Guidance Note for Use of Projection Factors for Background and Roadside pollutant concentrations.

There are two ways to use the projections factors provided in the excel spreadsheet:

1: For measurement data; or

2: for NETCEN background mapped data as available on
http://www.airquality.co.uk/archive/laqm/tools.php

The following describes how to project data for future years using the factors available on
http://www.airquality.co.uk/archive/laqm/tools.php?tool=year.

The factors must be applied to mapped background data carefully. The following rules apply:

For all pollutants, projections should never be made backwards to the relevant year only forwards from the nearest map to the relevant year. If a map exists for the year required – use the map – do not project from previous year maps.

For NOx and NO_2: use 2001, 2005 and 2010 maps for 2001, 2005 and 2010 respectively.

Years 2002 – 2004: use the mapped 2001 concentration and relevant factors for interim years.

Years 2006 – 2009: use the mapped 2005 concentrations and relevant factors for interim years.

Years 2011 and beyond: use the mapped 2010 concentrations and relevant factors for following years.

An example for NOx background is shown below.

for PM_{10} : use 2001, 2004 and 2010 maps for 2001, 2004 and 2010 respectively.

Years 2002 – 2003: use the mapped 2001 concentration and relevant factors for interim years.

Years 2005 – 2009: use the mapped 2004 concentrations and relevant factors for interim years.

Years 2011 and beyond: use the mapped 2010 concentrations and relevant factors for following years.

An example for PM_{10} is shown below, and takes account of the total, secondary and primary background projections that need to be projected.

for Benzene : use 2001, 2003 and 2010 maps for 2001, 2003 and 2010 respectively.

Year 2002: use the mapped 2001 concentration and the 2002 factor.

Years 2004 – 2009: use the mapped 2003 concentrations and relevant factors for interim years.

Years 2011 and beyond: use the mapped 2010 concentrations and relevant factors for following years.

for CO : use 2001map for 2001.

Year 2002 - 2025: use the mapped 2001 concentration and relevant factors for following years.

for 1,3-butadiene : use 2001 and 2003 map for 2001 and 2003 respectively.

Year 2002: use the mapped 2001 concentration and relevant factor for 2002.

Year 2004 - 2025: use the mapped 2003 concentration and relevant factors for following years.

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Example of projection of NOx background concentrations:

Background NOx concentrations are required for an assessment for the years 2003, 2008 and 2013.

Concentrations ($\mu g/m^3$) derived from the mapped background data are:

2001 NOx background concentration	2005 NOx background concentration	2010 NOx background concentration
33.7	29.2	23.2

The factors to be used for the projections are those highlighted in the table below:

Year	NOx Background Projection Factor
2001	1.000
2002	0.961
2003	**0.926**
2004	0.896
2005	**0.869**
2006	0.836
2007	0.800
2008	**0.764**
2009	0.728
2010	**0.695**
2011	0.670
2012	0.650
2013	**0.632**

Therefore:

Future Years required	2003	2008	2013
	2001 Mapped x 2003 Factor	2005 Mapped x 2008/2005 Factor	2010 Mapped x 2013/2010 Factor
Calculation	33.7 x 0.926	29.2 x 0.764/0.869	23.2 x 0.632/0.695
Equals (mg/m^3)	31.2	25.7	21.1
Base Year Factor for forward projection	2001	2005	2010

Projected background NOx concentrations of 31.2, 25.7 and 21.1 $\mu g/m^3$ have been calculated for 2003, 2008 and 2013 respectively.

Example of projection of PM_{10} background concentrations:

Background PM_{10} concentrations are required for an assessment for the years 2003, 2008 and 2013.

Concentrations ($\mu g/m^3$ gravimetric) derived from the mapped background data are:

2001 PM_{10} Total concentration	2004 PM_{10} Total concentration	2010 PM_{10} Total concentration	Secondary 2001 PM_{10} concentration
19.3	18.5	17.0	7.8

The factors to be used for the projections are shown in the table below:

Year	Primary PM_{10} Background Projection Factor	Secondary PM_{10} Background Projection Factor
2001	1.000	1.000
2003	0.954	0.955
2004	0.930	0.932
2008	0.850	0.841
2010	0.815	0.795
2013	0.794	0.795

To project PM_{10} background concentrations the primary, secondary and coarse fractions must be considered. The coarse fraction of PM_{10} is assumed to be 10.5 ($\mu g/m^3$ gravimetric) for all years.

To calculate Total 2003 PM_{10} Background:

Firstly, calculate the primary PM_{10} concentration in 2001.

Total 2001(mapped) – (coarse + secondary 2001 mapped) = **The 2001 primary PM_{10} concentration**	19.3 – (10.5 + 7.8) = **1.00**

Adjust the Primary 2001 PM_{10} concentration to 2003:

Primary 2001 x 2003 projection factor = 1.00 x 0.954	**Primary 2003 PM_{10}** = **0.95**

Then, **calculate the secondary 2003 PM_{10}** concentration:

2001 Secondary x 2003 projection factor 7.8 x 0.955	**Secondary 2003 PM_{10}** **7.45**

The **total 2003 PM_{10}** concentration is therefore:

2003 Primary + 2003 Secondary + Coarse 0.95 + 7.45 + 10.5	**Total 2003 PM_{10}** **18.9**

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To calculate Total 2008 PM_{10} Background:

The primary PM_{10} 2008 concentration first needs to be calculated:

Total 2004 (mapped)	18.5
-	-
Coarse	10.5
-	-
Secondary 2004	7.27

Secondary 2004 = 2001 Secondary x 2004 projection factor	
7.8 x 0.932	7.27

=	=
Primary 2004 PM_{10}	**0.73**

Now **adjust the Primary 2004 PM_{10} concentration to 2008** using the 2004 and 2008 adjustment factors:

Primary 2004 x 2008/2004 factors	**Primary 2008 PM_{10}**
=	=
0.73 x (0.850/0.930)	**0.67**

Then, **calculate the secondary 2008 PM_{10}** concentration:

2001 Secondary x 2008 projection factor	**Secondary 2008 PM_{10}**
7.8 x 0.841	**6.56**

The **total 2008 PM_{10}** concentration ($\mu g/m^3$) is therefore:

2008 Primary + 2008 Secondary + Coarse	**Total 2008 PM_{10}**
0.67 + 6.56 + 10.5	**17.7**

To calculate Total 2013 PM_{10} Background:

The primary PM_{10} 2013 concentration first needs to be calculated:

Total 2010 (mapped)	17
-	-
Coarse	10.5
-	-
Secondary 2010	6.20
Secondary 2010 = 2001 Secondary x 2010 projection factor	
7.8 x 0.795	6.20
=	=
Primary 2010 PM_{10}	**0.3**

Now **adjust the Primary 2010 PM_{10} concentration to 2013** using the 2010 and 2013 adjustment factors:

Primary 2010 x 2013/2010 factors	**Primary 2013 PM_{10}**
=	=
0.3 x (0.794/0.815)	**0.29**

Then, **calculate the secondary 2013 PM_{10}** concentration:

2001 Secondary x 2013 projection factor	**Secondary 2013 PM_{10}**
7.8 x 0.795	**6.20**

The **total 2013 PM_{10}** concentration ($\mu g/m^3$) is therefore:

2013 Primary + 2013 Secondary + Coarse	**Total 2013 PM_{10}**
0.29 + 6.2 + 10.5	**17.0**