

GUIDANCE NOTE 15

CHP SCHEME POWER OUTPUTS

Total Power Output and Total Power Capacity

GN15.1

For selecting the relevant QI definition, the Total Power Capacity (CHP_{TPC}) at ISO conditions should be used.

GN15.2

Total Power Output (CHP_{TPO}) is used for assessing Power Efficiency and calculating QI. CHP_{TPO} is measured at the generator terminals (ignoring parasitic loads)¹ and reported in kWh or MWh. CHP_{TPO} includes mechanical power output converted to electrical equivalent².

$CHP \text{ Total Power Output (CHPTPO)} = \text{Electricity Output} + \text{Electrical Equivalent of Mechanical Power Output}$

Where:

Electrical Equivalent of Mechanical Power Output = Mechanical Power x 1.05

- Refer to GN13 for guidance on CHP Scheme Monitoring.

Mechanical Power Outputs

GN15.3

A large proportion of the electricity generated in CHP that is consumed onsite is used to run electric motors which drive pumps, fans, compressors, etc. In the case of a CHP Scheme generating mechanical power to drive a pump, fan or compressor directly, the losses in turning mechanical energy into electrical energy and then back into mechanical energy are avoided. To reflect the savings achieved relative to conventional approach, mechanical power output directly coupled to mechanical loads is credited as an equivalent electrical output. This is included in the calculation of Power Efficiency by multiplying the mechanical power by a factor of 1.05 to provide an equivalent electrical power which would do the same work. However, where mechanical power is provided by a CHP Scheme prime mover it will not usually be possible to measure the shaft power directly.

- Refer to GN22 for guidance on Indirect Determination of Energy Outputs (Mechanical Power).

GN15.4

Mechanical power used within the Utilities Area for drives that are integral to the operation of the CHP prime movers (e.g. the air compressor module of a gas turbine)

¹ Some schemes, particularly smaller schemes, may measure power output to the site, net of parasitic loads. This is acceptable since applicants will be claiming the lower net electrical output, consistent with the treatment of uncertainties in GN20.8. Applicants should be aware that in many cases this will reduce the reported electrical efficiency (and QI) by several points.

² For CHPQA the term Power is taken to mean electrical or mechanical energy i.e. power totalised over a period of time, expressed in kWh or MWh, as opposed to the strict definition of power, which is an instantaneous rate of work, expressed in kW or MW.

shall not be included as CHP mechanical power outputs for the purpose of calculating a Scheme's Power Efficiency and QI. This is because the value of this energy is included in shaft output power and heat from the engine.

GN15.5

Mechanical power used within the Utilities Area for drives other than those integral to the operation of the CHP prime movers, where the alternative driver is an electric motor, may be included as CHP mechanical power outputs for the purpose of calculating Power Efficiency and QI. These may include steam turbine-driven boiler feed-water pumps, cooling water pumps, condensate extraction pumps and compressors for process air. The rationale for including the mechanical power driving these plant in the calculation of the QI is that, if they were instead driven by electricity generated by the CHP, their consumed power would be included in the power measured at the generator terminals and, therefore, included in the CHP_{TPO} .

METERING REQUIREMENTS

Electrical Power

GN15.6

For metering electricity, clearly labelled commercial/industrial three-phase electricity meters of billing quality should be used. Watt-hour meters, current and voltage transformers shall be to appropriate Standard and Accuracy Class dependent on the rated capacity, as shown in Table GN15-1:

Table GN15-1 – Classification of Electricity Metering Equipment

Rated Capacity	Watt-Hour Meter Standard and Accuracy Class	Current Transformer Accuracy Class (Note 1)	Voltage Transformer Accuracy Class (Note 2)	Nominal Overall Uncertainty for CHPQA (Note 3)
>100 MVA	BS EN IEC 62053 (2021) Class 0.2S	0.2S	0.2	±0.5%
<100 MVA	BS EN IEC 62053 (2021) Class 0.5S	0.2S	0.5	±1.0%
<10 MVA	BS EN IEC 62053 (2021) Class 1	0.5	1	±1.5%
≤1 MW	BS EN IEC 62053 (2021) Class 2	0.5	1	±2.5%

Notes

- (1) CTs to IEC 61869-2
- (2) VTs to IEC 61869-3 (2011)
- (3) The actual uncertainty is influenced by power factor and metered load (percent of rated measuring current). The nominal values tabulated shall be used to assess the excess uncertainty of metering systems (meters, current and voltage transformers) that do not meet the applicable standard for their rated capacity.

Mechanical Power

GN15.7

Where prime movers or secondary steam turbines are used to produce external mechanical power, direct measurement of the power output is not possible and it must be established by indirect calculation methods.

GN15.8

Where possible, the calculation shall be from the driver side, i.e. for an engine or gas turbine, by energy balance from the fuel inputs and estimated losses or, for a steam turbine from the steam flow and its inlet and exit conditions. Where this is not possible, a calculation from the driven side is required. Sometimes, steam turbines are installed alongside electric motor drives for the same duty. In this case, trials using the motor-driven machine may provide the required information (see GN22).

Exported Power

GN15.9

All electricity meters, including export electricity meters, must be declared in a Schemes submission.

GN15.10

Only the total Power generated (MWh) during the Self-Assessment period is required to perform a Self-Assessment of quality. However, information on the Power imported and exported is also required for Government statistics and will similarly be subject to Verification and Audit. Sales from an Energy Services Company to a single host site are not counted as exported. Sales to a second customer (whether or not heat is also supplied to that customer) are considered exports.

GN15.11

A detailed breakdown of exported power to non-residential customers is not part of the Self-Assessment for CHPQA Certification and will not be subject to Verification and Audit. However, this information is required for new or upgraded schemes requesting a Certificate for Energy Efficiency and by Government for the collation of annual energy statistics. Applicants who complete this information will not need to be sent a separate survey form by the Department for Energy Security and Net Zero as part of the Annual Inquiry into Electricity Generation. The Electricity Act (1989) allows the Secretary of State to require certain information from any licensed or licence-exempt generator or supplier on such matters as the quantity of electricity generated by particular methods, or fuels used, or electricity transferred or supplied. Most of this information will have been supplied as part of the Self-Assessment for CHPQA, but some items, such as the breakdown of electricity exported to each customer, are not required for Self-Assessment for CHPQA Certification.

GN15.12

Sales should be recorded as: sold direct to a member of the same qualifying group (see Licence and Licence Exemption Orders for definition of 'Qualifying Group'); sold direct to another customer outside the Qualifying Group; sold to a supplier for onward sale.

GN15.13

Sales of exported power to Residential Users should not be disaggregated. Residential Users should be treated as a single customer, and the total sales recorded

- Refer to GN30.4 for a definition of Residential User or Residential Use.