

Cogeneration and U.S. Energy and Environmental Needs

Cogeneration, also known as combined heat and power (CHP), is a boiler system used to produce heat and electricity and is probably the most efficient means of operation available to industry. Industrial cogeneration is frequently powered by natural gas, which is efficient and clean burning. Increased reliance on cogeneration will make energy use more efficient, help meet future energy needs, and contribute to environmental protection by reducing harmful emissions.

The Bush Administration has included cogeneration as a component of its National Energy Plan which notes that “cogeneration of electricity and heat and combined heat and power allow for the productive use of much of the waste heat from electricity production, which accounts for about two-thirds of the energy used to produce electricity.” The Plan recommends that the Secretary of the Treasury work with Congress on legislation to encourage increased energy efficiency through cogeneration projects by shortening the depreciation life for these projects or providing an investment tax credit. It also recommends that the EPA Administrator work with local and state governments to promote the use of well-designed cogeneration and other clean power generation at Brownfield sites and promote cogeneration through flexibility in environmental permitting.

U.S. Use of Cogeneration

According to U.S. Energy Information Administration (EIA) data, there are more than 1,000 facilities operating cogeneration units in the United States. These facilities are spread among dozens of public and private organizations, including hospitals and colleges, and industries in virtually all states.

Approximately 56,000 megawatts (MW) of cogeneration electric generation, or 7 percent of U.S. electricity generation capacity, is currently in operation in the United States. This compares with only 10,000 MW in 1980.

Use of cogeneration has the potential to grow significantly in the U.S., as it has in other countries. For example, in Denmark and the Netherlands, more than 40 percent of electricity is obtained from cogeneration, while in the United Kingdom, cogeneration’s share of electric power production has doubled in the past decade, with additional growth targeted by the government. However, foreign countries make much of an effort than the United States does to encourage investment in cogeneration. For example, according to the American Council for Capital Formation, after five years, a U.S. company recovers only 29 percent of its investment in a cogeneration facility compared to 51 percent in Germany, 53 percent in Japan, 100 percent in the Netherlands, and 105 percent in China.

The cogeneration industry, the U.S. Department of Energy, and the U.S. Environmental Protection Agency have set the goal of doubling U.S. cogeneration capacity between 1999 and 2010 by adding approximately 50,000 MW of new capacity. If this goal is achieved, Cogeneration would represent about 14 percent of U.S. electric generating capacity in 2010.

Cogeneration has significant growth potential in three major market segments: industry, buildings, and district energy systems, which include universities, government complexes, and central business districts in many cities. Federal facilities have a cogeneration potential of nearly 5 gigawatts (GW).

Energy from Cogeneration: Clean and Efficient

According to EPA, cogeneration “is not only better than conventional electricity generation at reducing air pollution and fuel consumption, it’s more reliable and costs less.” Cogeneration constitutes less than 10 percent of total NO_x and SO₂ emissions.

Facilities using cogeneration are already covered by a host of Clean Air Act regulations limiting emissions from stationary sources. These requirements include an already lengthy New Source Review pre-construction permit review process, including public participation requirements for notice of permit reviews and opportunity for public comment and public hearings. In addition to permits limiting criteria pollutants, major industrial sectors are subject under the Clean Air Act to Maximum Achievable Control Technology requirements for toxic air emissions. For new facilities and major modifications of existing facilities located in non-attainment areas, controls meeting Lowest Achievable Emissions Rates must be installed.

Cogeneration units have efficiencies ranging from 70 percent to more than 85 percent, which is significantly higher than coal units at 34 percent and combined cycle gas units at 46 percent. Cogeneration is highly efficient because it generates electricity and useful thermal energy in a single integrated system. This contrasts with separate heat and power (SHP) systems in which electricity is generated at a central power plant. The thermal energy recovered in a cogeneration system is used for heating or cooling. Because cogeneration captures the heat that would otherwise be rejected in traditional generation of electric power, the total efficiency of these integrated systems is much greater than that of SHP systems.