

# A UK Emissions Modelling System (UK-EMS)

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RESEARCH



# Overview

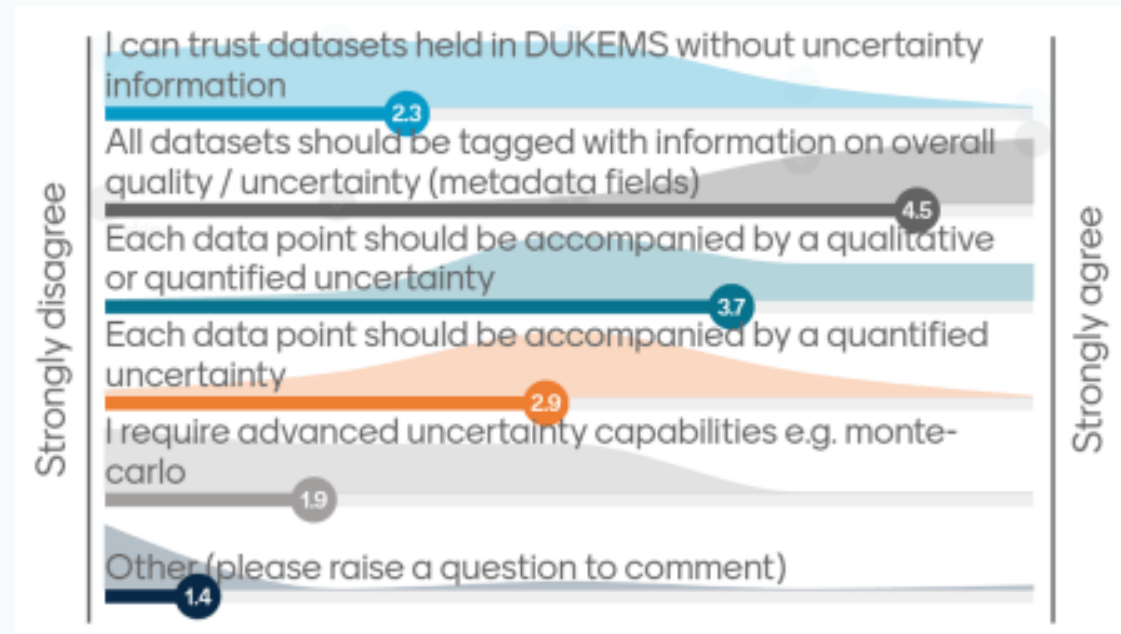
- Community driven and co-designed
- Open and accessible system providing access to emissions data and associated calculation methods
- Consistent approach for provision of emissions data across a range of spatial and temporal scales
- Ability to generate model ready data exploring 'what if' scenarios

*The core objectives are the delivery of a **proof-of-concept framework and tools** designed to be operational long term in supporting the atmospheric modelling community by providing a flexible, user-friendly system to deliver **emission input data** for modelling in a **transparent, traceable and reproducible manner***

# Modelling community helped inform UK-EMS design

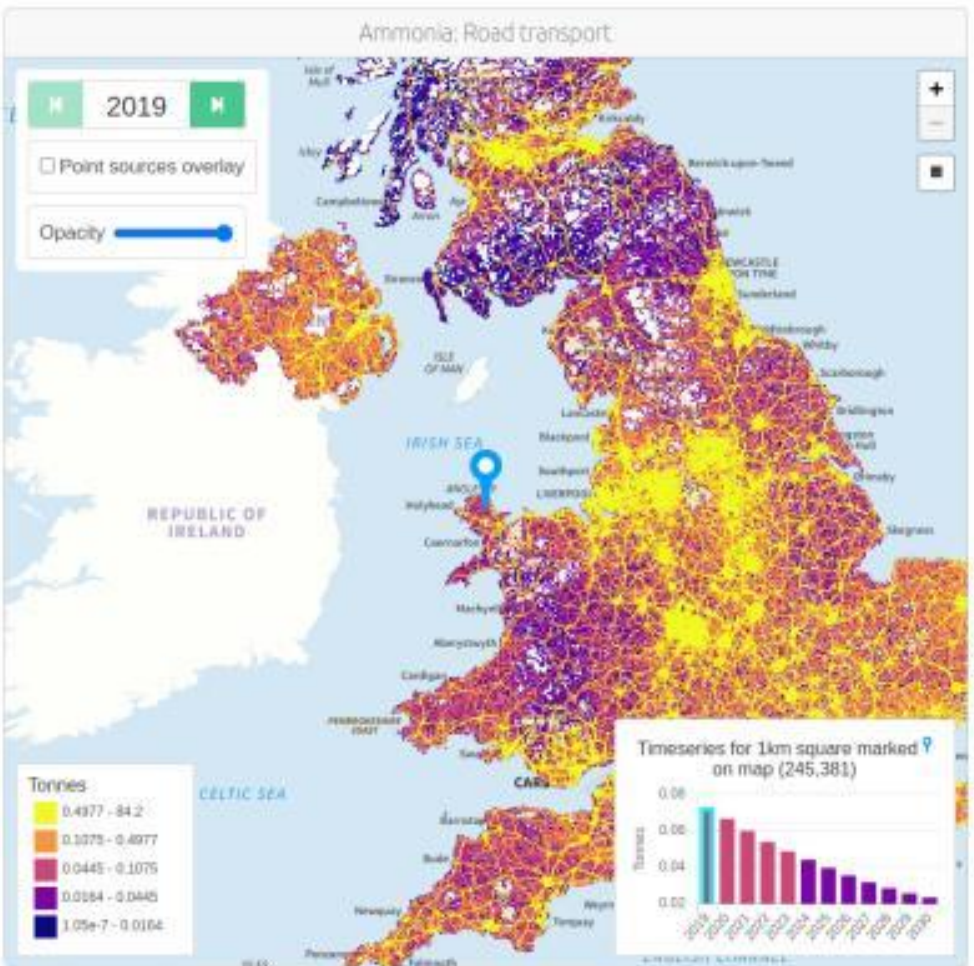
- Many different technical requests:
  - **Upper and lower bands**
  - **Qualitative scores / rankings**
  - **Granular information needed to allow for sensitivity testing**
- BUT – overall appreciation that data **provenance and traceability** should be the priority

