

## (New) Air Quality Directive(s): Implications for UK Monitoring Networks

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## The next 20 minutes...

- The UK context – our current monitoring network
- PM equivalence – what we found and we will do about it
- 4<sup>th</sup> Daughter Directive – implementation
- New Air Quality Directive – monitoring requirements
- The bottom line (costs)



## Caveats...

- Legislative proposals are subject to change
- Site numbers can go down as well as up
- Compliance options will vary from country to country
- Much of what is presented is still subject to the decision making process within Defra and elsewhere



## The UK Context

- Automatic Urban and Rural Network (AURN):
  - 127 site and over 400 instruments:
    - 67 PM<sub>10</sub>
    - 84 ozone
    - 107 NO<sub>x</sub>
    - 78 CO
    - 74 SO<sub>2</sub>
- 17 Heavy metals & 24 PAH (both gravimetric PM)
- 39 benzene (2 GCs; 3 BTX; 34 pumped tubes)



## The UK Context

- Ecosystem impacts monitoring:
  - Acid waters monitoring network
  - Acid deposition network
  - Ammonia network
  - POPs and TOMPs networks
- EMEP monitoring
- Local authority monitoring:
  - Possibly an additional 1000-1500 sites
  - At least 1500 automatic analysers



## PM Equivalence

- UK study began Mar 04, ended June 06
- Equipment tested:
  - PM<sub>10</sub> – Kleinfiltergerat (ref sampler)
  - PM<sub>10</sub> Partisol 2025;
  - PM<sub>10</sub> TEOM;
  - PM<sub>10</sub> TEOM retrofitted with a Filter Dynamics Measurement System (FDMS);
  - PM<sub>10</sub> OPSIS SM200, (SM200 Beta and SM200 Mass);
  - PM<sub>10</sub> Met-One Beta Attenuation Monitor (BAM);
  - PM<sub>10</sub> Met-One BAM retrofitted with a heater (Smart BAM);
  - PM<sub>2.5</sub> – Kleinfiltergerat (ref sampler)
  - PM<sub>2.5</sub> TEOM retrofitted with an FDMS



# Implications For EU Member States Of New Air Quality Directives

## PM Equivalence

- Study report published 13 June 06
- In the UK:
  - TEOM fails equivalence tests
  - Partisol 2025 Sequential Sampler; TEOM retrofitted with FDMS (for PM<sub>10</sub> and PM<sub>2.5</sub>); and the OPSIS SM200 (by Beta) pass without correction
  - OPSIS SM200 (by Mass) and Met One BAM pass with correction
  - Have determined relationship between FDMS<sub>base</sub> and TEOM for future comparisons
- UK has commenced upgrading National Network initially using FDMS units retrofitted to existing TEOMs



## 4<sup>th</sup> Daughter Directive

- PAHs, Cadmium, Arsenic, Nickel and Mercury
- Requires ambient and deposition monitoring of 4 heavy metals and sets target values for PAHs as Benzo[a]pyrene (1 ng/m<sup>3</sup>), As (6 ng/m<sup>3</sup>), Cd (5 ng/m<sup>3</sup>), and Ni (20 ng/m<sup>3</sup>); no TV for Hg
- Monitor PAH as PM<sub>10</sub> current UK network measures approx PM<sub>14</sub> and total (particulate and vapour phase)
- Will require UK to replace all 24 of the current PAH monitors with the reference or equivalent method
- Will require further 11 B[a]P sites and 10 heavy metals sites
- 1<sup>st</sup> year of data to report = 2008



## New Air Quality Directive

- available on CAFÉ website <http://europa.eu.int/comm/environment/air/cafè/index.htm>
- Merges - Framework, DD1, DD2 & DD3 Directives and Exchange of Information Decision
- Implementation date – 2 years after publication
- Co-decision procedure with Council and European Parliament
  - Council – political agreement
  - EP – 2<sup>nd</sup> reading Spring 2007
- Reviews and updates the framework, 1<sup>st</sup> and 2<sup>nd</sup> DDs
- Ozone Articles remain roughly the same as DD3
- 3-5 year extension to compliance deadlines in affected zones provided that strict criteria met and plans to move towards compliance put in place
- Indications of where limit values apply



## New Air Quality Directive

Reference Methods = new CEN standards (Annex VI)

- Type approval – mutual recognition of reports
- Timetable for conversion of networks
- Calculate and report uncertainties on annual basis
- Defra will require all gas analysers to be MCERTS approved prior to equipment replacement programme
- So far, around 75% of the analysers in the UK networks are type approved



## New Air Quality Directive

- PM<sub>2.5</sub>:
- new limit value 25 µg/m<sup>3</sup>; non-mandatory 2010-15; mandatory 2015 onwards
  - non-mandatory 'exposure reduction' target at urban background of 20% on 2010 concentrations by 2020
  - Urban background monitoring where > 100,000 population
- Other pollutants:
- 2:1/1:2 ratio of urban background to roadside/kerbside sites (Annex V)
  - benzene and a recommended list of ozone precursors retained



## New Air Quality Directive – UK View

- Some sites will decrease:
  - 51 fewer CO sites
  - 35 fewer SO<sub>2</sub> sites
- Some sites will move:
  - NO<sub>2</sub>: more “zone” sites, fewer “agglomeration” sites, especially for urban background (UB)



## Implications For EU Member States Of New Air Quality Directives

### New Air Quality Directive – UK View

- Some sites will increase:
  - PM: 52 additional sites required:
    - 22 PM<sub>10</sub> converted to PM<sub>2.5</sub>
    - 25 new UB PM<sub>2.5</sub>
    - 11 co-located traffic PM<sub>2.5</sub> with existing PM<sub>10</sub>
    - 8 new PM<sub>10</sub> and PM<sub>2.5</sub> sites



### New Air Quality Directive – UK View

- Directive allows for “supplementary methods” including modelling, which halves the number of sites required.
- Ratio of UB to traffic, and PM<sub>10</sub> to PM<sub>2.5</sub> between 2:1 and 1:2.
- Full PM<sub>2.5</sub> speciation at rural background.



### The Bottom Line

- Capital costs only (£/€000s):
  - PM equivalence: £379 (€570)
  - 4<sup>th</sup> Daughter Directive: £434 (€653)
  - New Directive plus EMEP: £1,941-£2,314 (€2,918-3,479)
- Total: £2,754-3,127 (€4,141-4,702)



### Other Options

- Integration of local authority sites?
  - Difference in purpose (local vs national)
  - Siting/operational control
  - Strategic need
  - Need for common QA/QC procedures
  - Cost!
- Rezoning?
  - Political acceptability and credibility of network
  - Simplicity
- Further options...?



### Some Final Thoughts...

- New monitoring requirements impose huge financial burdens on member states, both in setting up new networks and maintaining them:
  - 100 AURN analysers to be replaced in next 5 years through normal turnover, regardless of new requirements
- The UK has reduced this burden through modelling:
  - Modelling allows site numbers to be halved, but term “supplementary assessment methods” devalues it.
  - Modelling allows far more extensive assessments than monitoring alone.
  - The Commission should encourage Member States both to assess through modelling and to report the results.

