Department
for Environment
Food & Rural Affairs

Policy development and IAM in the UK

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What opportunities are coming up?

Domestic:

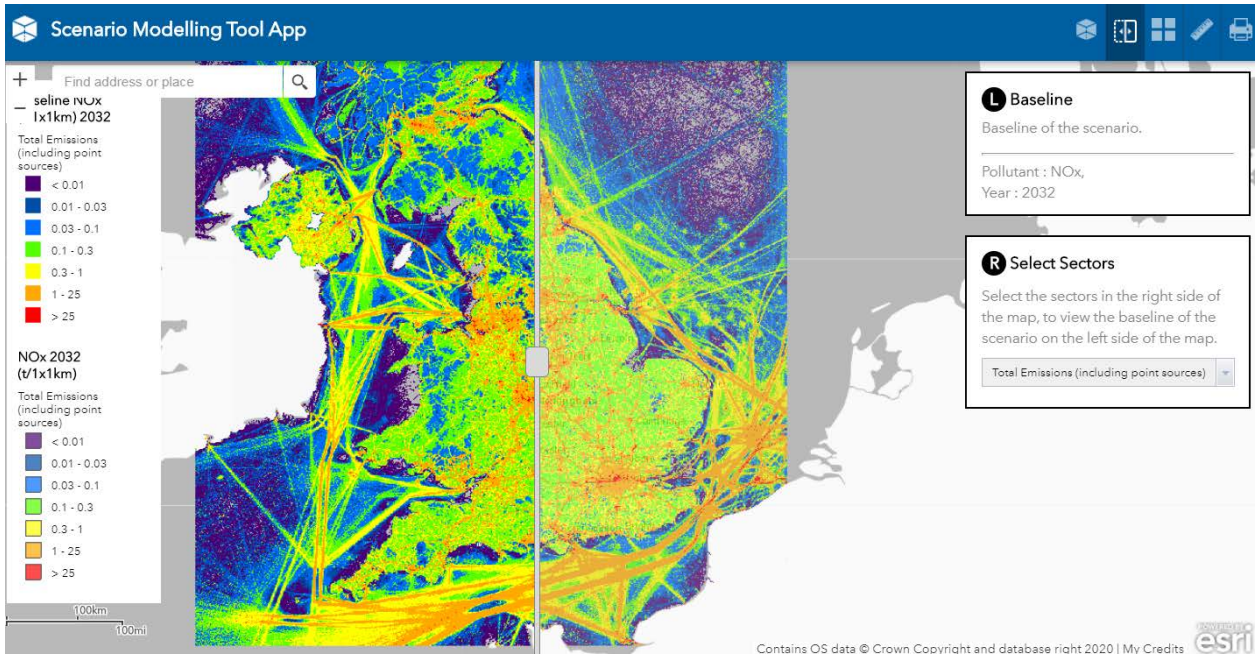
- Developing PM2.5 Targets
- Enable targeted local action in areas with an air pollution problem – e.g. Clean Air Zones

International:

- Review of the Gothenburg protocol
- Co-chair of Global Forum
- UNFCCC COP26 in Glasgow, November 2021

What are the challenges?

- Looking to the future
- Tackling uncertainties
- Thinking locally/spatial targeting
- Wider changes, e.g. Net Zero
- Integrating new tools e.g. Scenario Modelling Tool



$PM_{2.5}$ Targets

- PM2.5 chosen as it is the air pollutant of greatest harm to human health
- Objectives for the two targets:
  - **Reducing the annual mean level of PM2.5 in ambient air**
  - **In the long-term, reducing population exposure to PM2.5**
- Detailed **air quality modelling** is required to predict how PM2.5 concentrations may change in the future which is a process with inherent and significant uncertainty.

IMPERIAL COLLEGE LONDON
in collaboration with

UK Centre for Ecology and Hydrology

and

EMRC

- **Current work plan with UKIAM**

- **Support for Defra in setting targets for PM2.5 in Environment Bill**
- **Analysis of range of scenarios up to 2050 with and without climate measures from net zero scenarios; starting point NAEI2018**

