

Promise of Cogeneration

Benefits far outweigh costs



In our bid to find cleaner, more cost-effective and efficient energy, cogeneration can play a very important role. It offers higher efficiency and lower waste on the one hand, and greater fuel flexibility and lower cost on the other.

Until recently, its use was confined to heating/cooling systems and a few selected industries. However, with the benefit of new technology a much wider range of industries, from sugar to chemicals to textiles, are employing cogeneration. Its potential is just beginning to be realised.

Cogeneration, quite simply, is a process that simultaneously produces two or more forms of useful energy, such as electric power and steam. It harnesses, to great effect, the thermal and electrical energy that is released as part of the production process in various industries.

When a fuel is burned to generate heat, and that heat is exploited in a thermodynamic cycle to produce electricity, a great deal of energy is wasted. This wasted energy emerges as heat. If that heat can be utilised for space heating, for making hot water or in a manufacturing process, it could reduce the amount of additional energy needed for those heating purpose. The waste heat, which can be up to two-thirds of the energy content of the fuel, is virtually free once it has served its purpose in the electricity plant, making the economics of cogeneration extremely favourable.

Because cogeneration facilities are able to utilise the available energy in more than one form, they use significantly less fuel input. The benefits of cogeneration are, therefore, substantial. It reduces energy costs and offers fuel flexibility. It also protects a company from the effect of power cuts and improves the quality of power. And finally, it reduces wastes.

Cogeneration can be implemented in many ways. Small diesel engines, gas turbine plants with waste heat boilers, combined cycle cogeneration stations, biomass-based plants can all be used to provide heat as well as generate electricity. But whatever the source of heat, the economic premise upon which the plant is based is identical in every case.

There are two types of cogeneration plants. The first is the “topping cycle” kind where the primary fuel is used to produce electricity, and the thermal energy, which is the by-product, is then used for process heating. In the “bottoming cycle” system, heat is required for the process at high temperatures and hence, power is generated through a suitable waste heat recovery system.

Cogeneration projects normally have a higher capital cost than plants built purely for power generation. The extra cost will come from the additional components needed for the heat capture and transfer system.

However, the benefits completely outweigh the costs, the foremost being the benefit to the environment. Cogeneration can eliminate toxic substances in flare gas emissions. It can reduce greenhouse gases by offsetting coal-fired thermal generation and eliminate chlorofluorocarbons associated with absorption cooling and refrigeration.

A cogeneration plant reduces the immediate release of waste heat from the power station. The heat will reach the environment eventually, at least most of it will, but its release will be more diffused.

Also significant is the greater energy efficiency achieved through the use of cogeneration. The waste heat from a power plant, captured and utilised elsewhere, displaces energy that would otherwise have to be generated for the same purpose. Normally that energy would have been produced by burning more fossil fuel.

Cogeneration can reduce electrical costs by up to 40 per cent. Savings can also be achieved because of the reduced need for capital investment in replacement boilers or pollution control. Value can also be captured from assets such as flare or shut-in gas, which would otherwise be wasted.

Reference book:
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