

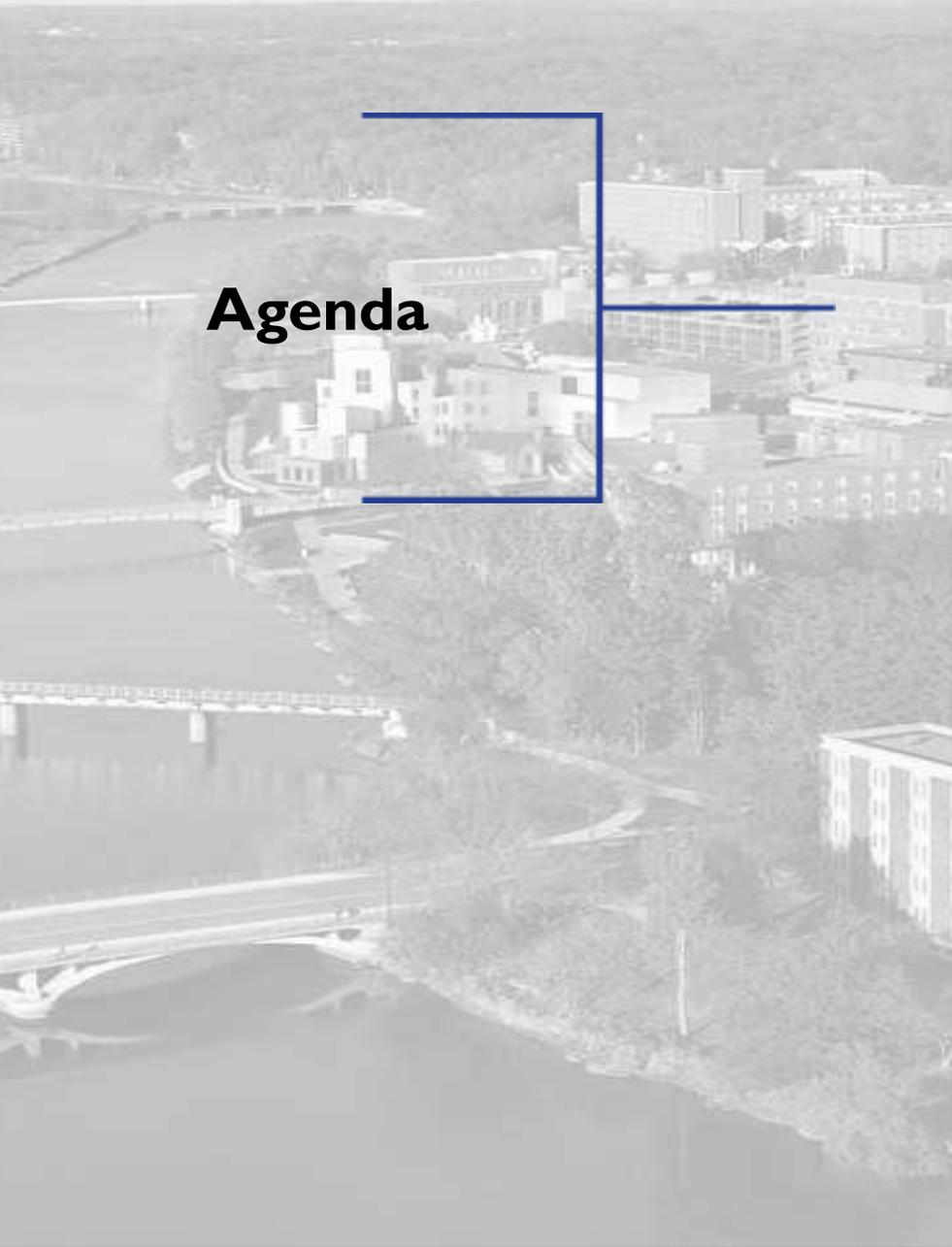
The University of Iowa
Backup Power Switching
Procedure Project



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Presenter



Agenda

Project Background

Campus Overview

Electrical Distribution System

Existing Generation Assets

Critical Medical/Research Facilities

Critical Building Diesel Generators

Options Investigated

Recommendations

Project Background



Overall Issues:

