

GUIDANCE NOTE 22

INDIRECT DETERMINATION OF MECHANICAL POWER OUTPUTS

MAIN PRIME MOVERS

GN22.1

Where one of the main prime movers in a CHP Scheme drives a mechanical load rather than (or as well as) an electrical generator, it will usually be of sufficient importance to warrant metering of the process-side operation in terms of flow rate, temperatures and pressures. These measurements may permit the absorbed power to be determined. For a liquid pumping duty this is straightforward but for a gas compressor the calculation can be quite complex, depending on the number of stages, intercooling and, sometimes, changes in molecular weight. Calculation methods are documented in engineering texts.

GN22.2

An alternative method is to derive the driven load from an energy balance including the fuel input, the energy content of the exhaust gases and, where applicable, the engine cooling circuits. This will involve exhaust gas analysis and the sensitivity to errors in oxygen content may render this approach less robust than calculation of load from the process conditions.

GN22.3

Where the prime mover is a steam turbine, measurement of the steam flow and its inlet and exit conditions will permit the mechanical power output to be calculated.

GN22.4

Manufacturers' design data or, preferably, test data can provide a good basis for determining difficult power outputs. This approach may require an estimate of the fall-off in performance/efficiency since new.

GN22.5

If there is a back-up method of driving the mechanical load using an electric motor, the electrical input to this motor can be used to estimate the shaft power required to drive the mechanical load (using the manufacturer's figures for motor and gearing efficiencies).

SECONDARY STEAM TURBINES

GN22.6

Some sites will have steam turbines driving pumps or compressors within the Utilities and/or Process Areas. It may be advantageous to include these within the CHP Scheme if the CHP Scheme otherwise fails to meet the threshold criteria for Good Quality. For CHP Schemes that already meet the criterion without including such drives there is no merit in making the monitoring and assessment unnecessarily complex unless this useful heat is actually used in power generation.

GN22.7

These secondary drives may have only limited metering or indicators in place. Possible calculation methods are those outlined above for prime movers. The applicant should consider the benefits of including these drives in terms of the balance of the benefits derived from the additional contribution to CHP_{TPO} and the monitoring necessary to achieve the required standard. A rough estimate of the benefits may be derived using the design duty of the drive.

GN22.8

Where the secondary steam turbine is either a fully or partially condensing steam turbine the heat rejected in the condenser must be deducted from the CHP heat outputs.