COOPERATIVE EXTENSION
WASHINGTON STATE UNIVERSITY
ENERGY PROGRAM

Combined Heat & Power FACTSHEET

Combined Heat and Power glossary of terms.

Glossary

Auxiliary firing – The addition of extra fuel into the exhaust gases of a turbine to provide an increase in heat output is called auxiliary firing. This uses the preheated excess oxygen in the exhaust gas from the turbine and provides extra heat at high efficiency. This is ideally suited for meeting peak heat demands.

Availability – The ratio of the number of hours a piece of equipment is available for use to the number of hours it is required for use. This ratio provides a measure of how much time equipment is not available for use, e.g. when it is undergoing maintenance or repair. Equipment may also be available for use for more hours in a year than it is actually used (see load factor or utilization).

Avoided cost – Incremental cost to an electric power producer to generate or purchase a unit of electricity or capacity, or both, but which is instead provided by a third party or which is not needed due to energy conservation and efficiency.

Back-pressure steam turbine – A back-pressure steam turbine relies on the expansion of the steam within the turbine – which is driving the alternator— without condensing the steam. The exhausted steam is then used to provide the heat for the hot water distribution system. This is a simple system but comparatively inefficient.

Backup power – A specific industrial application for onsite power generation technology. This applies to any equipment that exists solely to provide a redundant power source in the case of a failure of the primary power source. Backup power devices are characterized by low load factors, rapid startup and high reliability (also called standby power or standby generation).

Base load— The level of demand, for heat or electricity, which exists for the majority of the operating period. The demand will rarely be less than this base load. This load should be met from the lowest cost sources.

Baseload capacity – Amount of power that a generating facility can continuously produce.

Best Available Control Technology (BACT) – An emission limitation based on the maximum degree of reduction of each pollutant subject to regulation and emitted from or which results from any major emitting facility. The permitting authority, taking into account energy, environmental and economic impacts, and other costs, on a case-by-case basis determines what is achievable for each facility through application of production processes and available methods, systems, and techniques. This includes fuel cleaning or treatment or innovative fuel combustion techniques for control of each pollutant.

Calorific value – The number of heat units obtained by the combustion of a unit mass of a fuel. The higher or gross calorific value(HCV) of a fuel is the total heat developed after the products of combustion are cooled to the original fuel temperature. The lower calorific value (LCV) is the total heat produced on combustion less the energy in the uncooled products of combustion, including uncondensed water vapor. The LCV of a fuel is typically 5-10% less than the HCV. Some engine suppliers quote engine fuel consumption and efficiencies using the LCV of the fuel, but gas is sold in Britain by its HCV. It is essential to use the same definition of caloric value throughout CHP system calculations involving fuel costs and fuel energy inputs.

Capacity – The maximum power output or the load for which a generating unit, generating station, or other electrical apparatus is rated. Common units include kilovolt-ampere (kVa), kilowatt (kW), and Megawatt (MW).

Capacity factor – The ratio of the energy that a plant produces to the energy that would be produced if it were operated at full capacity throughout a given period, usually a year. Sometimes called the plant factor.

Combined cycle – The combination of a number of power generation methods to extract the most energy from the fuel. Typically, the exhaust from a gas turbine, driving a generator, is used to generate steam that then drives a steam turbine, also driving a generator. This increases the efficiency of electricity generation to about 50%.

Demand – Rate at which electricity is delivered, expressed in kilowatts, kilovoltamperes or other unit, at a given instant or averaged over a specified time.

Demand charge – Charge for the maximum rate at which energy is used during peak hours of a billing period.

Demand diversity – The demand diversity is a measure of how much of the potential connected load is experienced as an actual load at a given time. The actual definition is the peak demand at the central heat supply source divided by the sum of the individual heat demands. A factor of between 0.85 and 0.95 is normal for space heating systems. A similar concept also exists for the connected electrical load.

Diesel engine— A form of reciprocating internal combustion engine which ignites the fuel/air mixture by compression. The diesel engine has a high mechanical efficiency and hence a high power/heat ratio in CHP applications.

Distributed Generation (DG) – The integrated or stand-alone use of small, modular electricity generation resources by utilities, utility customers, and/or third parties in applications that benefit the electric system, specific end-use customers, or both. From a practical perspective, it is a facility for the generation of electricity that may be located at or near end users within an industrial area, a commercial building, or a community.

Distributed power – Process in which generation facilities, energy storage facilities (thermal energy storage, batteries) and other strategies such as district energy and demand-side management efforts are located at or near the customer's premises.

Exempt Wholesale Generator (EWG) – Unregulated energy producer, not classified as a utility, that can generate electricity for sale at wholesale rates and purchase power for resale at market rates, but cannot sell electricity in the retail market.

Exit fee – Charge levied by a utility when a customer leaves the grid or reduces its load through distributed generation, to compensate for investments made by the utility on behalf of that customer.

Extraction-condensing steam turbines – An extraction steam turbine system is one which includes a turbine which exhausts the steam to a lower than atmospheric pressure. This increases the efficiency of the generation but increases the coast and complexity of the plant.

Higher Heating Value (HHV) – The standard measure of the energy released during combustion of a fuel, assuming the product water is in the liquid state. For natural gas fuel, the HHV is approximately 10% for higher than the lower heating value (LHV).