- Critical Medical Research Facility Expansion on Campus
- Customer Expectation of Continuous Reliable Electrical Power
- Desire to Move Toward More Distributed Generation Model

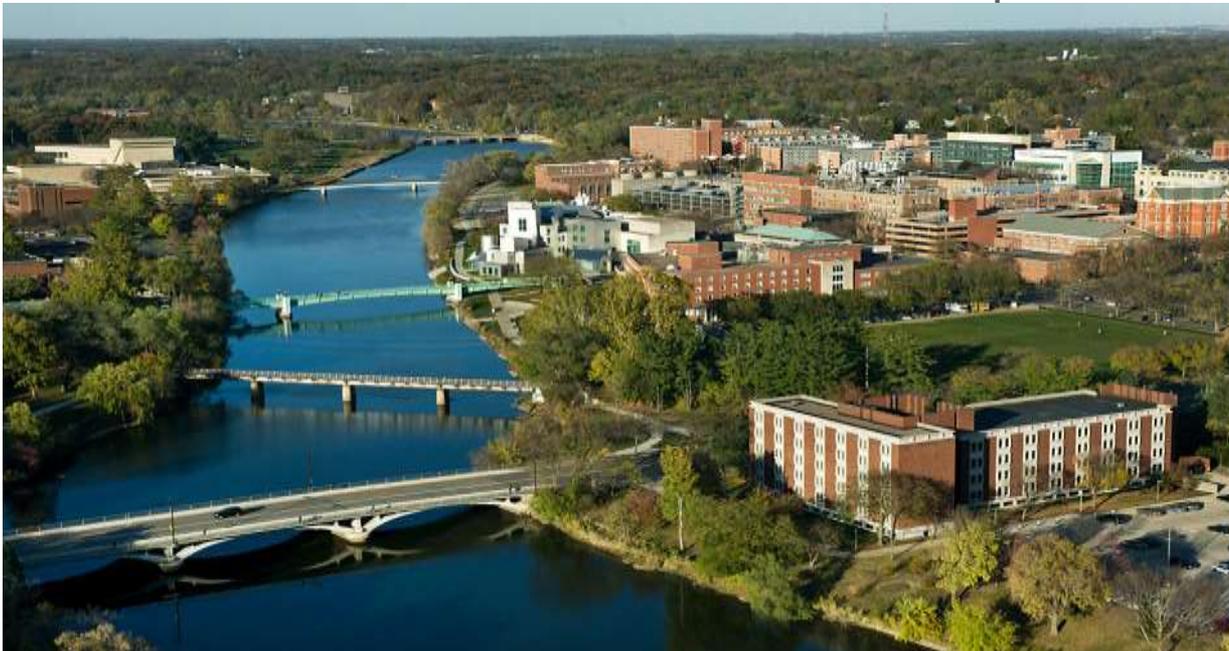
Current Configuration:

- Individual Buildings Equipped with Emergency Diesel Generators
- Generators Not Sized to Serve Entire Building Load
- Power Plant Boilers Serve STGs and Steam-Driven Chillers
- Small Blackstart Diesel Generator at Power Plant

Campus Overview

East and West Campus Separated by Iowa River

- Most Critical Medical Research Facilities Located on West Campus
- Power Plant and Water Plant Located on East Campus
- Chilled Water Loop Serves Both Campuses
- Separate Substations for Each Campus