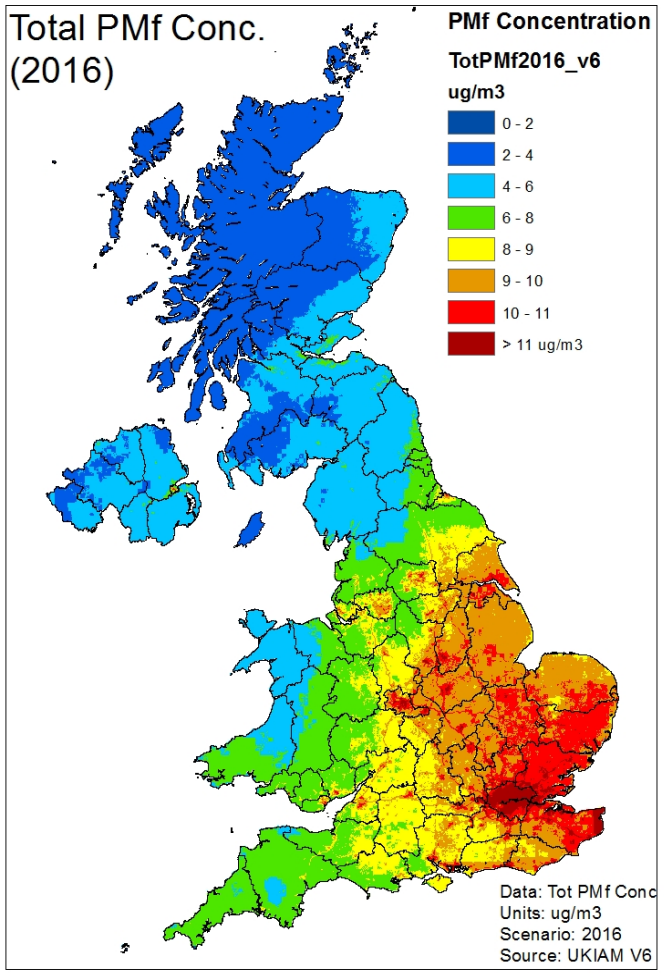
- **Baseline corrections for recent changes e.g. for diesel car emissions (Euro 6 post RDE diesels as clean as petrol)**

- **Sensitivity studies –e.g. to uncertainties illustrated for primary PM2.5 sources; different assumptions about electrification of transport**

- **Parallel work on NH3 and future agricultural scenarios: and uncertainties in ecosystem protection (probabilistic approach to uncertainties in modelled deposition and in critical loads). Gives a more progressive picture of improvement than “yes/no” exceedance.**

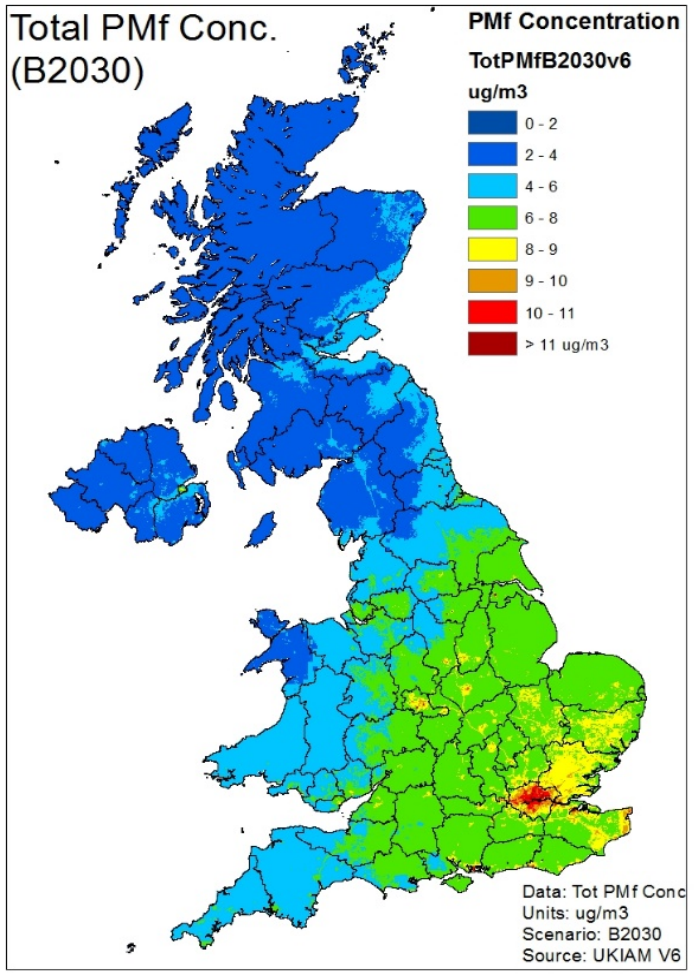
Results from new model version:

