

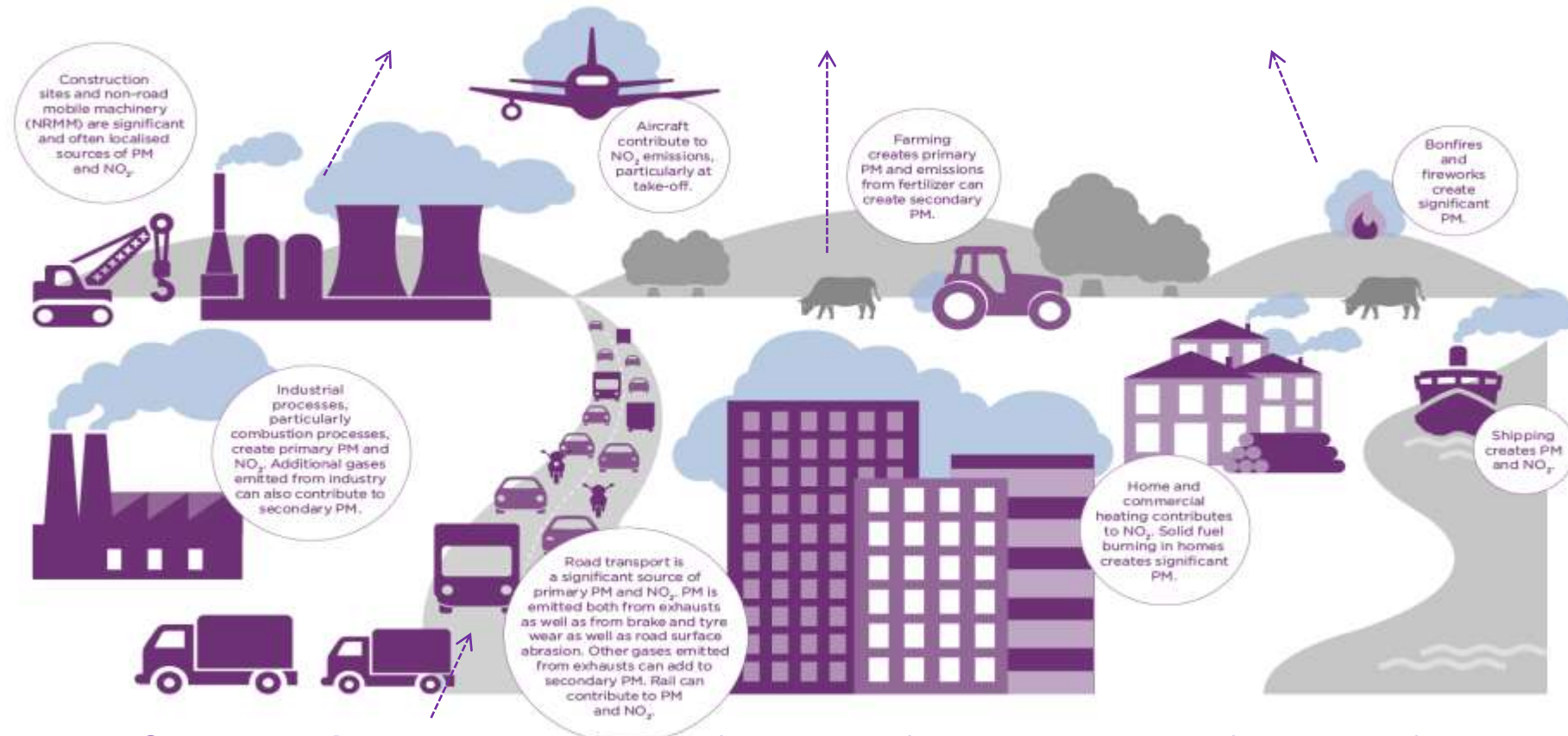
Science Needs for Air Quality Policy

STFC Network + Launch Event
John Newington
14th – January 2020



All everyday activities contribute to poor air quality

Emissions are the total amount of each pollutant that ends up in the atmosphere.



Concentrations are the amounts of pollutants found within a specific area – often where people are.

Changing Regulatory Commitments, Targets and Ambitions



The Environment Bill

Environment Bill – Jan 2020

“A duty to set a target on PM2.5 as an annual average concentration in ambient air”

In addition, AQ is a priority area in the central targets framework and can be used for additional AQ target setting.