Electrical Distribution System

East and West Campus Separate
Substation L – East Campus

- Four-Breaker Ring Bus
- Two Utility Interconnections
- Two Power Plant Buses

Substation U – West Campus

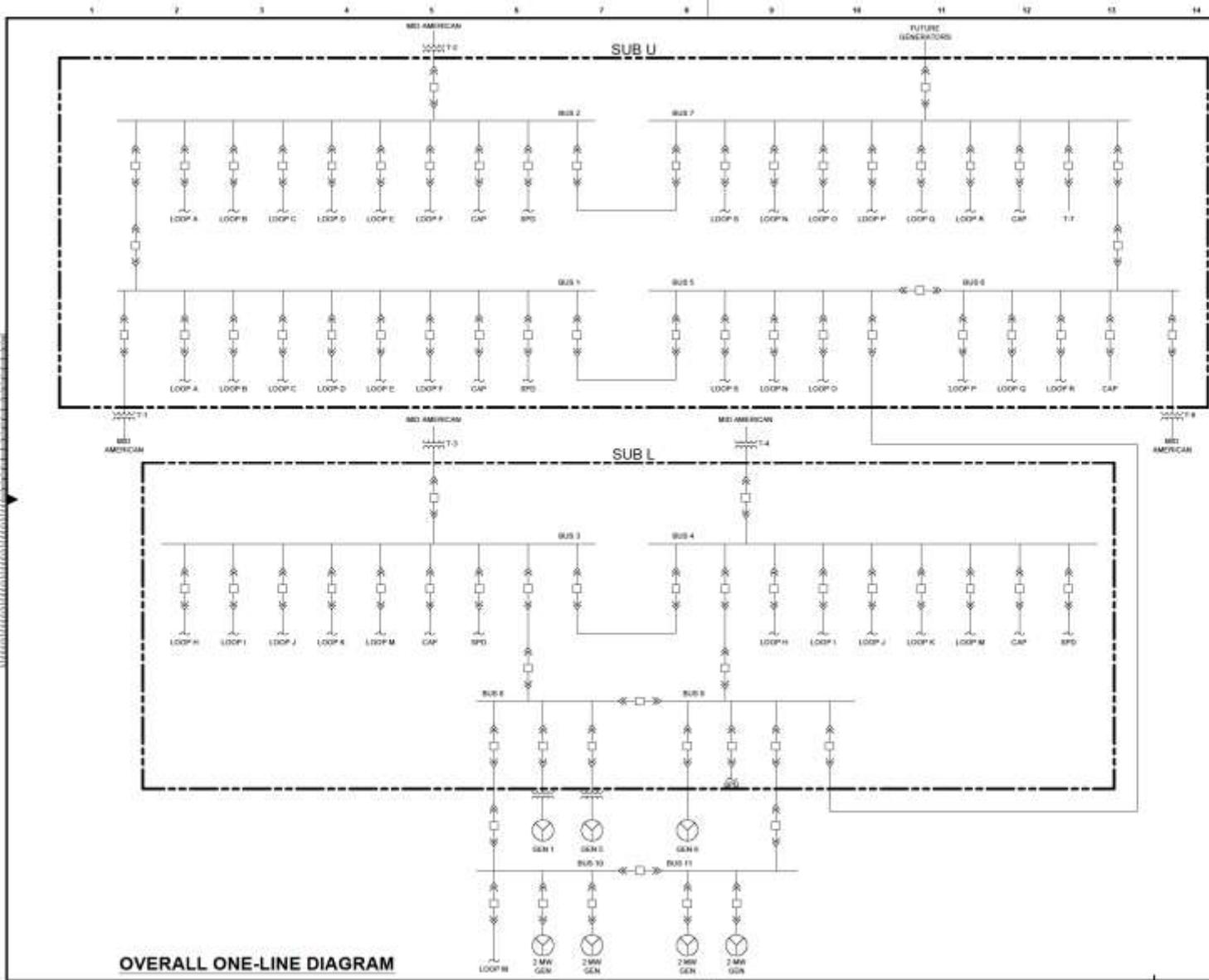
- Four-Breaker Ring Bus
- Three Utility Interconnections

24MW Across Campus Tie

13.8kV Primary Distribution

- Loop with Normal Open Point
- Manual Switching





OVERALL ONE-LINE DIAGRAM

NO.	DATE	BY	CHKD	DESCRIPTION

Burns & McDonnell
 800 W. FRIEGWAY
 SUITE 200
 FORT WORTH, TEXAS
 P. 817-371-0381

DATE	DESIGNED	BY	CHKD

The University of Iowa
 UNIVERSITY OF IOWA

BACKUP POWER GENERATION STUDY

OVERALL ONE-LINE DIAGRAM

SCALE	PROJECT

NO. **E-600** OF

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By: **E-600 OVERALL ONE-LINE SW**

Existing Generation Assets



East Campus

- Numerous Individual Building Diesel Generators.