Independent System Operator (ISO) – A neutral and independent organization with no financial interest in generating facilities that administers the operation and use of the transmission system.

Independent Power Producer (IPP) – Any entity not regulated by the government as a public utility that owns or operates an electricity generating facility and offers electric power for sale to utilities and/or the public (also known as Non-Utility Generator).

Installed capacity – Maximum load-carrying ability of a generating facility.

Interruptible rate – Price paid for electricity by commercial or industrial customers that have agreed to have their power cut off by the supplier in the event of high demand due to severe weather or equipment problems.

IPP (Independent Power Producer) – Non-utility electricity generator that sells power to others.

ISO (Independent Systems Operator) – Impartial third party responsible for maintaining secure and economic operation of an open-access electrical transmission system on a regional basis.

Load factor – A ratio of the amount of electricity produced by a particular piece of power generation equipment in a given year, divided by the amount that it could have produced if it were operated continuously at full power. For those readers familiar with the terminology common to power generation equipment, this is equivalent to an average (or annual) load factor, and is not to be confused with the instantaneous actual load/rated load ratio.

Local Distribution Company(LDC) – Traditional utility that distributes natural gas or electricity or both to local customers.

Lower Heating Value (LHV) – The standard measure of the energy released during combustion of a fuel, assuming the product water is in the gaseous state. For natural gas fuel, the LHV is approximately 10% lower than the higher heating value (HHV).

Marginal cost – In the utility context, the cost to the utility of providing the next (marginal) kilowatt-hour of electricity, irrespective of sunk costs.

Nameplate rating – The full-load continuous rating of a generator or other electrical equipment under specified conditions as designated by the manufacturer, and written on the nameplate.

Net metering – Allows the electric meters of customers with generating facilities to turn backwards when the generators are producing energy in excess of the customers' demand, enabling customers to use their own generation to offset their consumption over a billing period.

Nominal capacity – Approximate energy-producing capacity of a generating facility or unit under specified conditions during periods of highest load.

Open access – Ability to send or wheel electric power to a customer over a transmission and distribution system that is not owned by the generator of the power.

Peak load – The peak load is the maximum demand for heat or electricity that occurs in any one hour in a year.

Premium power – A specific industrial application for onsite power generation technology. This applies to any equipment that exists solely to provide power with a higher quality than that which is available from a conventional power source. This power may have a well-defined waveform, it may be direct current, or it may be more reliable than the conventional source.

Public Utility Regulatory Policy Act(PURPA) of 1978. Among other things, this federal legislation requires utilities to buy electric power from private "qualifying facilities," at an avoided cost rate. This avoided cost rate is equivalent to what it would have otherwise cost the utility to generate or purchase that power themselves. Utilities must further provide customers who choose to self-generate a reasonably priced backup supply of electricity.

Recuperated microturbine – A microturbine that includes a recuperator to recover some of the residual energy from the hot offgases exiting the expander, thereby increasing electrical efficiency.

Retail wheeling – Transmitting electricity over transmission lines not owned by the supplier of the electricity to a retail customer of a supplier.

Self-generation – On-site production and use of electricity by an industrial facility or other energy customer.

Spark-ignition gas engine— A form of reciprocating internal combustion engine burning gas in which spark plugs provide ignition. Most gas engines used for CHP are based on commercial diesel engine designs, but with lower compression ratios and other modifications.

Spinning reserve – Generating capacity that is on-line in excess of the load on the system ready to carry additional electrical load.

Stranded cost – Difference between market value of generating assets and the amount of the debt still owed on them. If the utility must drop its rates to meet the deregulated competition, revenue may not be adequate to cover the debt and the operating costs of the facility. The amount of debt uncovered is the stranded cost.

Switching station – An assemblage of equipment used for the sole purpose of tying together two or more electric circuits. Selectively arranged switches are used to permit a circuit to be disconnected in case of trouble, or to change electric connections between circuits. A type of substation.

Synchronizing – The process by which the sinusoidal output voltage waveform of an AC generator is brought precisely into line with the frequency, time and voltage of another generator or with the main system to which it is to be connected.

Thermal/Electric ratio – A ratio describing the energy use of a particular industry (or facility), in which the total energy used as heat is divided by the total energy used as electric power. This refers to energy used within the plant rather than the energy purchased at the plant gate. This value is usually used in conjunction with assessments of cogeneration options.

Thermal Energy Storage(TES) – Systems that produce cold water, usually at night when electrical rates are lowest, and store the water in insulated tanks for use in air conditioning applications when rates are higher.

Thermal storage – Storage of heat, typically, in an insulated tank as hot water to provide a buffer against peak demand. The water may be pressurized to allow it to be kept at a higher temperature.

Wheeling— Moving electricity from the generating facility to the customer over one or more separately owned electric transmission and distribution systems.

Wholesale wheeling – Transporting electric power in amounts and at prices covered in long-term contracts between the generator and a distributor or large power consumer.

Visit the following website for more information:
http://www.energy.gov/ or http://search.ornl.gov/

Other Combined Heat and Power publications available at:
http://www.energy.wsu.edu/publications.html