# Targets and Indicators for PM2.5
## *some personal thoughts*

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Total PMf Conc. (2016)

**PMf Concentration**
TotPMf_2016v2
ug/m3

| | |
|---|---|
| ■ | 0 - 2 |
| ■ | 2 - 4 |
| ■ | 4 - 6 |
| ■ | 6 - 8 |
| ■ | 8 - 9 |
| ■ | 9 - 10 |
| ■ | 10 - 11 |
| ■ | > 11 ug/m3 |

Data: Tot PMf Conc
Units: ug/m3
Scenario: 2016
Source: UKIAMV5c

**2016**

Total PMf Conc (C2030)

**PMf Concentration**
TotPMfC2030v2
ug?m3

| | |
|---|---|
| ■ | 0 - 2 |
| ■ | 2 - 4 |
| ■ | 4 - 6 |
| ■ | 6 - 8 |
| ■ | 8 - 9 |
| ■ | 9 - 10 |
| ■ | 10 - 11 |
| ■ | > 11 ug/m3 |

Data: Tot PMf Conc
Units: ug/m3
Scenario: C2030
Source: UKIAMV5c
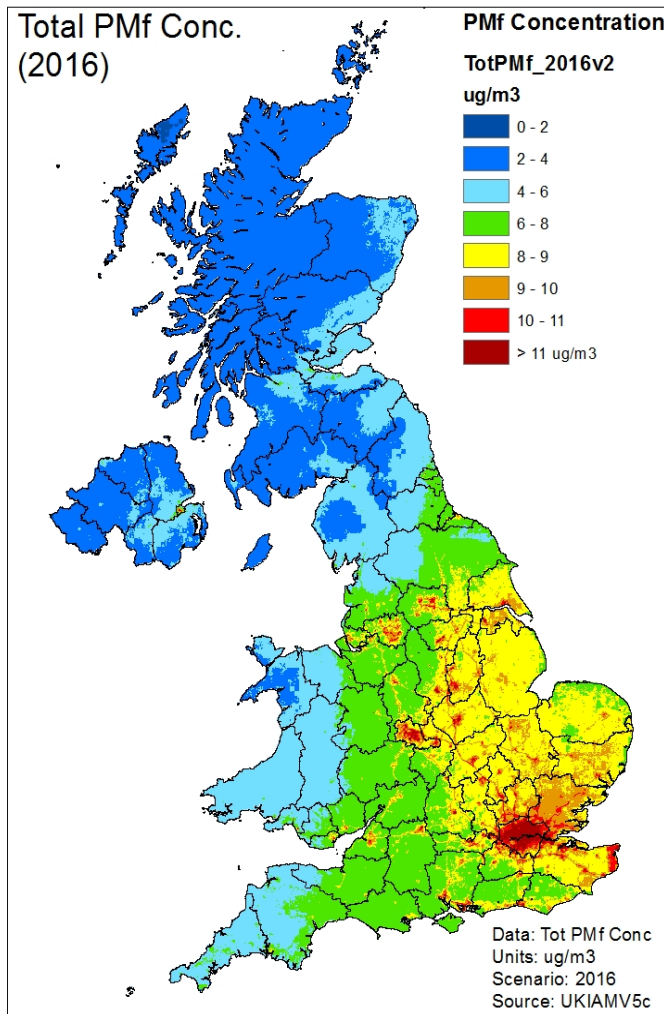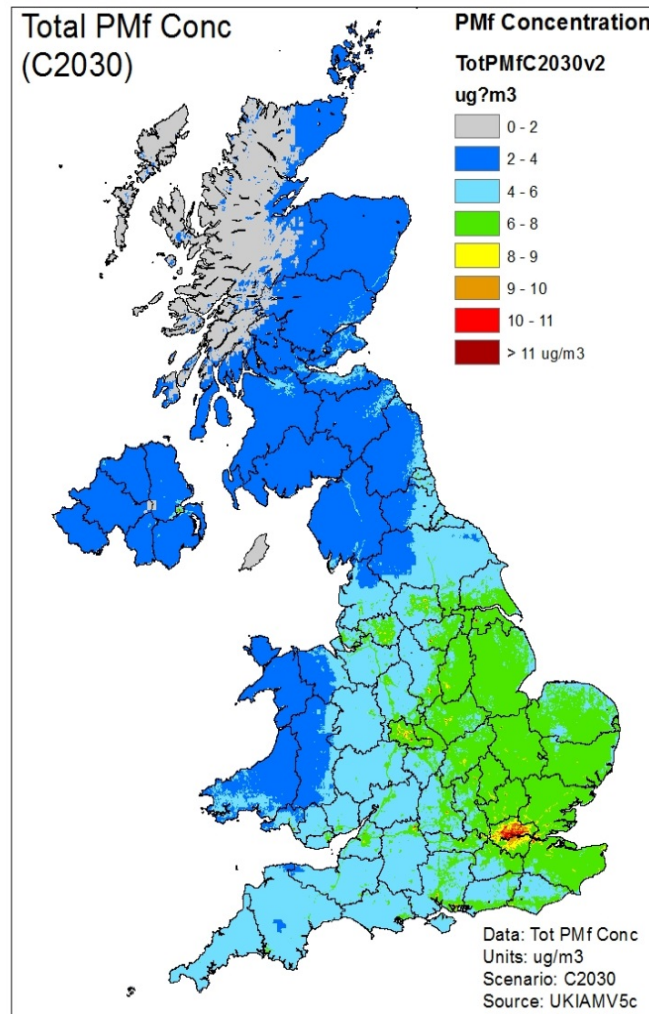
**Central 2030 scenario**