2016



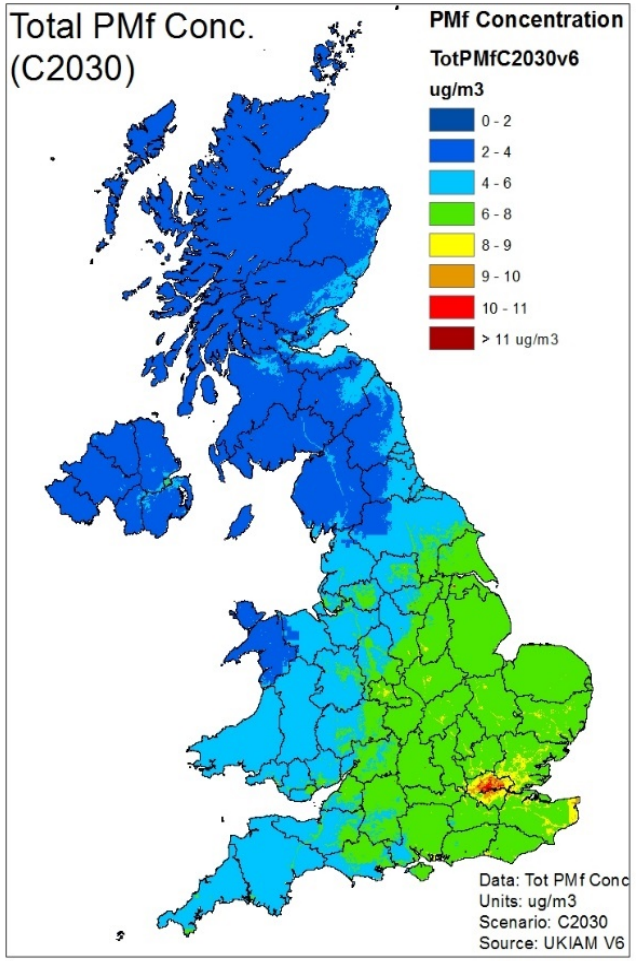
PWMC(UK) =9.11 (SIA=4.0,PPM=2.0)
PWME(UK>10)=.557

