

## COMMERCIAL + INDUSTRIAL SERVICES

bulletin

Technological advances in energy generation, distribution and delivery proceed at a remarkable pace. The options available to any commercial or industrial operation are as varied as they are numerous.

At Bay State Gas we strive to provide you the latest in technology and information on the most advanced and efficient natural gas energy solutions that are right for your business.



## COGENERATION SYSTEMS

## Cogeneration Systems

- > Improves overall energy efficiency and fuel utilization
- > Lowers electric and overall energy costs
- > Reduces NOx, SOx and CO2 emissions
- > Offers power reliability during outages
- > Enhances power quality

## Facilities that may benefit from Cogeneration Systems include:

- > Office building and office campuses
- > Retail store complexes
- > Municipal facilities
- > Larger schools and public buildings
- > College campuses
- > Hospitals
- > Industrial facilities

## Systems Provide Power and Heat

Cogeneration or combined heat and power (CHP) are just two of the most common terms referring to the application of technologies to generate electricity and thermal energy from a single, highly efficient, and economically integrated system. In contrast to traditional central power generation from a local utility, cogeneration systems are located on or near your facility to satisfy all or part of the facility's electricity requirements. Conventional power generation converts on average only about a third of its fuel's potential energy into electricity, throwing off substantial heat during the process. The CHP system captures this wasted heat, achieving total system efficiencies of 75% to 85%, and turns it into usable thermal energy for hot water, space heating, cooling, dehumidification and other process applications. It does this more efficiently, economically, reliably and with less harm to the environment than centralized, dedicated electric production.

Cogeneration systems optimize energy dollars by utilizing the heat normally lost during centralized production of electricity through the integration of a power system (such as an engine or turbine) and a heat recovery system (usually a boiler), located on or near the user's facility. Large commercial facilities such as multiple unit office complexes, campus institutions and industrial facilities often benefit from aggregating energy needs in an integrated cogeneration system. Advances in reciprocating engines and steam turbines now make it feasible for single-building users to take advantage of cogeneration technology.

## Cogeneration Systems



*Tecogen cogeneration modules arrive prepackaged ready for installation. Photos courtesy of Tecogen, Inc.*



### Design, Build, and Operate Options Available

A well-designed system can reduce energy costs, improve power reliability and quality, and meet or exceed pollution emission standards. No one approach to system design dominates. A variety of approaches to system design have evolved, including firms that can provide design and build services, independent builder/owner/operators, and vendors who offer comprehensive energy supply and services

To accurately develop a technical and economic feasibility assessment for a cogeneration plant, the designer must gather customer-specific data about utility rates and charges, the planned site's energy use, and equipment. Gathering site data is a critical phase of the evaluation process. This allows for accurate assessment of savings potential without going through all the rigorous design steps, thus reducing up-front costs and still providing an accurate estimate of project costs and potential energy and energy cost savings.

### Power Generation Equipment Options

Numerous equipment options exist to provide the electrical energy for your facility including reciprocating engines, turbines and microturbines. Natural gas is the preferred fuel for spark ignited reciprocating engines due to emissions concerns. Today's natural gas engines offer low first cost, fast start-up, proven reliability when properly maintained, excellent load-following characteristics and significant heat recovery potential. Facility capacities range from 30kW to 30MW.

Thermal loads most suited to engine-driven cogeneration systems in commercial/institutional buildings are space heating and water heating, boiler feed water pre-heating and any industrial process that can utilize hot water. Its use for absorption cooling and/or distributed energy system dehumidification could increase the size and improve the economics of the system. Primary applications for cogeneration systems are those with high, steady electric and thermal energy demands.

Gas turbines produce high quality heat that can be used for district heating steam requirements or recouped and used to either improve the efficiency of power generation or generate steam to drive a steam turbine in a combined-cycle plant.

Low maintenance and high quality waste heat make gas turbines a preferred choice for many large commercial CHP applications. Sizes range from several hundred kilowatts to over several hundred megawatts.

When used to generate power on site, gas turbines are often used in combined heat and power mode where energy in the turbine exhaust provides

thermal energy to the facility. Simple cycle gas turbine CHP applications are most prevalent in smaller installations, typically less than 40 MW. Steam or hot water is produced in an unfired heat recovery steam generator and sent into a central thermal loop for space heating during winter months or to single-effect absorption chillers to provide cooling during the summer.



Tecogen cogeneration module. Photo courtesy of Tecogen, Inc.



Installed Tecogen cogeneration modules. Photo courtesy of Tecogen, Inc.



## Partners In Energy Working Together

YOUR SOURCE FOR ENERGY SOLUTIONS

If you believe that cogeneration technology is an appropriate consideration for your operation, our **Partners In Energy** program can assist you. We offer financial incentives to help you minimize your upfront cost by sharing a portion of the cost to design, purchase and install the equipment. Simply follow the program guidelines to qualify for matching funds.\*

These rebates, combined with the reduction in your overall energy expenses can provide an outstanding return on investment that will pay dividends for years to come.

\*Program restrictions apply. Limited time offer.

FOR MORE INFORMATION call us toll-free

**1-888-NEW-GAS-0**

(1-888-639-4270)



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