Principles/timelines

- *Evidence-based / Evidence development (2020-21)*
- *Independence / Expert advice (TBC)*
- *Transparency / Consultation (TBC)*
- *Time constrained / SIs deadline (Autumn 2022)*



Air Quality Policy and Legislative Landscape

Three Reasons why the policy landscape will continue to need science input:

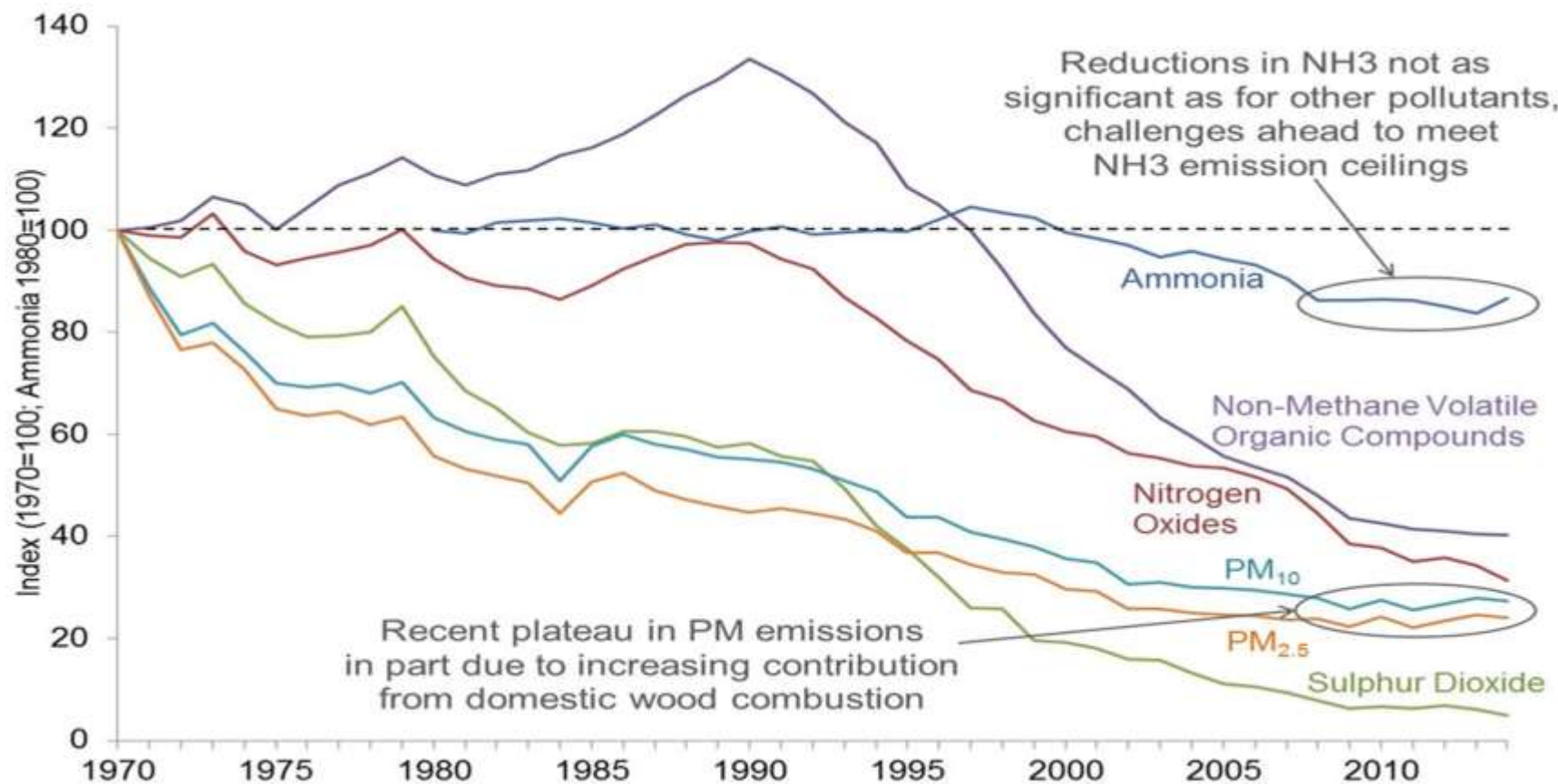
- **Continued Legal obligations** to meet our emission ceilings and protect the public from air pollution and continued public scrutiny on air quality.
- **Conservative Manifesto** Includes a commitment “to support clean transport to ensure clean air, as well as setting strict new laws on air quality”
- **Environment Bill:** Expected Passage over next few months