**Modelled PM2.5 using UKIAM taken from report : "PM2.5 exposure and reduction towards achievement of WHO standards"**
**ApSimon et al...** *www.gov.uk/government/publications/air-quality-assessing-progress-towards-who-guideline-levels-of-pm25-in-the-uk*

# Modelling with UKIAM

## clear improvement by 2030
reflects reduction in imported contribution as well as in UK emissions in Central 2030 scenario meeting NECD ceilings

## still exceedance of WHO
guideline of 10 ug/m3 in major towns and cities with local source superimposed on background

UK Government committed to setting target for annual mean PM2.5 (Env Bill). How should this relate to WHO AQ guidelines?

NGOs are calling for target to be WHO guideline- but what does this mean in practice?

*Does this have the same problems as limit values for NO2, focusing on hot-spots/roadside sites rather than reducing overall exposure and health effects.*

**Alternative : Aim to reduce population exposure (as in CLRTAP and GAINS)**

**Indicator: Population weighted mean concentration, PWMC**
*( population exposure without including population growth)*

*-> Direct assessment of health impacts based on total mass and driving down concentrations everywhere including below WHO guideline.*

*Consistent with no threshold, but no emphasis on higher exposure e.g.> current WHO guideline*

| PWMC | National | Rural | Urban | London |
|------|----------|-------|-------|--------|
| 2016 | 7.706 | 6.479 | 8.060 | 10.56 |
| 2030C | 5.668 | 4.834 | 5.909 | 7.84 |

**Number of people exceeding the WHO guideline of 10 ug/m3**

*e.g. UK commitment to halve population exceeding 10ug/m3 by 2025*

*Will be safely met, but not a good indicator as very sensitive to modelling uncertainties: small difference in concentration in populated areas close to 10ug/m3 can make a big difference.*

*Baseline 2016: central estimate 14.8 million people above 10ug/m3*

*Model +1ug/m3 -> 27.2 million*

*Model -1ug/m3  -> 8.6 million*

*Also implies little improvement in London where concentrations are highest relative to rest of country*

