State Energy Conservation Office

Combined Heating and Power Evaluation Guidelines for Critical Government Facilities

Background

Texas House Bill 1864 (10 Tex. Gov. Code §2311) was passed by the Senate on May 22, 2013 as an amendment of HB 1831. The bill requires all critical governmental facilities to formally consider the feasibility of implementing Combined Heat and Power (CHP) technology prior to construction or extensive renovation or replacing major heating ventilation and air conditioning equipment of critical buildings and facilities.

As of September 1, 2013, all government entities must comply with the law by following these three steps:

1) Identify which government owned buildings and facilities are critical in an emergency situation.

2) Prior to constructing or making extensive renovations to a critical governmental facility, the entity in control of the facility must obtain a feasibility study to consider the technical opportunities and economic value of implementing CHP.

3) When the expected energy savings of the CHP system exceed the expected costs of purchasing, operating, and maintaining the system over a 20-year period, equipping the facility with a combined heating and power system is preferred to promote energy security. The benefit/cost ratio over a life cycle period of 20 years should be greater than 1.0.

Evaluation Guidelines

The following is a guideline that should be followed by all applicable governmental buildings and facilities that are in the process of construction or renovation. The critical infrastructure facility that meets standards does not require permission of the State Cogeneration Council as defined in Chapter 2302.

Applicable Facilities

All state agencies and all political subdivisions of the state including cities, counties, school districts, institutions of higher education, and municipal utility districts that are deemed critical infrastructure must comply with the law.

To determine whether a government building or facility is critical, it must meet the following criteria:

- Is continuously occupied;
- Maintains operations for at least 6,000 hours each year;
- Has a peak electricity demand exceeding 500 kW; and
- Serves a critical public health or public safety function during a natural disaster or other emergency situation that may result in a widespread power outage.

Facility Types

Examples of facilities that could apply are:

- Command and control center;
- Shelter;
- Prison or jail;
- Police or fire station;
- Communications or data center;
- Water or wastewater facility;
- Hazardous waste storage facility;
- Biological research facility;
- Hospital; and
- Food preparation or food storage.

Emergency and Standby Power

Texas adopted the 2011 National Electric Code (NEC) requirements. According to NEC Article 700 requirements, all mission critical facilities are legally required to have emergency power to be available in 10 seconds. Legally required standby systems (Article 701) which provide emergency to fire hydrants and switch gear areas must be available within 60 seconds or less. Rather than installing a diesel backup generator to provide outage protection, a facility can design that capability into CHP systems. CHP systems come with dual fuel generators that are powered with diesel during start up and then switch to natural gas mode. When capital cost decisions are evaluated, placing more circuits on a base load CHP system and reserving a minimum amount of power needs to be met by emergency generators will prove to be more economical than simply expanding the size and number of emergency generators at a site.

CHP Feasibility Study

The objective of a feasibility study is to evaluate the technical and economic feasibility of a CHP project in the critical facility, and to determine if it meets the requirements of HB 1864. Items needed to conduct the study include:

1) General facility information;
2) Twelve months of electric and natural gas consumption data;
    a. Annual thermal and electric loads;
    b. Determine whether the peak electricity demand exceeds 500 kW;

    c. Look at thermal and electricity load coincidence during the year. CHP projects need both thermal and electrical loads to exist at the same time.
3) Utility rates – blended electricity rate and natural gas rate;
4) Natural gas pressure, if natural gas is provided on-site;
5) Identify any existing onsite generation;
6) Operating hours of facility;
    a. Operations must be at least for 6,000 hours per year;
7) Type of thermal loads throughout the year (including steam, hot water, chilled water, hot air, etc.); and
8) Type of cooling loads and size of load in tons (HVAC equipment, particularly chillers).

Feasibility Screening Report

The feasibility screening report must be signed by one of the following:

- Engineering or architectural firm with experience developing CHP projects; or
- The Department of Energy Technical Assistance Partnership. The TAP provides qualification screenings at no charge.

In the report a comparison between base case and CHP case must be provided. This report includes a comparison of annual energy consumption and annual operating costs. Also, included in the report will be simple payback in years and total operating costs to generate on-site. This should be labeled "total operating costs to generate, $/kWh." The final item in the report will indicate the operating and maintenance cost of the system over a 20 year period. This will take into account the energy savings, less the purchase, operation and maintenance costs over the 20 year period[i].

CHP System Requirements

If it is determined that a CHP system is feasible and the facility will move forward with an installation, the new CHP system should:

1) Be located at the site of the facility;
2) Be the primary source of both electricity and thermal energy;
3) Be able to provide all electricity needs to power the facility's critical emergency operations for at least 14 days;
    - The CHP system should be sized for highest reliability to match critical electric loads;
4) Have a combined overall efficiency of greater than 60 percent;
5) Have the ability to operate during a grid outage;
    - Have a black start capability;
    - Be able to interconnect to the grid and operate in island mode to support critical loads and reconnect to the grid after an event.
6) If the site is located within a flood zone then the CHP system, including all components required for proper operation (pumps, controls, switch gear, etc.) must be located above the expected flood level.

Definitions

Combined Heat and Power (CHP) or Cogeneration: The on-site simultaneous generation of two forms of energy (heat and electricity) from a single fuel/energy source, typically natural gas.

Major Renovation: a major renovation project is a building renovation or improvement where the implementation cost is $2 million or more, based on the initial cost estimate. 34 TAC Chapter 19, Subchapter C, Rule 19.33.

Major HVAC Replacement: a major HVAC replacement constitutes the replacement of all chillers in a facility with a chiller load greater than 100 tons.

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[i] Assumptions for energy cost escalation and operation and maintenance costs shall not exceed the most recently published Consumer Price Index data.