOSAL

PROPOSAL

- **To build a Micro-grid for the State buildings that combines:**
 - The use of the thermal piping as the backbone for the grid with decentralized steam turbines placed at State facilities, powered by the plants thermal loop.
 - Install CHP at the plant to replace existing boilers and engines to provide uninterruptable back up power to the plant.
 - Meets States Goals

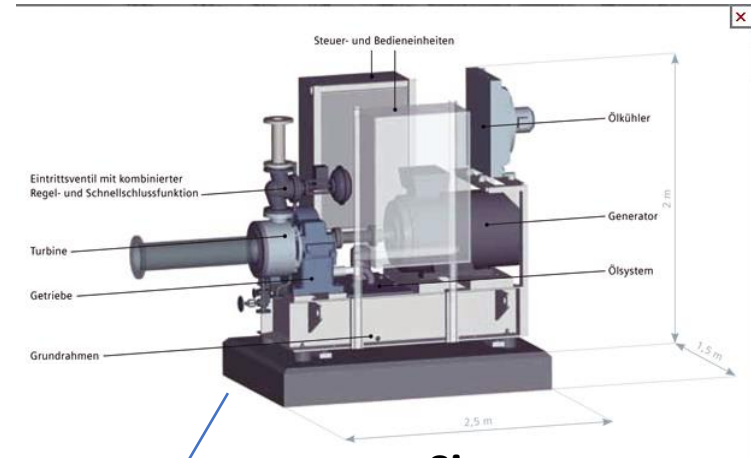
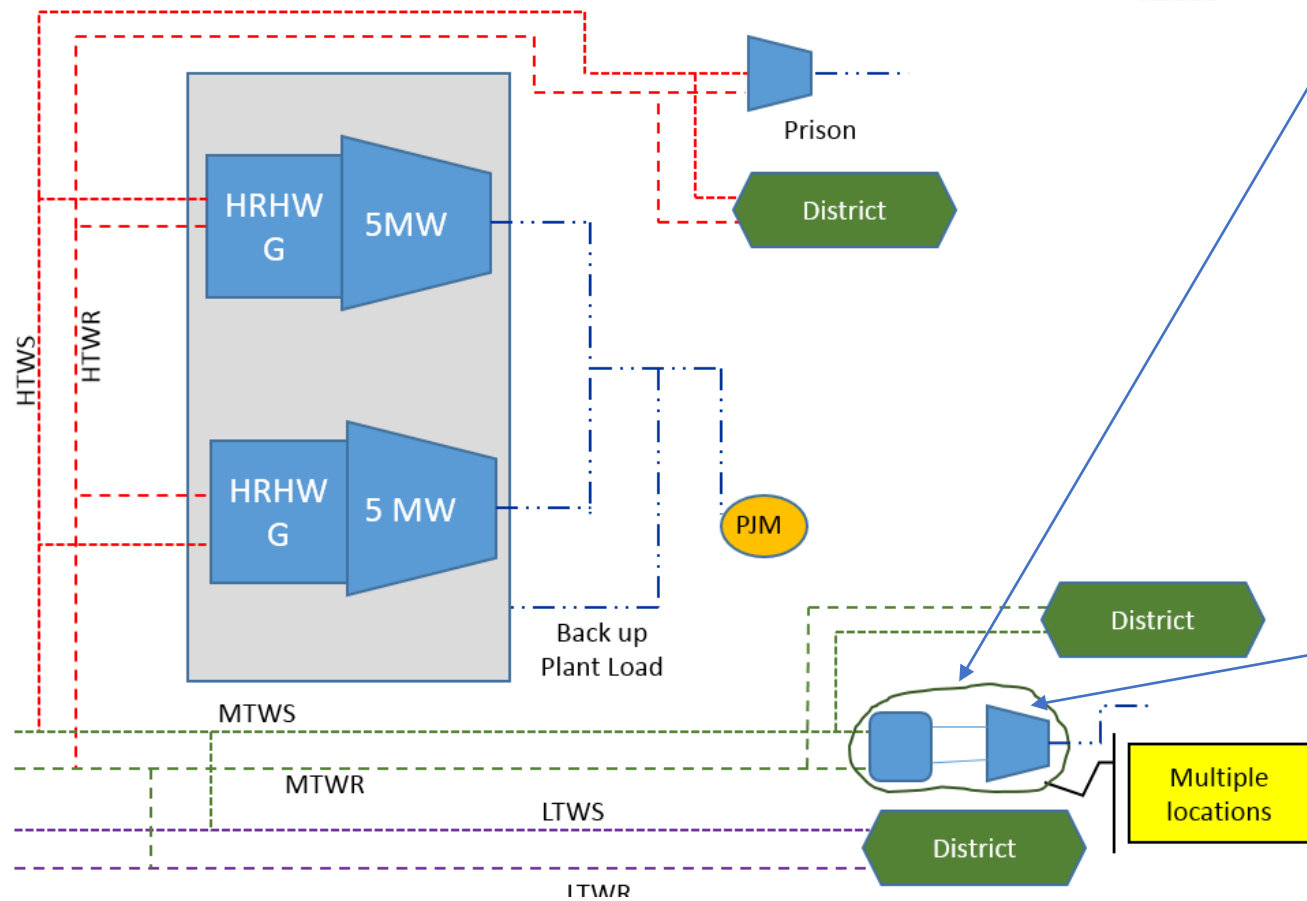
STATE GOALS