Department
for Environment
Food & Rural Affairs

So What are Our Science Needs

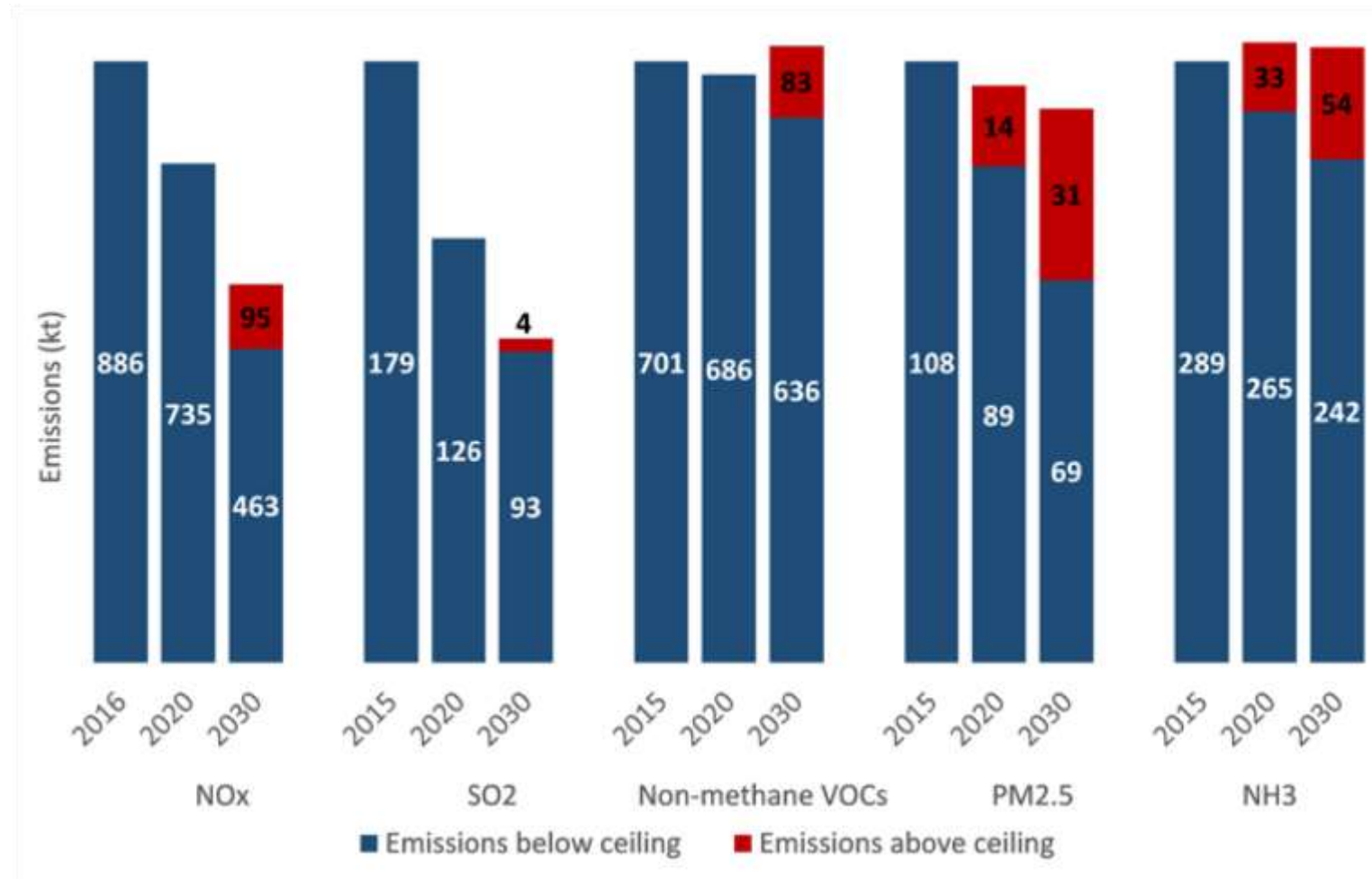
UK national emissions are mostly improving



