Combined Heat and Power (CHP)

Owners may wish to consider Combined Heat and Power (CHP), also known as “cogeneration”, as part of the Green Retrofit Program. CHP is the simultaneous production of two or more useful forms of energy from a single fuel consuming device. The average efficiency of the fossil-fueled power plants in the U.S. is 33% and has remained virtually unchanged for 40 years. This means that two-thirds of the energy in the fuel is lost as heat. CHP systems recycle waste heat and convert it to useful energy, and they can achieve overall efficiencies of close to 80%. For certain buildings in high cost electric areas, or areas with installation incentives, CHP can reduce costs while reducing energy use.

CHP can significantly reduce a multi-family building’s annual energy costs. Instead of buying all the building’s electricity from a utility and separately purchasing fuel for its heating (mechanical) equipment, most--or even all--of the electricity and heat can be produced for less money by a small on-site power plant operating at a higher combined efficiency. The type of CHP system commonly applied to multi-family housing uses a device that contains an engine, similar to that found in a car or truck, or a microturbine, that drives a generator to produce electricity. The heat (thermal energy) produced by this process is recovered and used to produce hot water or steam, operate a chiller or serve as a desiccant instead of being exhausted from the engine and transferred through the engine radiator (as in an automobile). Prior to installing a CHP system, all of a building’s electricity is provided by an electric utility. All the heat and hot water is provided by the building’s mechanical systems (typically boilers). After installation, the CHP system provides all or part of the electricity, heat and hot water.

With packaged CHP systems the primary components are pre-packaged in the factory. Typically the packages are complete with all the heat recovery equipment, generator controls and monitoring indicators. This makes them easier and less expensive to install since the labor can be performed by plumbing and electrical contractors and easier to maintain.

In apartment buildings CHP systems can supply electricity, space heating and/or hot water. If there is a swimming pool, they can heat the water. If the building’s air conditioning uses a steam absorption system, the CHP system can provide the steam to run it. The economics for installing CHP currently favor buildings over 100 dwelling units, but there are examples of installations in smaller buildings. Buildings which share a common boiler room can each be smaller in size (less than 150 units) and still benefit from a CHP system. Some limitations are a product of utility requirements and charges for systems connected to the grid.

A packaged unit, which can provide most of the hot water and a significant percentage of the annual electricity used by a typical 200 unit building will occupy a space of approximately 10 feet wide, 12 feet long and 7 feet high (including access space required for repair and maintenance). For lowest installation costs, it’s best to locate the system in close proximity to the building’s mechanical and electrical equipment—typically a boiler room, or an unoccupied room or space nearby. In general, the unit should be close to the building’s heating and hot water equipment, the building’s utility electrical service, the utility gas or fuel supply, and an area offering an exhaust outlet. The system can also be placed outside the building. Buildings Departments usually must approve the system plans as they would for another piece of building equipment, such as a boiler or chiller. The utilities interconnect requirements for electricity and supply gas must also be satisfied.

Additional information at: http://www.hud.gov/offices/cpd/library/energy/pdf/chpguide1.pdf