BAU 2030



PWMC(UK)=7.37
PWME(UK>10)= .055

Central 2030



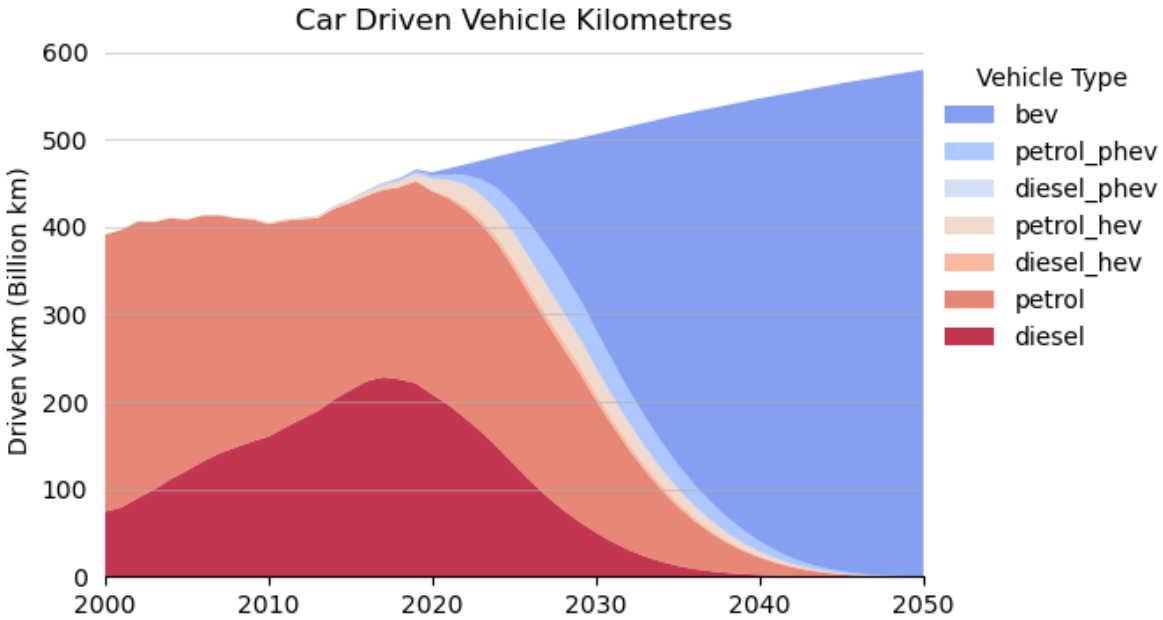
PWMC(UK) =6.76
PWME(UK>10)=.011

Modelling road transport scenarios to 2050

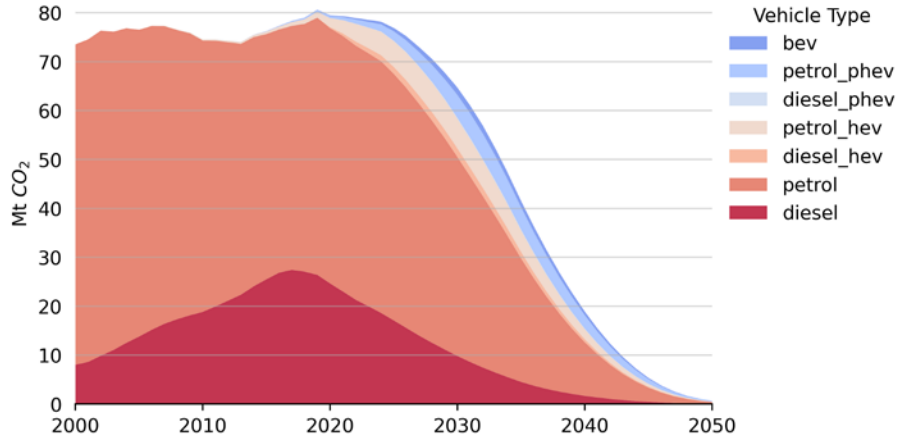
Illustration from Daniel Mehlig's PhD project on EV scenarios to 2050 (CCC scenario)

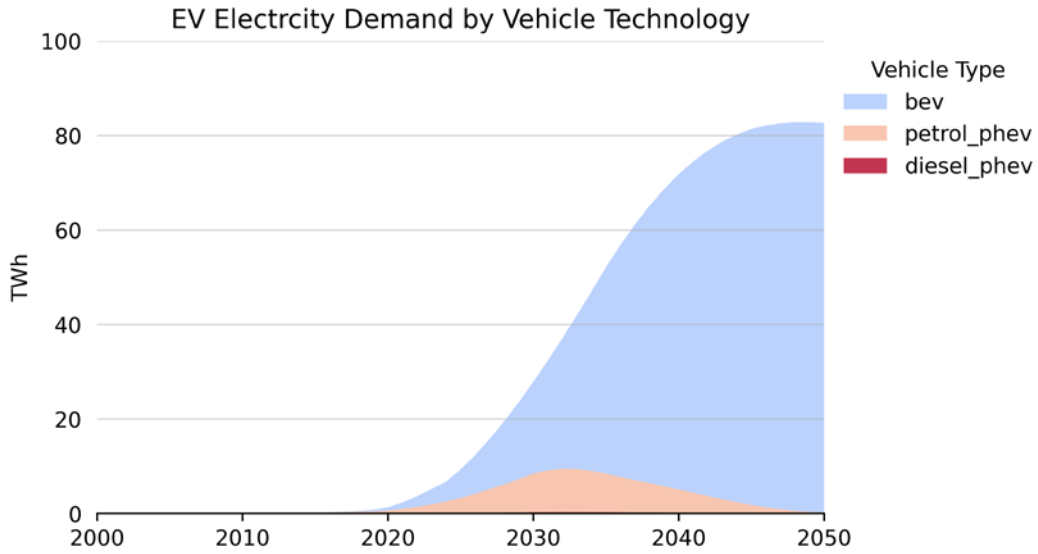
Fleet Model

Forecast new vehicle sales data + retirement->Fleet composition -> projected km driven



