

Calibrating Defra's Background NO_x and NO₂ Maps against 2016 Measurements



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Introduction

This note provides an update to the suggested approach¹ to treating background concentrations of nitrogen dioxide (NO₂) and nitrogen oxides (NOx) when using the Calculator Using Realistic Emissions for Diesels (CURED) V2A, which was published in September 2016. Part of the approach involved uplifting base year concentrations to match national background measurements made as part of the Automatic Urban and Rural Network² (AURN). Uplift factors were provided in Table 2 of the document for the base years of 2014 and 2015. Uplift factors are now provided for 2016 (see Table 1 below).

Table 1: Uplifts to be Applied to Total Background Concentrations

Base Year	% Concentration Uplifts Expressed as a Fraction ^{a, b}	
	NOx	NO ₂
2016	0.208	0.102

^a for example 0.208 means that the measured concentrations were, on average, 20.8% higher than the mapped concentrations.

^b at the time that this note was produced, 2016 was the most recent full calendar year of available measurements and so uplift factors for subsequent years cannot be derived.

Derivation of Factors

2016 Base Year

For 2016, the mapped NO₂ values have been calibrated against the 56 background suitable AURN sites with more than 75% data capture (Figure 1). This shows that the maps under-predict the background concentrations by 10.2%, on average (i.e. $1/0.9076 - 1 = 0.102$). The value used in Table 1 for NO₂ for a 2016 base year is thus 0.102.

Figure 2 shows the same comparison for NOx. For NOx, there is also under-prediction in the maps. The value used in Table 1 for NOx for a 2016 base year is thus 0.208 (i.e. $1/0.8276 - 1 = 0.208$).

¹ Air Quality Consultants (2016), Deriving Background Concentrations of NOx and NO2 for Use with 'CURED V2A', [Online], Available: <http://www.aqconsultants.co.uk/getattachment/Resources/Download-Reports/Adjusting-Background-NO2-Maps-for-CURED-September-2016.pdf.aspx>.

² Defra AURN Archive, [Online], Available: <http://aurn.defra.gov.uk/>.

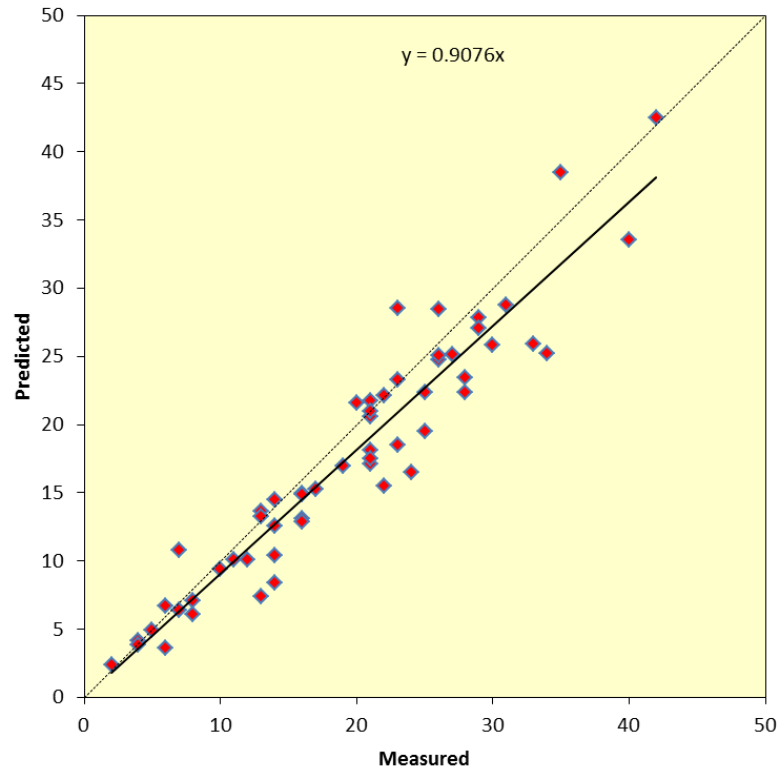


Figure 1: Predicted Mapped versus Measured NO₂ Concentrations at AURN Background Sites in 2016

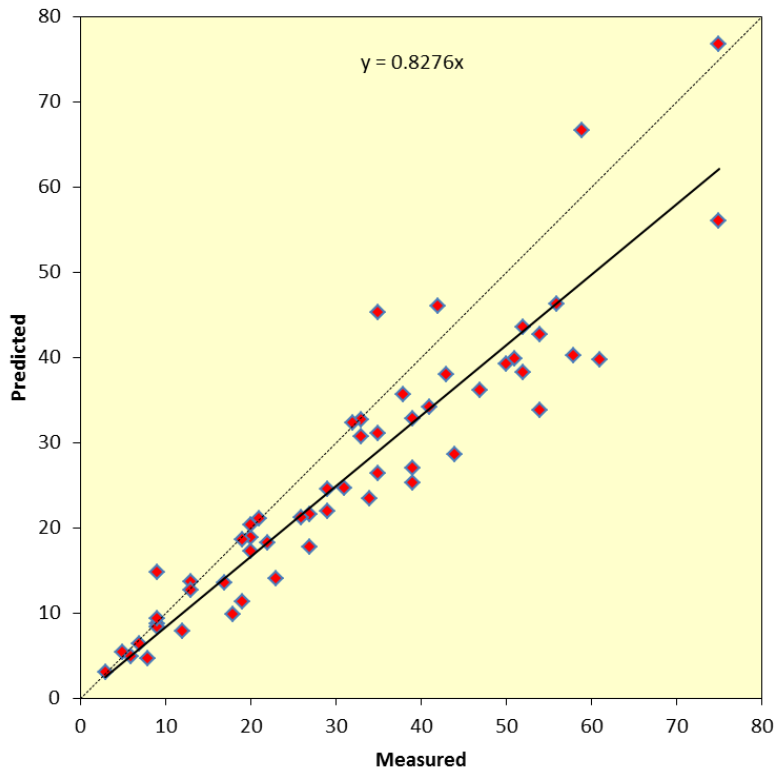


Figure 2: Predicted Mapped versus Measured NO_x Concentrations at AURN Background Sites in 2016