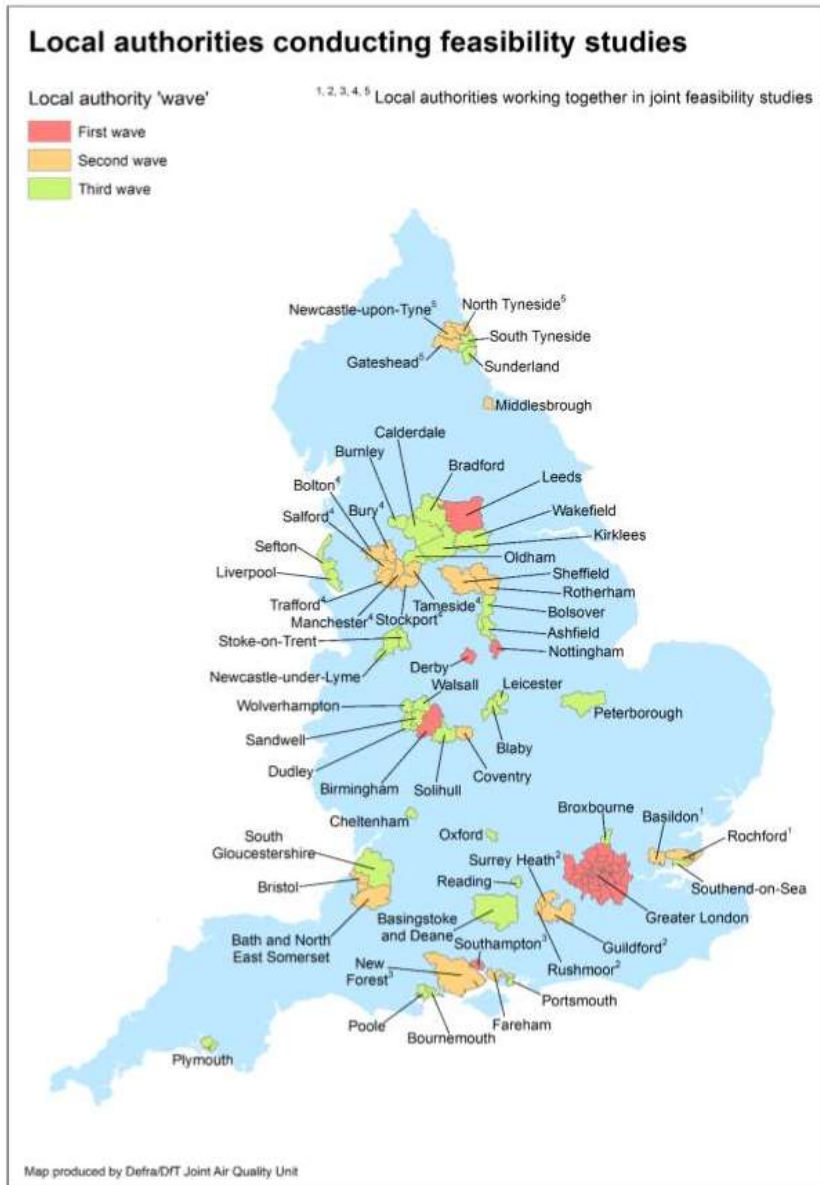
- Long-term decline in the emissions of key air pollutants since 1970.
- With the exception of ammonia and PM_{2.5}, emissions of all pollutants continued to decrease in 2015.

Meeting our Emissions Ceilings in 2020 and 2030

If we took no further action, we would be likely to breach our emission ceilings for PM_{2.5} and NH₃ in 2020 and all five of our emissions ceilings in 2030.