East Campus Power Plant

- Three Steam-turbine generators
- 1500kW Emergency/Blackstart Generator
- 4 – 2050kW NG Recip Generators – Under Construction

West Campus

- Numerous Individual Building Diesel Generators.



Critical Medical Research Facilities

Defined by U of Iowa

- Carver Biomedical Research Bldg (CBRB)
- Bowen Science Bldg (BSB)
- Medical Education Research Facility (MERF)
- Medical Research Center (MRC)
- Westlawn
- Eckstein Medical Research Bldg (EMRB)
- Medical Labs
- Pappajohn Biomedical Discovery Bldg (PBDB)
- Water Plant
- Power Plant

Building Load – Meter Data

- Coincident Peak 7730kW
- Average 5600kW

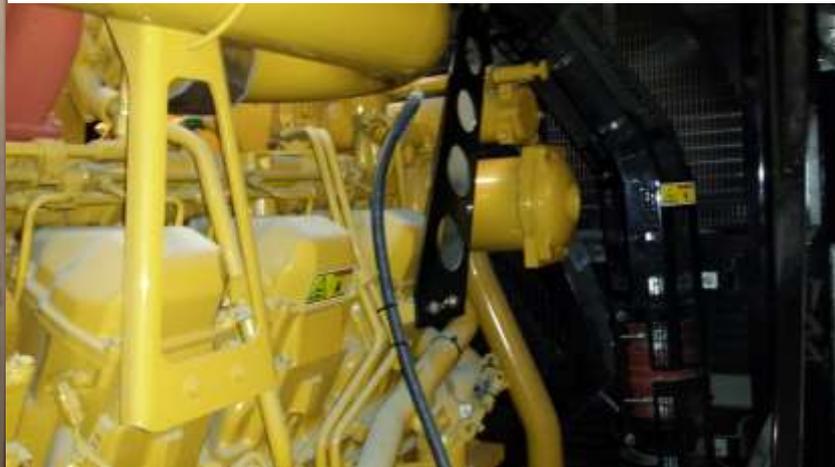
Building Generators

Critical Building Diesel Generators

- CBRB 1100kW
- BSB 1500kW
- MERF 1250kW
- Water Plant 1250kW
- Power Plant 1500kW
- Total Rated 6600kW
- 70% Total 4620kW

Standby Rated – 70% Load Factor by
Definition

All designed for Parallel Operation
Except BSB – Peak Shaving



Options Investigated

Baseload Building Diesel Generators

- Manual Operator Action Required
- Setpoint 70% of Rating Max
- Remote Monitoring and Control Not Available
- Power Plant NG Generators Take Load Swings
- Building Switchgear Controls Modifications Required
 - Transition from Emergency to Parallel