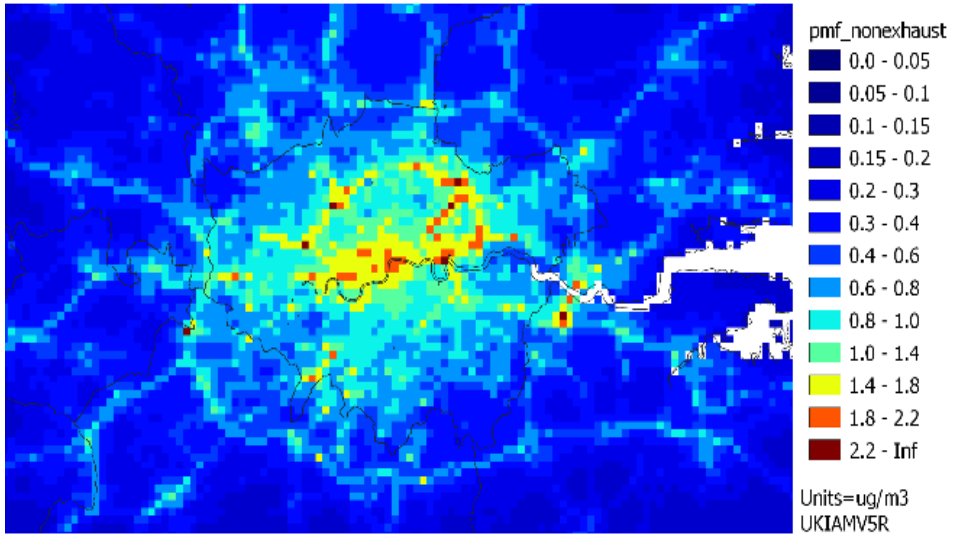
CO2 emissions



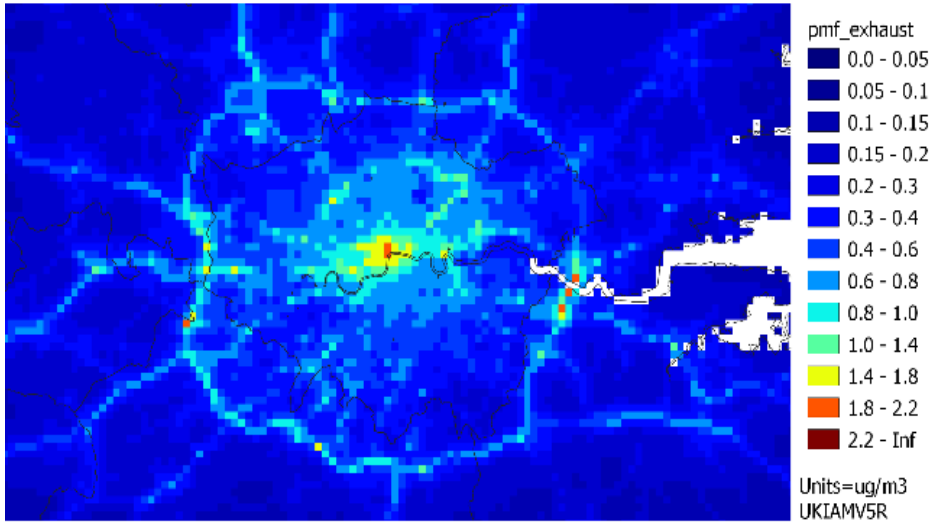


Reducing higher PM2.5 concentrations in urban areas: primary PM2.5

PM2.5:non exhaust 2016



PM2.5: exhaust 2016



Electric vehicles reduce NOx and CO2 but what effect on non-exhaust emissions (which dominate exhaust emissions)

Comparable emissions from brakes, tyres and road abrasion but big uncertainties (e.g. US EPA Efs for brakes much higher than from EEA guidebook)