National NO₂ Reduction Plan - Local Authorities Taking Action

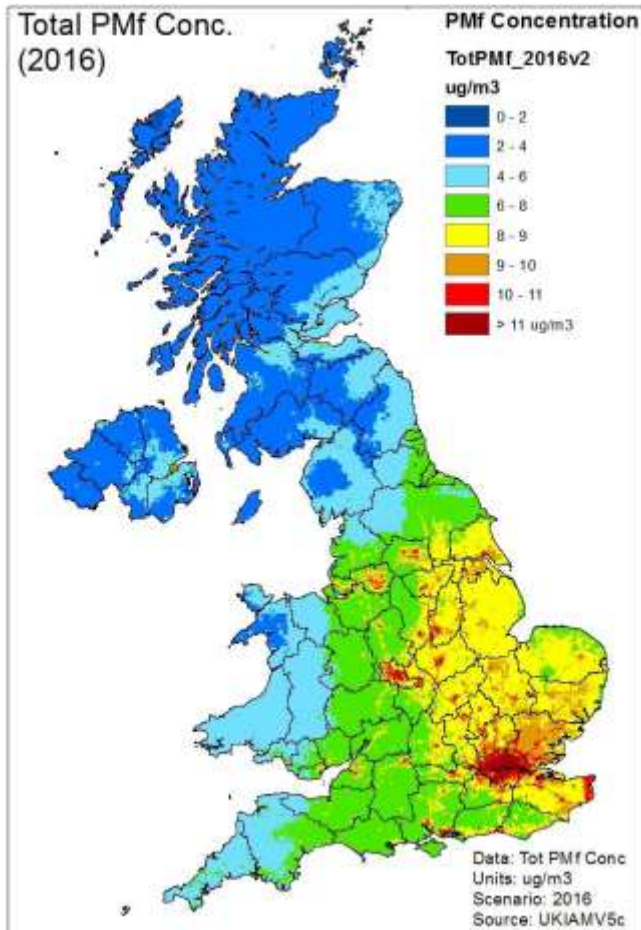


The risk from NO₂ is highly localised, so interventions are targeted to the problem areas.

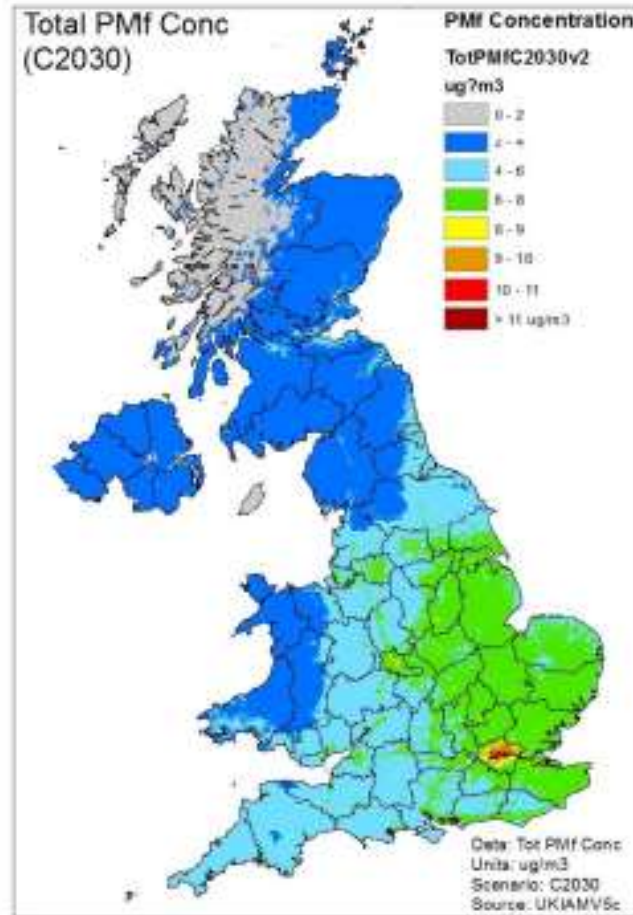
- 5 **'First wave'** local authorities (LAs), plus **London**, directed to develop local plans by Sept 2018.
 - 23 **'Second Wave'** LAs, directed to develop local plans by Dec 2018.
 - 33 **'Third Wave'** LAs were **projected to become compliant in 2019, 2020 or 2021** in national air quality modelling and were directed to conduct targeted feasibility studies in Mar 2018.
- Subsequently,
- 10 of these local authorities are **already compliant**, as shown by detailed local models
 - **10 of these LAs** directed to implement measures
 - **8 of these LAs** directed to develop detailed plans in Oct 2018.