- Long term thermal contract
- Improved reliability for thermal production and delivery
- Micro-grid to provide resiliency to State building
- Reduce energy costs

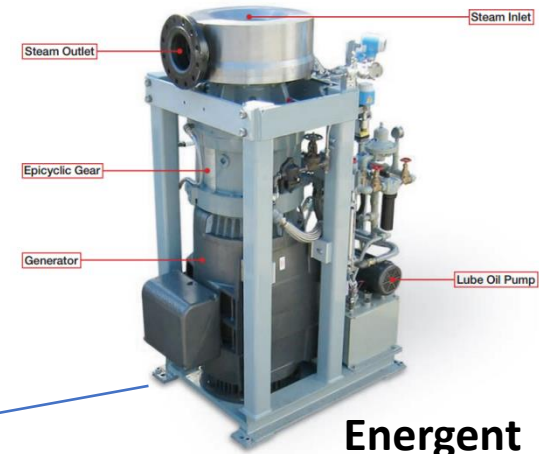
PLANNED EQUIPMENT

- 2x5 MW Gas turbines with Heat Recovery Hot Water Generators
- Energent 275 kW Microsteam Turbines to be used at Prison and State House
- Siemens SST0-40 300 kW Steam Turbines for use at State Buildings

PROPOSED SYSTEM



Siemens



Energent

OPERATIONS

- Operate gas turbines as merchant electricity producers
- Use waste heat from turbines to supply heat to thermal loop.
- 88,767,000 kWh produced.
- Sell up to 7 MW of output (energy only) to PJM and have available capacity for backup for internal plant loads
Approx. 60,000,000 kWh.
- Install 7 Micro Steam turbines along with Steam generators on State buildings to provide up to 50% electricity demand of each building. Assume 500 kW per site 8760 hours base load 4,400,000 kWh per year per site.



PROS & CONS

RISK / BENEFITS OF PROPOSED MICRO-GRID

Risks

- PJM Market Risk
- State closes facilities
- Repair costs to maintain thermal loop

Benefits

- Improved thermal system
- Increased sales of thermal energy
- New sales of electricity
- Improved relationship with State
- Reduction in Carbon foot print
- No Wheeling fees to Electric utility
- Reduced cost to build and operate



**USE IN CAMPUS
LOCATIONS**

CAMPUS APPLICATION

Benefits

- Increased Reliability
- Reduce energy costs
- Reduce carbon Emissions
- No Wheeling Fees
- Optimize existing assets of thermal system
- Can be retrofitted to existing systems easily



QUESTIONS?



ENR 500 Design Firm

ENR 600 Specialty Construction



**THANK
YOU**

JOSEPH MARTORANO, P.E.
jmartorano@kielybuilds.com
848.220.5902