Heavy batteries ->?increase tyre wear and road abrasion

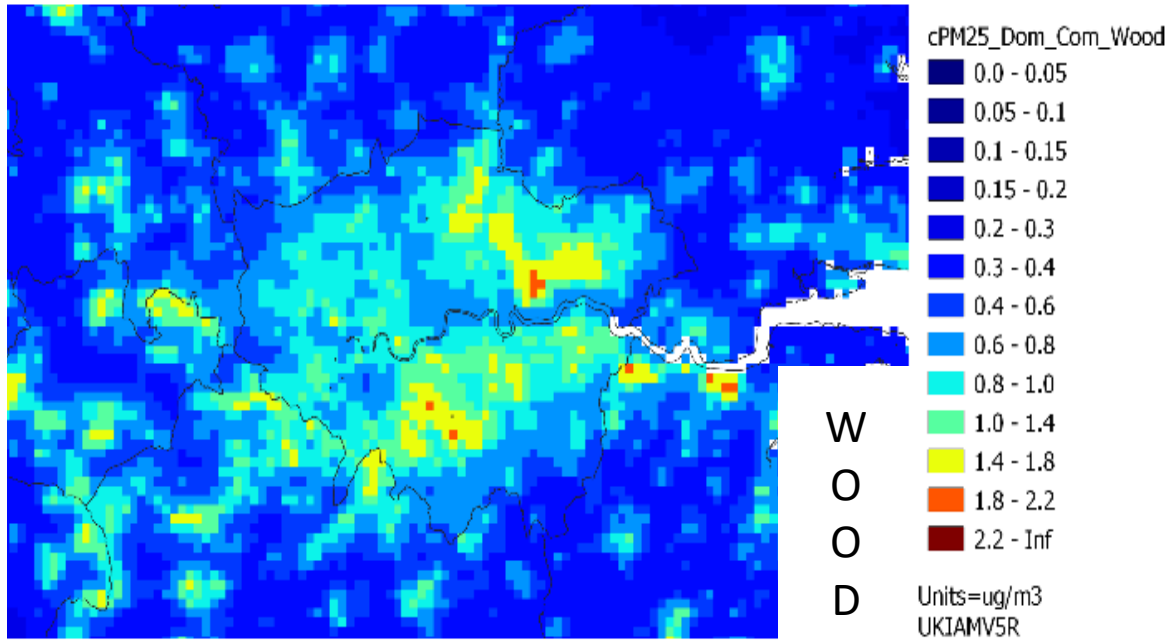
Regenerative braking up to 90% reduction in brake-wear?

But limited improvement without reduction in km driven

Refs: AQEG report
OECD report

Contribution **from** domestic wood-burning

UKIAM: Annual ave. concentrations of PM2.5 across London in 2016 from domestic wood burning



Limited measurements in London ~1 ug/m3

Big uncertainties in emissions (factor 4?)

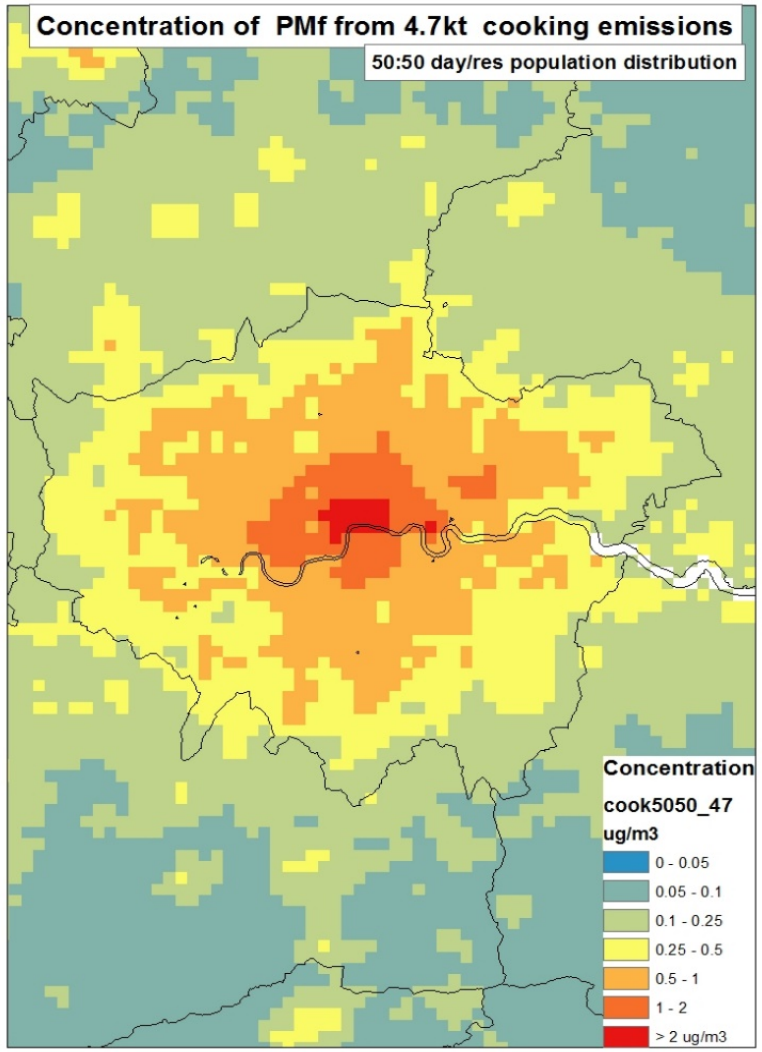
how much wood burned
what type, wet/dry,
type of stove/open hearth
condensable fraction

Spatial pattern of emissions

Dispersion from chimney releases in urban areas

-> overall huge uncertainties

Contribution from cooking?



