Opportunities for Combined Heat and Power (CHP) in Health Care

Over 200 hospital campuses and assisted living facilities use combined heat and power (CHP) to reduce operating costs and keep the lights on during and after natural disasters. Combined heat and power, also known as cogeneration, provides both electric power and thermal energy (heat) from a single on-site source, such as a turbine or reciprocating engine. The waste heat is used to provide additional services to the facility, including steam, domestic hot water, heat for sterilization of medical devices, as well as cooling with absorption chillers. CHP can provide services to a variety of loads from as low as 30 kW systems to upward to 50 MW district energy with CHP systems. A growing number of hospitals are considering CHP for their cost savings, resilience benefits and environmental improvements.

Cost Savings

CHP can lower operating costs by offsetting the need to use boilers to produce the needed heat for building heating, hot water and steam. The installation of CHP can also lower and provide more predictable electricity bills. A good example is the Gunderson Health System in Onalaska, WI. The 1.3 MW landfill gas-to-energy CHP system saves the hospital $400,000 in energy costs, as well as generates $500,000 in revenue by selling excess electricity to Xcel Energy. The San Diego VA Hospital's 4.6 MW CHP system is another great example of the cost savings provided by CHP. This system saves the one million square foot VA Hospital between $1 million to $1.5 million per year while providing the hospital space and autoclave heating, absorption chilling and domestic hot water.

Resilience Benefits

It is very difficult, and potentially dangerous, to move patients to other facilities before, during or after a natural disaster. So energy resilience is a vital concern for hospitals and long-term care/assisted living facilities. CHP can improve resilience by helping to prevent power outages, dips or surges. CHP can improve a buildings resilience by islanding itself from the grid during a grid power outage and maintain full operations of critical systems. The Mississippi Baptist Medical Center (MBMC) is an excellent example of how CHP can keep a hospital operational during and after a natural disaster. During and after Hurricane Katrina the MBMC CHP system provided thermal energy and electric power to the hospital for four days until the grid came back on. It was the only hospital in the Jackson, Mississippi region to keep power. Because of this capability, it received displaced patients from the other hospitals, as well as served as an emergency command center.

Environmental Benefits

Further, many hospitals are taking into account the environmental impact of their facilities. CHP can operate more efficiently to produce power than the traditional centralized grid, and also can offset boiler emissions by reducing demand for these systems. The Gunderson Healthcare CHP System by utilizing close-by landfill gas reduces flaring of the gas that had been flared at 300 cubic feet per minute. The Dell Children system reduces CO2 emissions by 40% and ozone causing NOx by 82%. The Shands Hospital in Gainesville, Florida has a 4.3 MW District Energy system with CHP. This system reduces CO2 by 58%, the equivalent of taking 4,365 vehicles from the road each year.

CHP Ownership and Operation

CHP is a bit different than a typical onsite generator and requires some additional expertise. There are a variety of options to own and operate the CHP system. In some cases, particularly for smaller systems, a hospital will train its existing staff to operate the system. However, there also is the option of third party ownership and operation of these systems. This third-party approach is growing in popularity and can be done through an Energy Service Agreement (ESA), Power Purchase Agreement (PPA) or Leasing Arrangement. For example, the 4.3 MW Dell Children's Hospital CHP system is owned and operated by the local municipal utility Austin Energy. The system also provides a tremendous amount of resilience to the hospital by providing 100% of the hospital's electricity, steam

and chilled water needs. With these well-developed ownership models, the concern regarding the complexity of operating a CHP system should not preclude a hospital from considering CHP.

Ready for CHP?

There are a lot of great reasons to do CHP at hospitals, with the greatest benefit coming to hospital resilience and operational savings. The Department of Energy's Southwest Combined Heat and Power (CHP) Technical Assistance Partnership can help you determine if CHP is a good fit for your facility. The CHP TAP provides no cost qualification screenings and project development assistance for hospitals and health care system campuses. These screenings are great if you are looking to do CHP now or are working through a facility planning exercise. The screenings are quick and easy to do and you will get the results back in less than a week. If you are interested, please contact Gavin Dillingham, Director of the SW CHP TAP at gdillingham@harcresearch.org .