

Executive Summary

The Charles E. Smith Center is a 4 story athletic facility located in Washington, DC. It plays host to the GWU basketball teams and water polo team as well as hosts other offices and locker rooms for various other GWU athletic teams. As the facility is over 30 years old, the main goal of this renovation project was to update the entire facility to both function better and become more aesthetically pleasing so it may become a landmark for GWU athletics.

The mechanical systems of the Smith Center have a variety specific design criteria because of the many types of occupancies. The first floor is almost completely supplied by 100% outside air because of the ventilation requirements while the upper floors use a both VAV and CAV AHUs to supply the spaces. All major heating is supplied by four natural gas powered condensing boilers. Cooling is provided by two air cooled cooling towers supplying two chillers.

In order to try to increase the efficiency of the facility, multiple alternative systems were considered. A combined heat and power plant and an energy recovery wheel were both considered to enhance the Smith Center's mechanical systems. Along with the mechanical alternatives, a look into the effects these systems would have on both the electrical system and the construction process were investigated.

When analyzed, the CHP system had a much lower life cycle cost compared to the current boilers even though the initial investment was greater. The energy recovery wheel resulted in both a lower life cycle cost as well as a lower initial cost.

CHP could be a valuable alternative to the boilers with a low payback period if the initial cost is able to be overcome. Implementing the energy recovery wheel would also be valuable to help reduce energy use and cost of the Smith Center