Source not included in national emissions inventory or in EEA guidebook.

But measurements suggest could be important (comparable with wood-burning?)

Very uncertain emissions. Illustration is for "worst case" assumption for sensitivity studies.

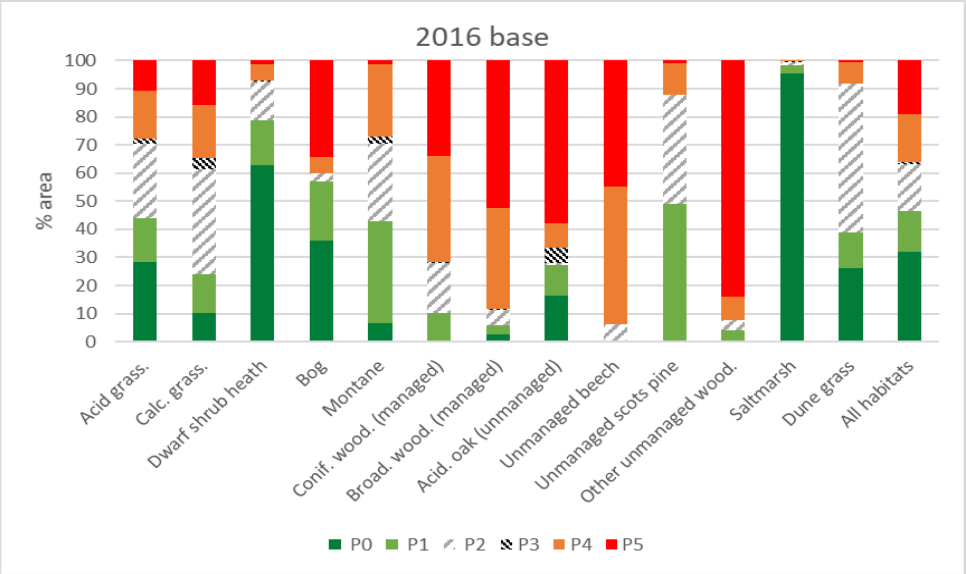
Will have highly localised peak concentrations e.g. close to restaurants/cook-shops/fried food

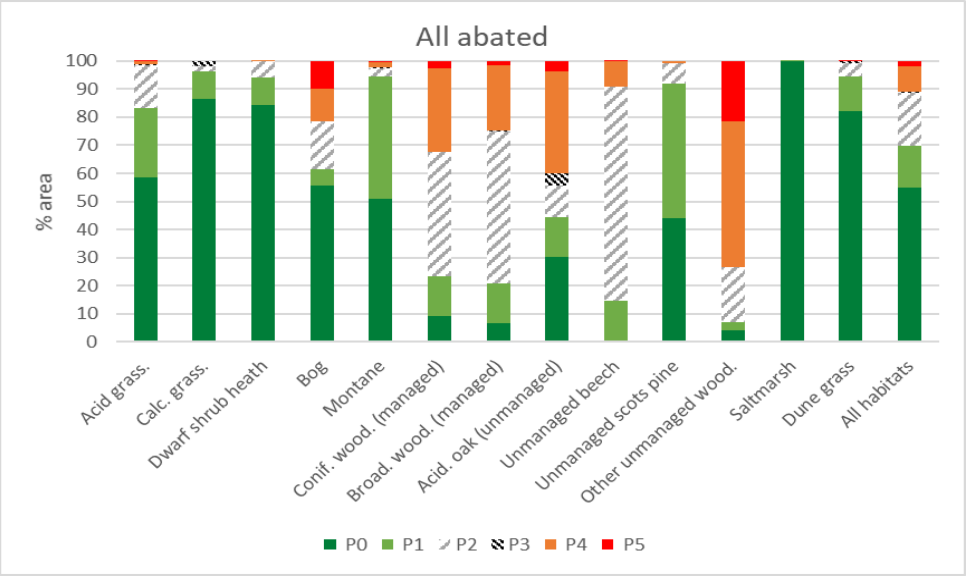
Very difficult to monitor and a problem if setting a "limit value"

