

## ENERGY

### COMBINED HEAT AND POWER UNITS

#### METHODOLOGICAL NOTES

A CHP (Combined Heat and Power) unit is a thermal installation in which the energy released from fuel is transmitted to an intermediate fluid. This intermediate fluid is normally directed in its entirety to electrical generator sets, designed and equipped in such a way that energy is partly used for driving the generator sets to produce electrical energy and partly to supply heat for various purposes: industrial uses, district heating, etc. The essential characteristic of a unit is that it is self-contained. The unit will be considered also as CHP, if there is simultaneous production of useful heat and mechanical energy.

Fuel input refers to the fuel consumed during a year by the CHP unit for the production of both usefully heat and high effective electricity. Fuel inputs are shown in natural metric unit and in Tera Joules.

According to annual overall efficiency of the unit data for capacity, production and fuel input are presented by type of cycle. Overall efficiency of the unit is ratio between the sum of gross electricity generation with useful heat from cogeneration to the fuel consumed for producing the CHP heat and electricity.

Maximum (gross) electrical capacity of a CHP unit is the maximum capacity, assumed to be active power, that could be generated continuously throughout a prolonged period of operation, with the additional assumption that the magnitude and method of production of the heat supply are, under all conceivable circumstances, those which lead to maximum electrical capacity.

Maximum net heating capacity of a CHP unit is the net heat transfer from the installation to the heating network. It is the heat in the hot fluid supplied to the heating network less, where appropriate, the heat returned to the installation by the fluid returning from the network. This capacity is net, meaning that it is related to the point of entry to the heating network, and excluded the heat consumed by the installation's auxiliaries, which use a hot fluid (space heating, liquid fuel heating, etc.) and losses in the installation/network heat exchangers.

CHP capacity of a unit is normally the maximum gross electrical capacity of the unit. The CHP capacity is calculated for unit which cannot be run in a complete CHP mode and with low efficiency. It is calculated by multiplying the heat capacity with the default power-to-heat ratio. The ratio between electrical and net heating capacity depends of the unit type :

- Combined cycle - 0,95
- Gas turbine with heat recovery - 0,55
- Internal Combustion engine - 0,75
- Steam: backpressure turbine - 0,45
- Steam: condensing turbine - 0,45

Gross electricity generation is the electricity generated by the CHP unit measured at the output terminals of the main generator. It comprises both CHP and condensing electricity.

Useful heat production (CHP heat) means heat produced in a cogeneration process. It refers to the total heat produced less separate heat generation. The separate heat can be generate by using a heat reduction station or a separate heating boiler.

CHP electricity generation is calculated if the overall efficiency of the units is below at a level 75% (or 80%). It is calculated by multiplying the ratio between gross combined power-to-net heating capacity by the net heat production (it refers to the total heat production less separate heat generation by the separate heating boilers or by using a heat reduction station).