

City of Rapid City/Rapid City Area Schools Common Energy Plant



The Common Energy Plant serves heating and cooling to the Rushmore Plaza Civic Center, owned by the City of Rapid City, and Rapid City Central High School, owned by Rapid City Area Schools. Retrofit of the chiller and boiler equipment was necessitated by not only the age (most equipment had been in service for over 35 years), but also by capacity issues caused by multiple expansions to both the Civic Center and Central High School.

The newly-outfitted Common Energy Plant will have capacity to heat and cool nearly 1,000,000 square feet between the two buildings. The new chiller and boiler systems, along with the distribution and controls upgrades, will yield dramatic reductions of operating costs. Full redundancy of a majority of the systems, especially those necessary for heating, along with emergency on-site electric generation, will allowed continued function of the facilities served during equipment failure or power outage.

Project Data

Owner

City/School Common Energy Plant
Gunar Dzintars (605) 394-2660

Location

Rapid City, South Dakota

Building Type

Central Utility Plant serving:
Rushmore Plaza Civic Center
Rapid City Central High School

Project Features

5,800 Sq. Ft. Plant
Existing Building, Phased Work
Revised Control Center

Mechanical Systems / Features

2-400 BHP Fire Tube Boilers
6-3,000 MBH Condensing Boilers
3 -400 Ton Chillers and Towers

Electrical Systems / Features

2000 kVa 480V Service
250 ekW Emergency Generator

Construction Cost

\$6,000,000 (projected)

Completion Date

2013 (projected)

Mechanical Engineering

Thorough study of the heating and cooling load data recorded by the plant operators over the previous five years was required to be able to determine the appropriate sizes of the plant equipment.

A variable primary chilled water distribution system will be implemented, maximizing chiller and distribution efficiency. Magnetic bearing chillers are being selected to provide extreme efficiency and reliability.

Heating water will be produced using a combination of traditional fire-tube "scotch marine" boilers and high-efficiency condensing boilers. This will take advantage of opportunities for high efficiency during shoulder seasons, yet provide the necessary capacity with optimized efficiency during the coldest periods of the year.

A complete upgrade of the controls systems, with intense application of performance monitoring equipment and efficiency optimizing routines, will be included in this project.

Electrical Engineering

The entirety of the electrical distribution system will be replaced. The new systems will be sized and configured to suit the new equipment. Power factor correction techniques will be applied as appropriate to counteract the effects of significant inductive and reactive loads, and harmonics reduction equipment will be applied to reduce the harmonics potentially caused by large variable frequency drives.

On-site generation of emergency power will maintain operation of heating and control equipment through a power outage. A single branch of emergency power will be applied, since all of the generator load is equipment and not life-safety.