36 LAs have been asked to consider charging Clean Air Zones but other measures preferred where they are as effective.

The Predicted PM_{2.5} UK Future



Base Year

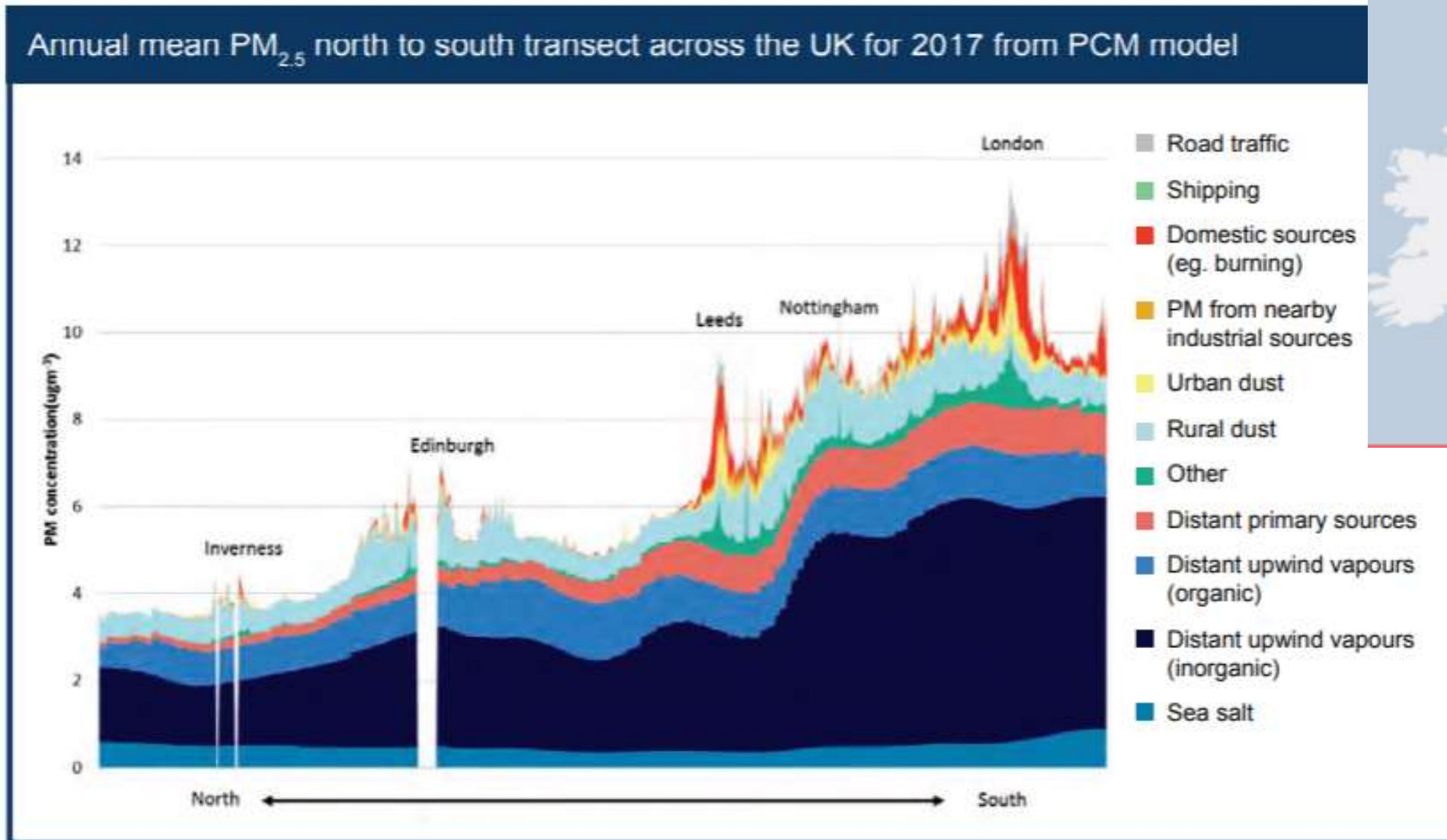


NAPCP

Model Assumptions and context:

- This Assumes all EU MS meet their NECD ceilings
- It does not include Net Zero policy developments
- It doesn't include behaviour change or innovations in brake and tyre wear or road surfaces