Options Investigated

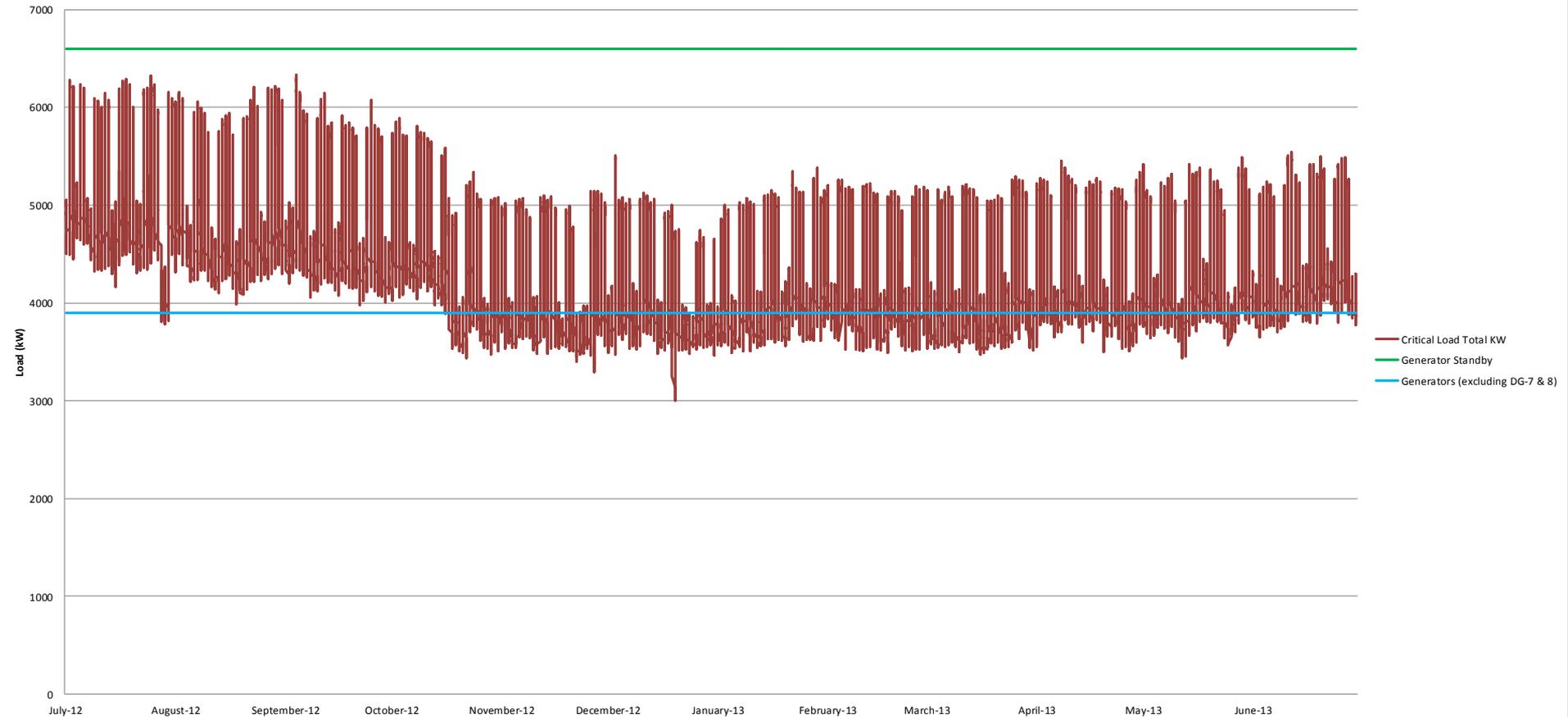


Load Share Building Diesel Generators

- Automated Generator Deployment
- Full Rating Available – 70% Load Factor
- Remote Monitoring and Control
- Remote Breaker Control
- Improved Transient Response to Load Swings
- Building Switchgear Controls Modifications Required
 - New Generator and Breaker Controllers

Average (kW)	Max (kW)	Max Date	Min (kW)	Min Date	PBDB Average (est) (kW)	PBDB Max (est) (kW)	Average with PBDB (kW)	Max with PBDB (kW)	Critical Loads in this graph include: Energy Usage for CBRB, MERF, BSB, Medical Labs, Westlawn, EMRB, and the Water Plant. Chilled Water Loads are excluded from this graph.
4444.3	6332.2	9/4/12 15:00	3005.5	12/20/12 3:00	1120	1400	5564.3	7732.2	

Critical Load Summary (Excluding Chilled Water)