# Population weighted mean exceedance, PWME
## = (Accumulated exceedance >threshold) /population

## Accumulated exceedance v threshold concentration 2016
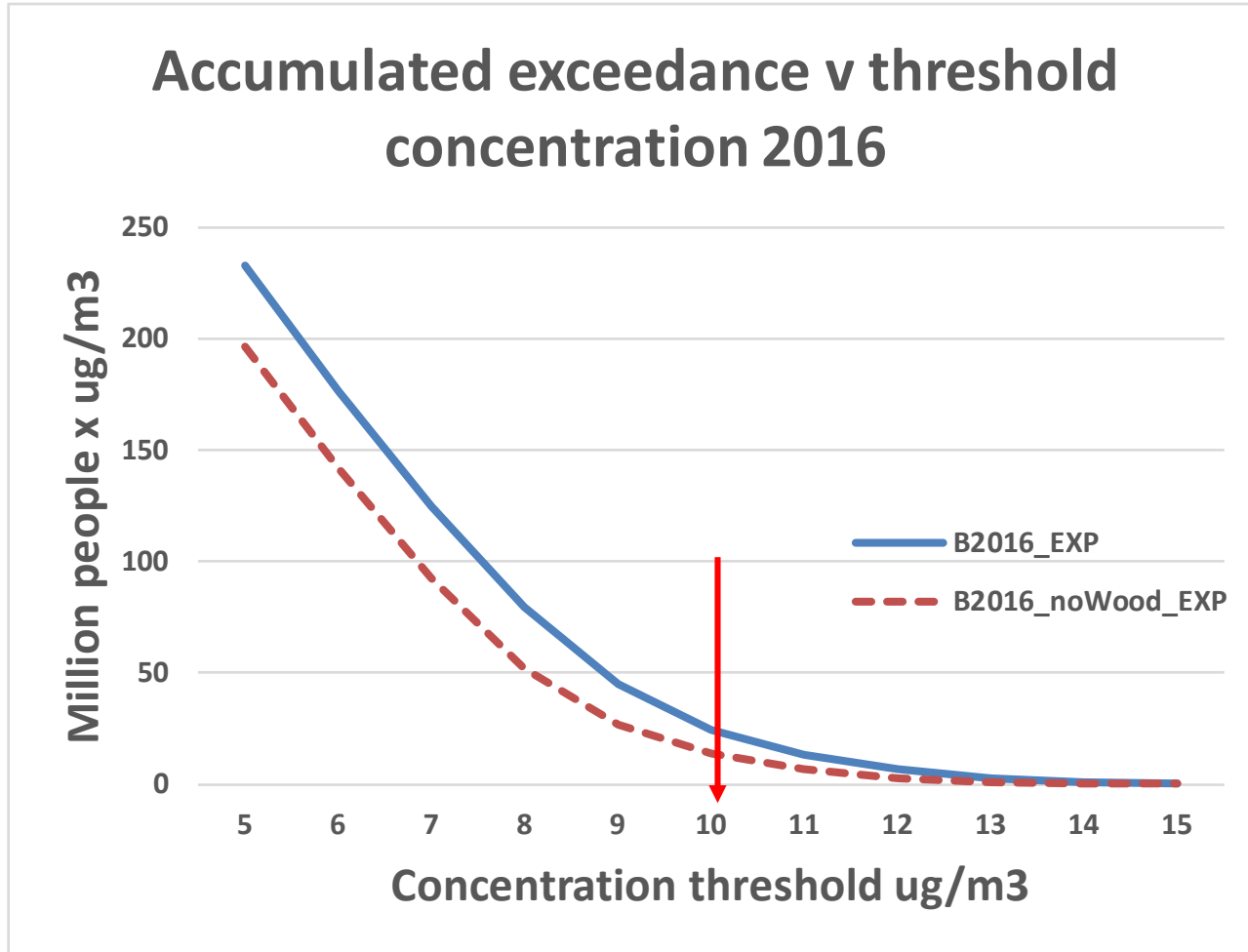


**Far more robust than no of people**

**Reflects whole community including most exposed**
