

## Template Air Quality Assessment Procedure for Gas-Fired Combined Heat and Power (CHP) Plant

### Purpose

The purpose of the air quality assessment is to determine the impact of a proposed CHP plant on local ambient concentrations of nitrogen dioxide at specific receptors. The air quality assessment should be undertaken in accordance with the procedures described below. The methodology, results and conclusion of the air quality assessment should be presented in a detailed report.

### Dispersion Modelling

The dispersion of the plume from the CHP stack shall be modelled using the [ADMS 4](#), [AERMOD](#), or [ADMS Roads](#) (when combined with road traffic sources) models. The dispersion modelling study should take into account the following matters.

### Emission Source/s

The stack release parameters used in the model should be defined as in Table 1. The source of emissions data should be identified. If information on variability/cycles/start-up/shut-down are not available, the model should be run based on the worst-case assumption that steady-state emissions occur all year round at a constant emission rate.

Table 1: Emissions and Stack Parameters

Parameter	Units
Stack Location	(xxxxxx,yyyyyy) grid reference
Stack height above ground	M
Number of flues	
Maximum pollutant emission rates at operating capacity (NO <sub>x</sub> )	g/s
Flue diameter	M
Flue area	
Exit temperature	K or °C
Efflux velocity	m <sup>3</sup> /s
Actual volumetric flow-rate	Am <sup>3</sup> /s

The height of the stack/s above ground must be provided. An indication of only the height of the stack above roof ridge is not adequate.

### Building Parameters

Buildings with a height of more than a third of the height of a stack within horizontal distance of approximately 10 stack heights are likely to affect the dispersion of plume. The structures on site that fulfil this criterion should be included in the model and referenced in the report.

### Meteorological Data

Details of the meteorological data to be used within the dispersion model would be provided in the report. Hourly sequential data should be obtained for at least three years from a

nearby representative Meteorological Office observing station. Preliminary modelling runs should be carried out to identify which year gives rise to the highest short-term and long-term pollutant impacts.

### **Terrain and Surface Roughness**

Terrain and surface roughness parameters used in the model set-up should be identified.

### **Background Concentrations**

In order to account for existing (baseline) levels of pollutants in the vicinity of the CHP plant, baseline pollutant concentrations should be added to the modelled stack NO<sub>x</sub> contribution. The baseline may include the existing contribution of other local sources of NO<sub>x</sub> (e.g. traffic) as well as the regional background.

Background estimates of NO<sub>2</sub> and NO<sub>x</sub> can be derived from the [DEFRA UK mapping of background concentrations](#) or from local ambient monitoring data, corrected to the relevant assessment year using the methodology outlined in DEFRA Technical Guidance [LAQM.TG\(09\)](#).

Care must be taken to give careful consideration of the combined impact of the CHP stack emissions with road traffic emissions in the vicinity of busy roads; the latter can dominate the baseline at certain urban locations.

All assumptions regarding background and baseline concentrations of NO<sub>2</sub> and NO<sub>x</sub>, and how they are combined with the modelled CHP stack NO<sub>x</sub> contribution, should be reported in order to provide a fully transparent modelling assessment. Guidance on the different methods for combining background and source-modelled NO<sub>x</sub> and NO<sub>2</sub> for short-term and long-term concentrations may be found in Technical Guidance [LAQM.TG\(09\)](#).

The methodology used to account for the NO<sub>x</sub> to NO<sub>2</sub> atmospheric conversion should be included in the report with justification/references for any assumptions employed.

### **Predicted Concentrations**

Ambient NO<sub>x</sub> contributed by the CHP stack should be predicted for the relevant averaging periods over a regularly-spaced receptor grid. A grid size extending over a 3 km radius from the site should be employed at a receptor spacing of 5 m. This fine grid spacing should enable the general pattern of ground level impacts to be mapped using concentration contours. Maps illustrating the contours should be presented in the report.

In addition, a minimum of 15 specific receptors should be used to provide predicted concentrations at sensitive locations in the area surrounding the CHP and the immediate vicinity of the plant. These receptors should include residential properties, schools, playground and outdoor leisure areas. Maps showing the predicted concentrations for each pollutant at specific receptor locations should be included.

The predicted results for specific receptors should be tabulated, and this should include the location of the receptor and distance from the stack. The location and grid reference for the point of maximum impact should also be identified.

A full discussion of modelling uncertainty and sensitivity to key input parameters should be included.

Template Air Quality Assessment Procedure For Gas-Fired Combined Heat and Power (CHP) Plant. Developed as part of the Environmental Protection UK 'CHP and Air Quality Guidance for Local Authorities'

## **Notes on This Procedure**

This procedure was prepared as part of the Environmental Protection UK 'CHP and Air Quality Guidance for Local Authorities' project in June 2011. It was adapted from an original procedure developed by the London Borough of Camden, which has been verified by Bureau Veritas.

Further guidance documents and tools are available to download from [www.environmental-protection.org.uk/CHP](http://www.environmental-protection.org.uk/CHP) or contact Environmental Protection UK, 44 Grand Parade, Brighton BN2 9QA.