

Advantages of the Proposed West Regional Chilled Water Plant as Compared to Decentralized Chillers at Buildings:

1. **LESS DISRUPTION** - In the short term, avoids extensive construction-related disruption to students near Anthony Hall and Wells Hall/International Center for replacement of those building's existing chillers, which have reached the end of their useful life.
2. **LOWER CONSTRUCTION COST**- As future master-planned buildings are added to the campus, there is lower total construction cost required for both the steam/electric and all-electric regional chiller plant options, including the cost of campus distribution piping.
3. **MORE SPACE IN BUILDINGS** - Avoids the need for approximately 43,000 square feet of mechanical/electrical room space to house chillers in future buildings, freeing that space for potential program use.
4. **REDUCED MAINTENANCE** - Fewer chillers, cooling towers, pumps, and electrical distribution equipment to maintain, all in a centralized location.
5. **IMPROVED AESTHETICS, REDUCED NOISE** - The central chilled water plant can be aesthetically pleasing and present much less noise concern as compared to decentralized chillers and cooling towers at each building. The existing grade-mounted cooling towers at Anthony Hall would be removed as an outcome of construction of the regional chilled water plant.
6. **"FREE" WINTER CHILLED WATER SOURCE** - The proposed regional chilled water plant would provide winter chilled water service via a waterside economizer cycle using the plant's cooling towers and plate heat exchangers. Winter chilled water service is a common requirement in laboratory buildings and in buildings with modern-age, premium efficiency building HVAC systems. The regional chiller plant options would avoid the need for process/winter chillers at buildings served by the plant.
7. **IMPROVED RELIABILITY** - Provides improved reliability of chilled water service (N+1 equipment redundancy is planned for the regional plant) as compared to single or non-redundant chillers at buildings.
8. **EFFICIENT ELECTRICITY USE** - The proposed large electric centrifugal chillers at the regional plant would incorporate primary voltage variable frequency drives, eliminating the parasitic loss of 480 volt transformers that would be required at decentralized, building-sized chillers. The regional plant's centrifugal chillers would be more efficient than typical air-cooled chillers used at smaller buildings.
9. The steam/electric option for the regional chilled water plant provides the following additional advantages:
 - a. **STEAM-SOURCED COOLING** - This option provides the most cost effective and practical way to provide steam-sourced cooling to the campus if the long term campus utility plan includes the continued use of centrally distributed steam.
 - b. **LESS ELECTRICAL DISTRIBUTION** - Greatly reduced campus electrical distribution requirements than with the all-electric regional chilled water plant option or the decentralized option, freeing available primary circuits for campus building growth. Makes use of existing campus steam distribution system to power 72% of the regional plant's chiller capacity while also helping to balance the steam versus electric load on the central power plant.

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- c. REDUCED ELECTRIC DEMAND - Reduces cooling-related campus electrical demand by 10 MW as compared to the all-electric regional chilled water plant option, and by 11 MW as compared to the decentralized option.
 - d. ELECTRIC LOAD SHEDDING CAPABILITY - A standby 2,800 ton chiller is included with the initial phase and onward, which could be energized in place of one of the equal capacity electric chillers in the plant to quickly reduce campus electric demand by 1.7 MW without reducing cooling service.
 - e. STEAM AND ELECTRIC LOAD BALANCE - Allows switching between steam and electric chillers, a potential benefit to the efficiency of the campus power plant and its steam and electric distribution systems.
 - f. EFFICIENT STEAM USE - The proposed steam turbine driven chillers reduce steam use by 50% as compared to providing an equivalent amount of cooling from steam absorption chillers.
10. The all-electric option for the regional chilled water plant provides the following additional advantages:
- a. AVOIDS STEAM-SOURCED COOLING - This option avoids steam-sourced cooling if the long term campus utility plan were to discontinue the use of centrally distributed steam.
 - b. REDUCED ELECTRIC DEMAND - Reduces cooling-related campus electrical demand by 1 MW as