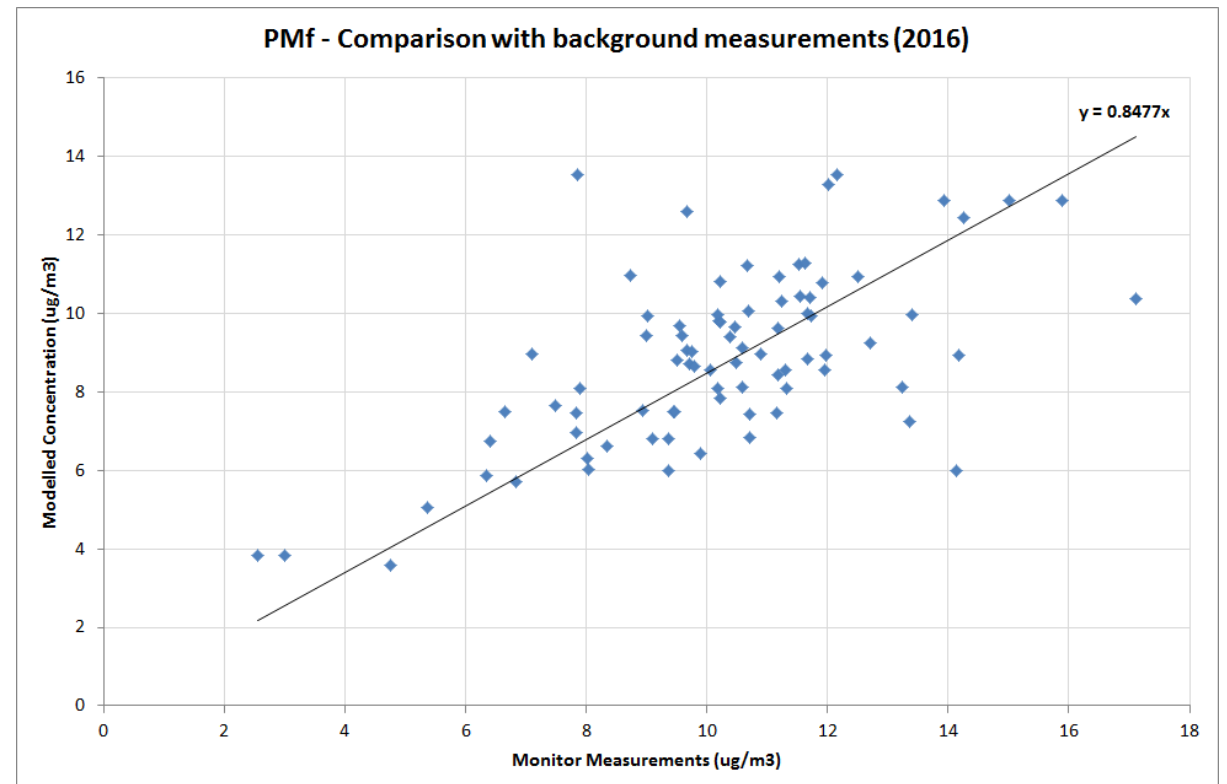
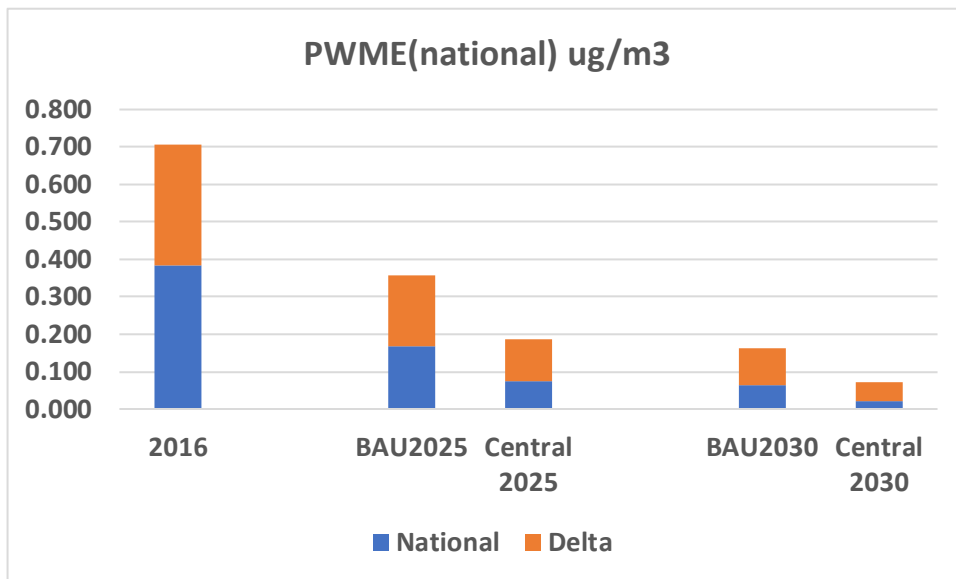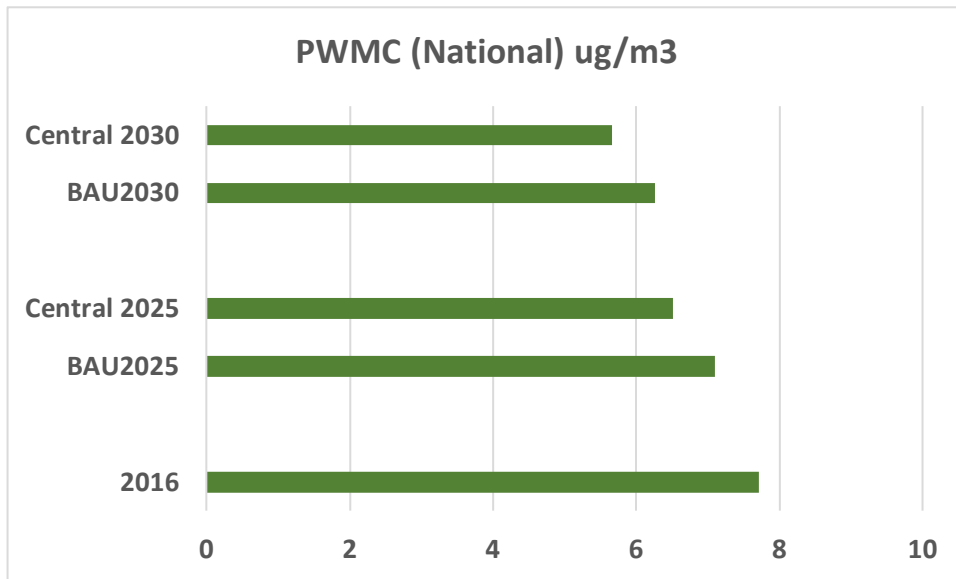% improvement 2030 Central from 2016