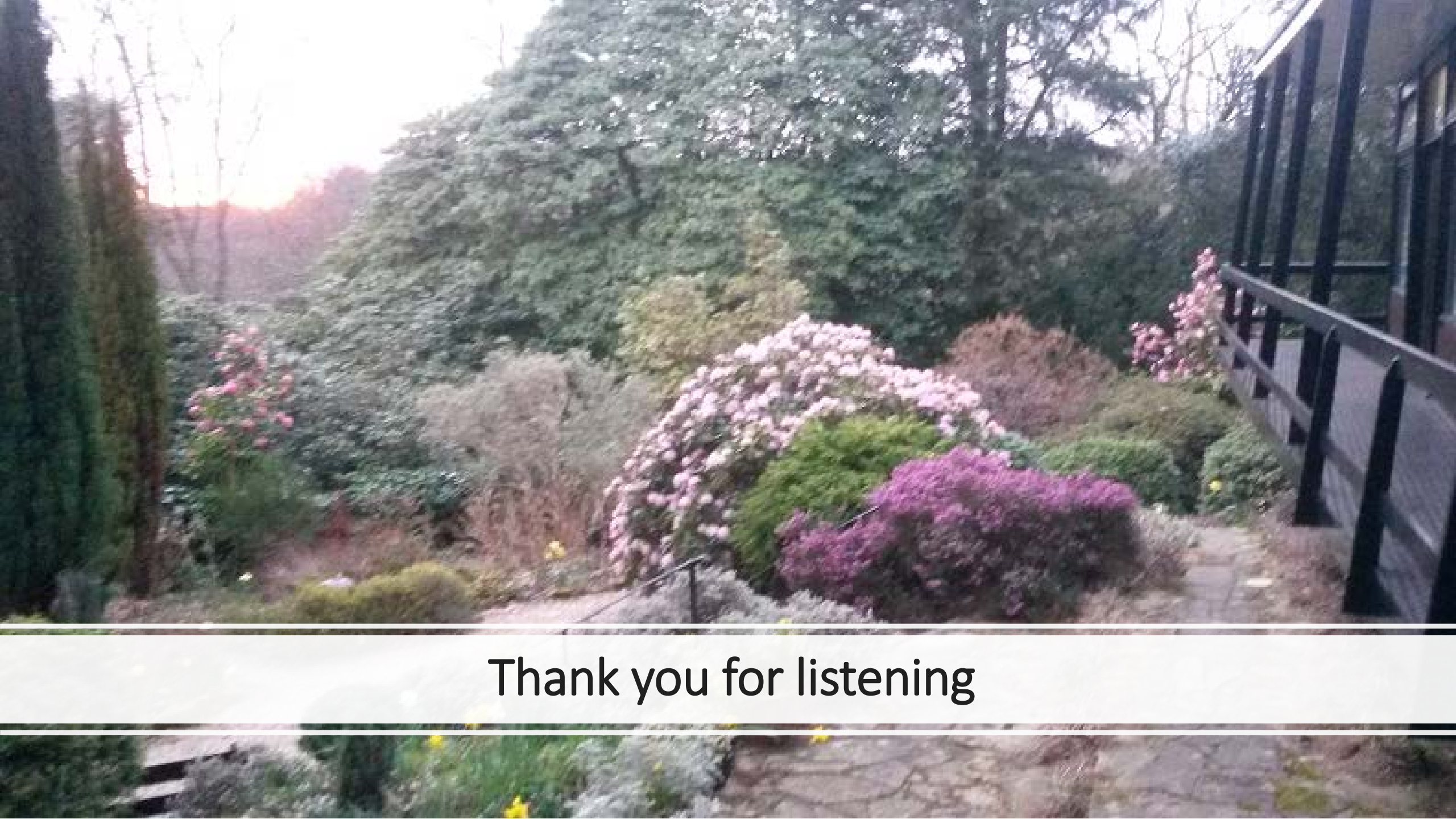
Nitrogen deposition and Ecosystem protection

Include ecosystem characteristics and orographic effects

- **Probabilistic approach uncertainties in critical loads and deposition**
- ***In general uncertainty in critical loads is more significant in assessment of critical load exceedances than uncertainty in deposition estimates.***
- ***Hypothetical scenario > NECD reductions: 40% abatement of all UK and imported emissions***
- **Investigate range of potential future land-use and agricultural scenarios**







Thank you for listening