Chilled Water Impact

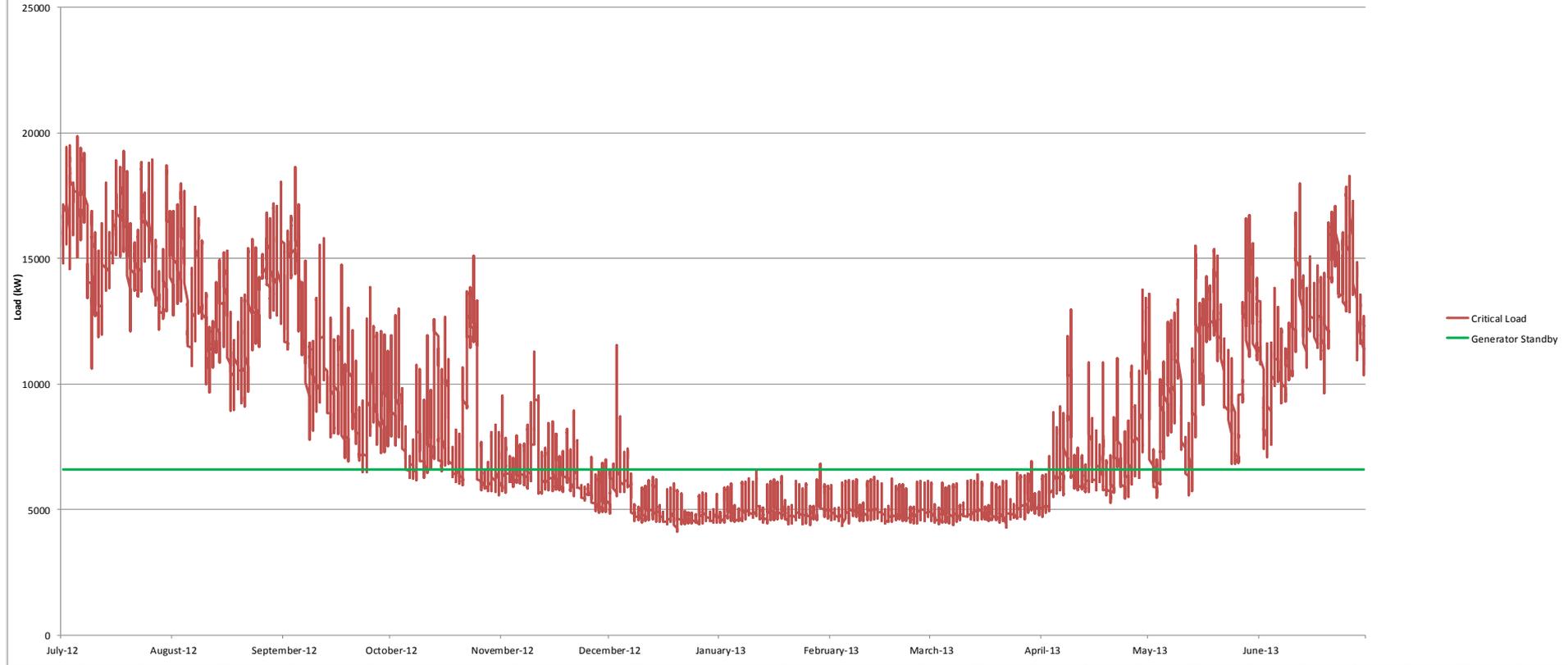
Chilled Water Load

- Mixture of Steam and Electric-Driven
- Only Supply to Critical Buildings
- Other Buildings AHU Valves Fail Closed
- Hospital Largest Consumer
- We're Still Working on This



Average (kW)	Max (kW)	Max Date	Min (kW)	Min Date	PBDB Average (est) (kW)	PBDB Max (est) (kW)	Average with PBDB (kW)	Max with PBDB (kW)	Critical Loads in this graph include: Building energy and CHW usage for CBRB, BSB, MERF, EMRB, Medical Labs, Westlawn; Building energy usage for Water Plant; and Hospital CHW. CHW usage is assumed to be 1KW per ton.
8934.3	19870.5	7/5/12 14:00	4112.7	12/20/12 4:00	1400	2658	10334.3	22528.5	

Critical Load (All Buildings)



Recommendations



Modify Building
Switchgear/Generators to
Load Share Building Diesel
Generators

- Minimal Cost Difference for Modifications vs. Baseload Option
- Existing Fiber Optic Cable Available
- Maximum Generation Capacity Realized
- Integrate with New NG Plant
- Automated Generator Deployment
- Remote Monitoring and Control

Questions & Answers



**Thanks for Attending.
Have a great Day.**