National  94.6 %  (89.9 to 96.4)

London    95.2 %  (85.5 to 98.8)

**Modelling uncertainties**

*Emissions (especially PPM2.5 & missing sources), projections,atmospheric modelling*

*Comparison with measurements shows underprediction*

**Although modelling & indicators helpful, a legally binding target needs a robust protocol to assess progress and compliance. How should measurements and models be used in this?**
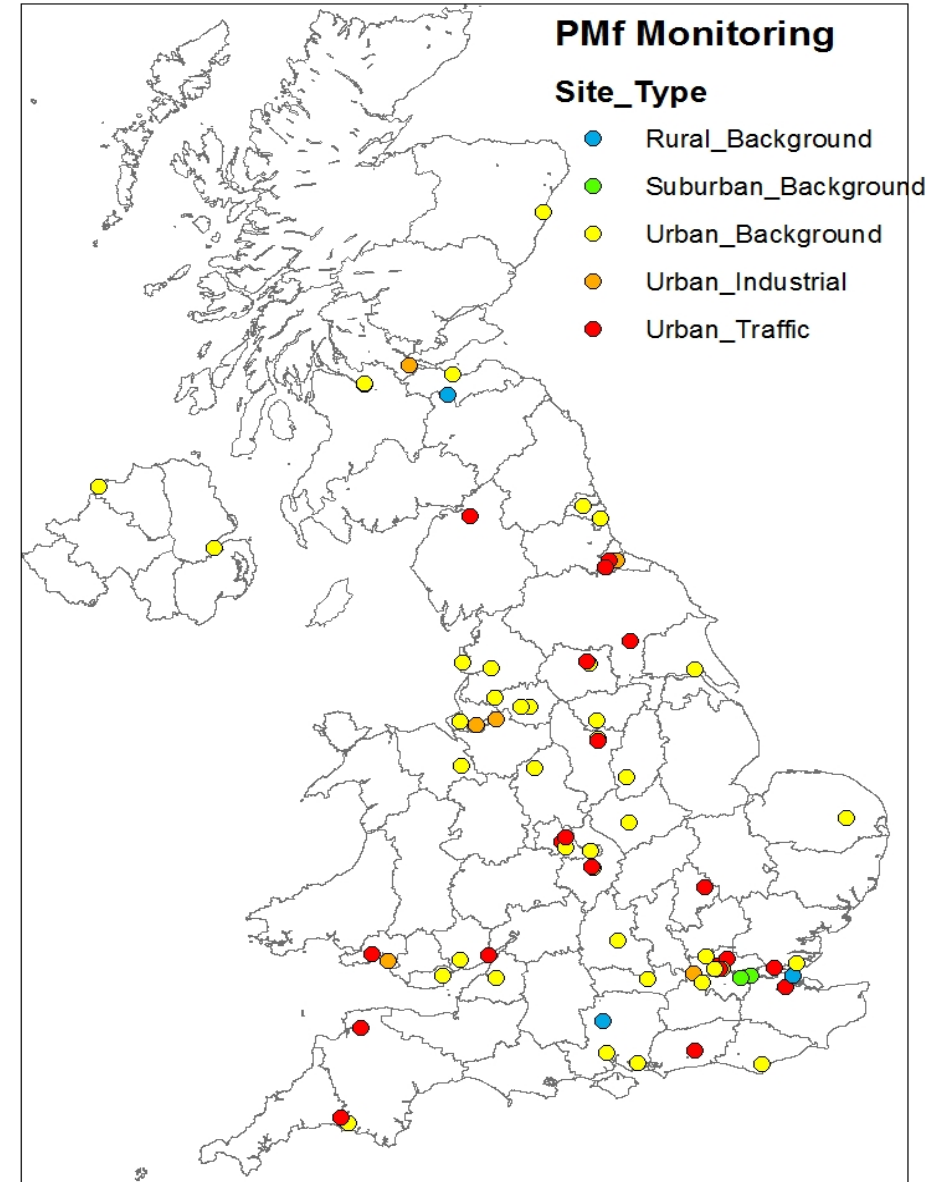
*NB large model uncertainties; different models->different results?*
*Legislation places reliance on measurements, but these also have their limitations.*

*Measurements in agglomerations are used as basis of current EU legislation on PM2.5.*
*Trends in index ~correspondence with PWMC*

*But measurements to estimate exceedance/PWME would need big extension of network?*



PMf Monitoring
Site_Type
- Rural_Background
- Suburban_Background
- Urban_Background
- Urban_Industrial
- Urban_Traffic

So more work to be done!

Exploring model uncertainties and assumptions-> concentrations both underestimating and exceeding measurements

Missing contributions (e.g. cooking, IVOCs) and sources with large uncertainties including non-exhaust emissions, wood-burning

Questions of scale; UKIAM uses 1x1 km grid but hot-spots and enhancement close to roads

Relating modelling to measurement network, and where more measurements could be helpful