Fine Particulate Matter: PM 2.5

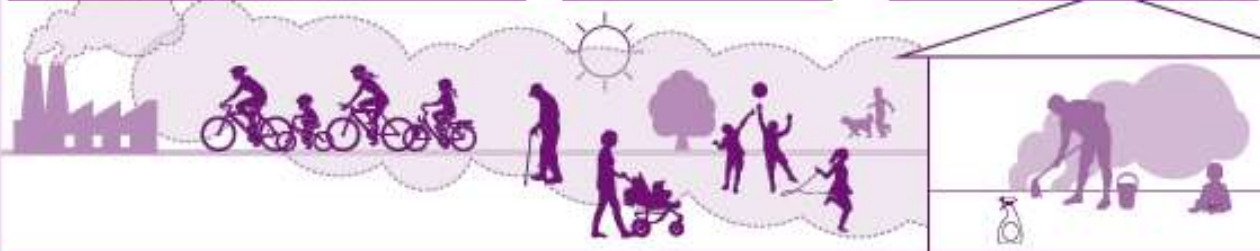
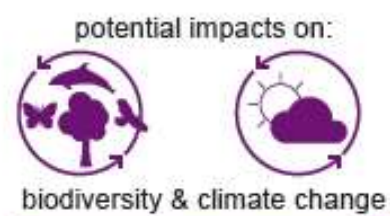
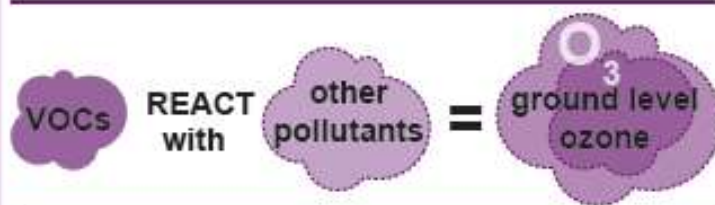


Volatile organic compounds (VOCs)

SOURCES

Domestic solvent use (household products)	20%
Fugitive emissions	17%
Food and beverage industry	13%
Agriculture	13%
Other industrial processes and solvent use	11%
Coatings applications	10%
Domestic combustion	5%
Transport	4%

IMPACTS



Ammonia (NH_3)

SOURCES

Agriculture

(includes anaerobic digestion)



88%*

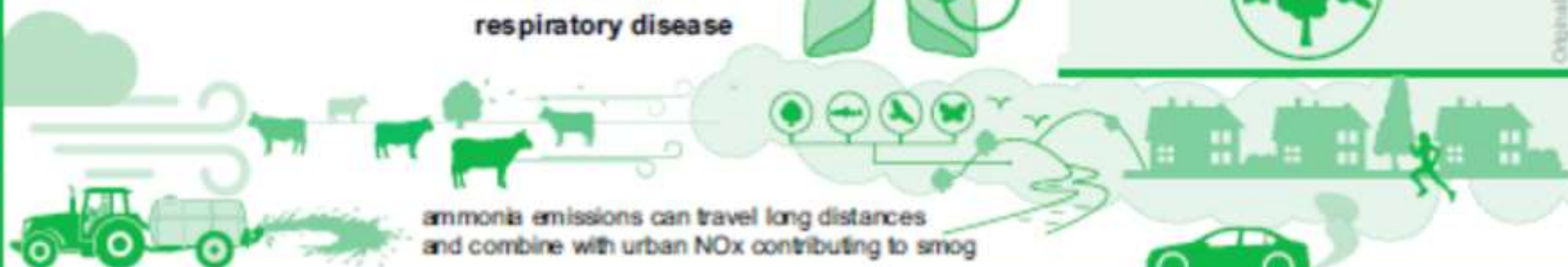
IMPACTS



Ammonia reacts in the atmosphere to produce particulate matter (PM) which has significant health impacts including:



cardiovascular and respiratory disease



ammonia emissions can travel long distances and combine with urban NO_x contributing to smog

