Utility Master Plan

Texas State University – San Marcos
Facilities Department
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Agenda

• Introduction
• Utility System Components
• Draft Utility Master Plan & Other reports
• Discussion
Sustainability

• Sustainability is the short and long term stewardship of resources to design, build, operate and maintain Texas State University – San Marcos campus buildings, utilities operations and grounds with environmental integrity and leadership. In a rapidly expanding campus with an ever increasing resource demand, it is our challenge to manage this growth while maintaining reliable, practical and professional approaches.

• Our sustainability goals balanced with practical implementation include reduction of life cycle costs, management of energy systems and water systems and seek relevant strategies. These approaches promote the maximization of operational and service efficiencies while minimizing wastes and environmental footprint.
Electrical Infrastructure

• Recommendations suggest that the University anticipate electrical demand to increase by approximately 75% (from a current peak of 17 megawatts to 32 megawatts) based on current campus master plan construction program.
Electrical Infrastructure Upgrade Project

- Replace cogeneration plant switchgear that service the campus.
- Replace several high priority transformers and switches.
- Analyze / design interconnection of the Central Plant 15 kV Electrical Switchgear and the South Chill Plant 15 kV Electrical switchgear.
- Conduct comprehensive Load Flow, Short Circuit, Arc Flash Study and Relay Coordination Study.
- Complete engineering assessment of campus electrical distribution system.
- Assess and coordinate electrical power supply service upgrades from SMEU.
Co-generation

• Existing diesel-natural gas fueled engine-generator has not been operated since Sept 2007; had the capacity to generate up to 6 megawatts of power. Bath Engineering assessed the engine-generator in late 2010 and identified major issues with the heat recovery boiler and with the viability of the unit.

• Bath Engineering also noted that environmental and operational controls need to be upgraded and a complete engine overhaul is required, and ancillary equipment needs to be rebuilt or replaced.

• The engine-generator will be decommissioned.
Co-generation – A Viable Option

• Even though the engine–generator will be decommissioned, a formal study will be undertaken in 2011 to assess co-generation options to meet university goals. Options include:
  – Partnering with a third party to build/operate a co-generation plant on campus.
  – Utilizing provisions in the current agreement between the City and LCRA to obtain power directly from a co-generation facility off campus.
  – Build/operate a co-generation plant on campus with utility staff.
Chilled Water System

• Recommendations suggest that the University prepare to increase chilled water capacity by at least 5k tons (including redundancy) based on current campus master plan construction program.
Steam

- Steam production is currently at near-peak capacity with 140,000 pound per hour capacity. With additional buildings, the University will need additional boiler capacity.
Potable Water & Sanitary Sewer

• Although the University’s Jackson Well can produce up to 4.3 million gallons of potable water per day, the elevated storage tank holds only 1.5 million gallons. Recommendations call for a second elevated storage tank be considered to meet projected demand.

• Storm sewer and sanitary sewer infrastructure will be coordinated with the City of San Marcos.
Thermal Study Results

- Total campus chilled water and steam generation capacity is adequate for the current cooling and heating loads. Additional chilled water and steam capacity is available to meet current campus demand should any single primary piece of equipment fail.

- The Harris Plant, however, as currently configured and operating in a stand-alone situation, does not have enough installed capacity to meet peak cooling or heating load in the event of a primary equipment failure.

- The existing chilled water, steam, and condensate distribution systems are adequately sized for the current thermal loads.

- Several isolated areas exist in the chilled water distribution system where piping is undersized at peak load and per best design practices. However, the pumping systems have enough capacity and differential pressure to overcome these situations.
Thermal Study Results (continued)

- Future additional chilled water capacity will be required in the Harris and South Plants to maintain system redundancy as future loads are added to the chilled water system. Space at each plant is available to accommodate this growth.
- Distribution capability is available to meet current and future partial redundancy between the utility plants.
- Limited DDC monitoring of temperatures, pressures and flow rates is currently installed on the campus thermal utility systems. Installation of flow meters, temperature sensors, and pressure gauges at all connected buildings would allow the facilities staff to monitor the system and isolate and troubleshoot problem buildings more efficiently than what is currently possible.
- Significant campus energy savings could be realized by increasing the campus chilled water differential temperatures by implementing variable volume pumping in all buildings.
Automation technologies and Metering systems

• The use of proven automation for plant and distribution equipment will result in safer, more efficient plants and a safer, more reliable utility system. Additionally, automation technologies can create a connected and coordinated system of plants that can increase redundancy and, therefore, reliability.

• New metering systems will allow for monitoring of energy and water consumption trends, increase in conservation efforts, and improved control and allocation of utility expenses.
Alternate Energy Measures

• Thermal Storage is not considered to be cost effective at this time due to current electric rate structure.
• Solar Power and Solar Thermal systems are being considered and will be integrated into the Utility Master Plan as part of an Alternative Energy section.
• City of San Marcos purchases power via contractual arrangements with LCRA which has solar, wind and hydro generation portfolio.
Energy Performance Contract

• In keeping with the energy sustainability initiatives, we plan to undertake an energy savings performance contract in 2011/2012. This type of performance contract is intended to make the most efficient use of our energy and natural resources as stated in the “Summary of Goals and Intended Outcomes for the Extended University Plan through 2012”.
Questions