The effects of ammonium deposition

acidification of habitats



excessive nitrogen in habitats



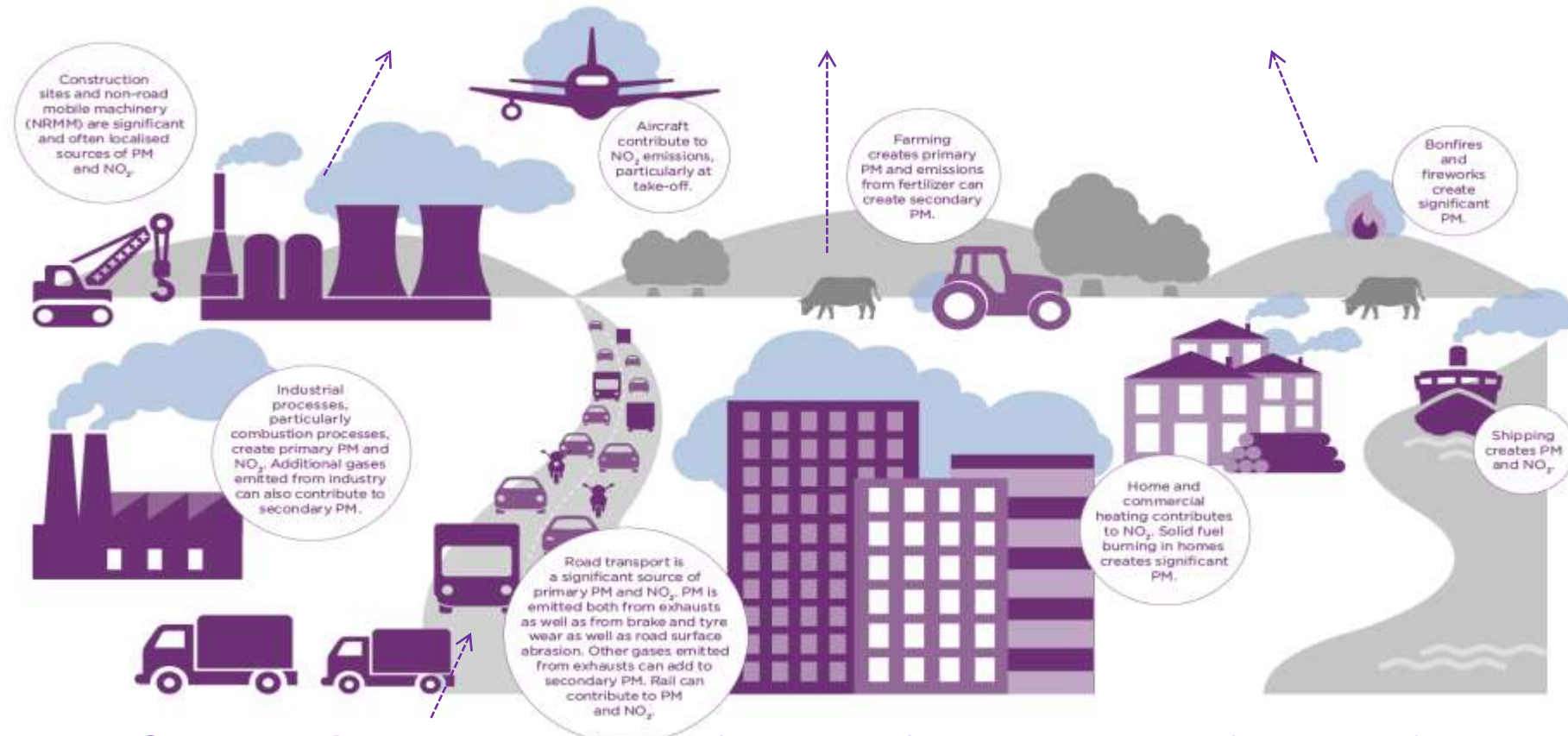
reducing biodiversity



Original design by Dyeline Digital Comm

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Summary of Science Questions: Areas of Research Interest

- **Air Quality improvements and their link to health & environmental impacts and outcomes**
 - PM composition and relative toxicity
 - Personal exposure and health inequalities: what information do we need to assess this
 - Non-exhaust Emissions (NEE): what is the composition and future emissions
 - Behaviour change: how do you monitor and evaluate scale of change needed and achieved
 - Quantifying and costing ecosystem change
 - Measurement of Black Carbon and Ultra Fine Particles
- **Evidence capability transformation & innovation**
 - Innovate on measurement technologies: sensors, indoor VOCs, Ammonia, satellites
 - Improve existing models: improve current picture and future prediction
 - Data Science Capabilities: make full use of atmospheric science and health datasets
 - Data transparency across evidence community and Industrial sector
- **Abatement Innovation and streamlining of implementation through planning**
 - Abatement of ammonia (and other pollutant) emissions from livestock production and anaerobic digestion and the subsequent digestate management
 - Abatement of Emissions from brake and tyre wear
 - Building design and indoor product development to reduce VOC, PM and other air pollutant emissions from all sources found in UK homes.