*“Uncertainty is useful as it indicates how much we can trust the data, but is most useful when considering how the level of uncertainty may propagate through the process of downstream modelling”*





# UKEMS Infrastructure: DataLabs



**Description**

Annual ammonia emissions for the UK on a 1km grid for 2019-2030. All source data come from the National Atmospheric Emissions Inventory (<https://naei.beis.gov.uk/>). The source data is processed to calculate total annual ammonia emissions for both individual and all snap sectors, which are provided in this dataset. The snap sectors are: Combustion in energy and transformation systems; Non-industrial combustion plants; Combustion in manufacturing industry; Production processes; Extraction and distribution of fossil fuels; Solvent and other product use; Road transport; Other mobile sources and machinery; Waste treatment and disposal.

**Provenance**

This dataset is based on NetCDF grids provided to the UKEMS project by Ricardo and reprocessed by UKCEH.

**Spatial reference system**

British National Grid (EPSG:27700)

**Temporal extent**

2019-01-01 to 2030-12-31

**UK Community Emissions Modelling System**

Search for data and resources

Normalized grids for diesel buses and coaches on motorways in London (ND4)

Domestic contribution of SMP from 2005 to 2018

Normalized grids for diesel cars on motorways (M4)

**UK Community Emissions Modelling System**

View and Download Data

Download

Search

**UK Community Emissions Modelling System**

Download annual emissions for a single pollutant

Select a pollutant category: Ammonia

Select source by a snap sector: Road transport

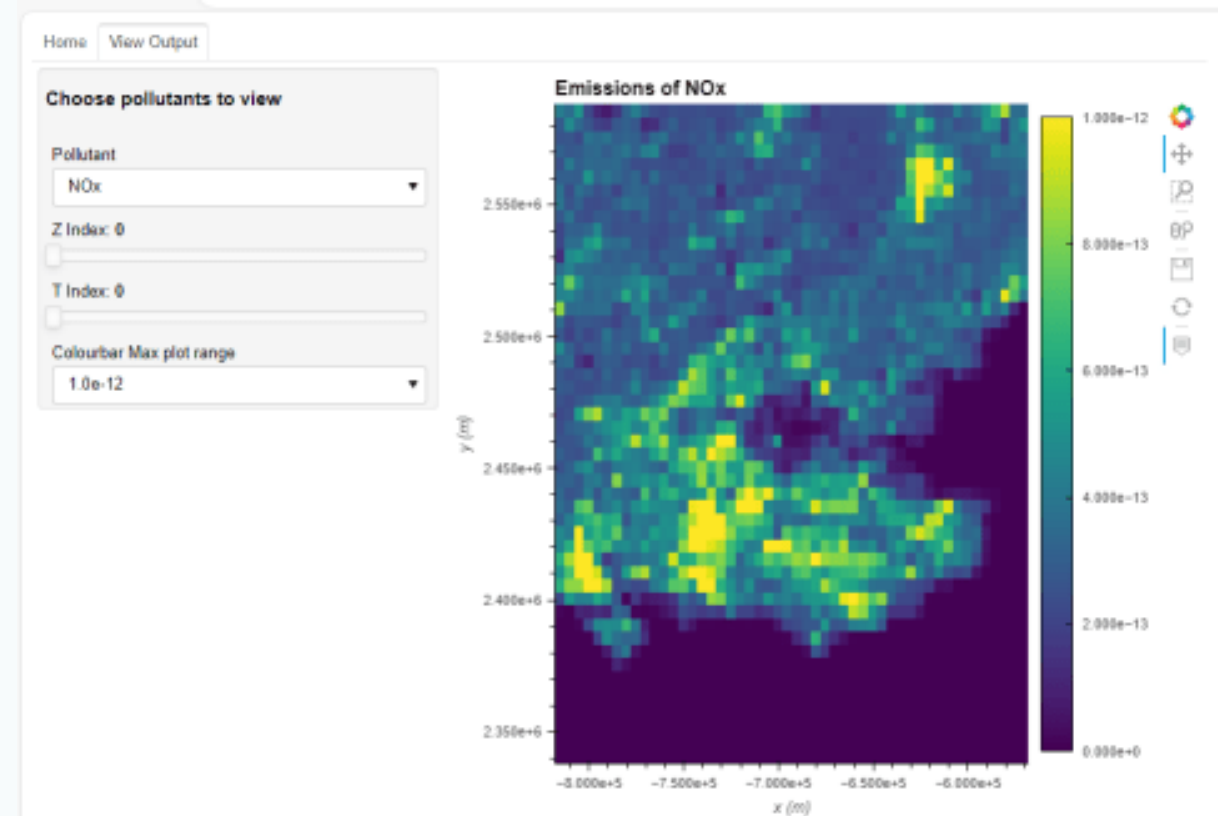
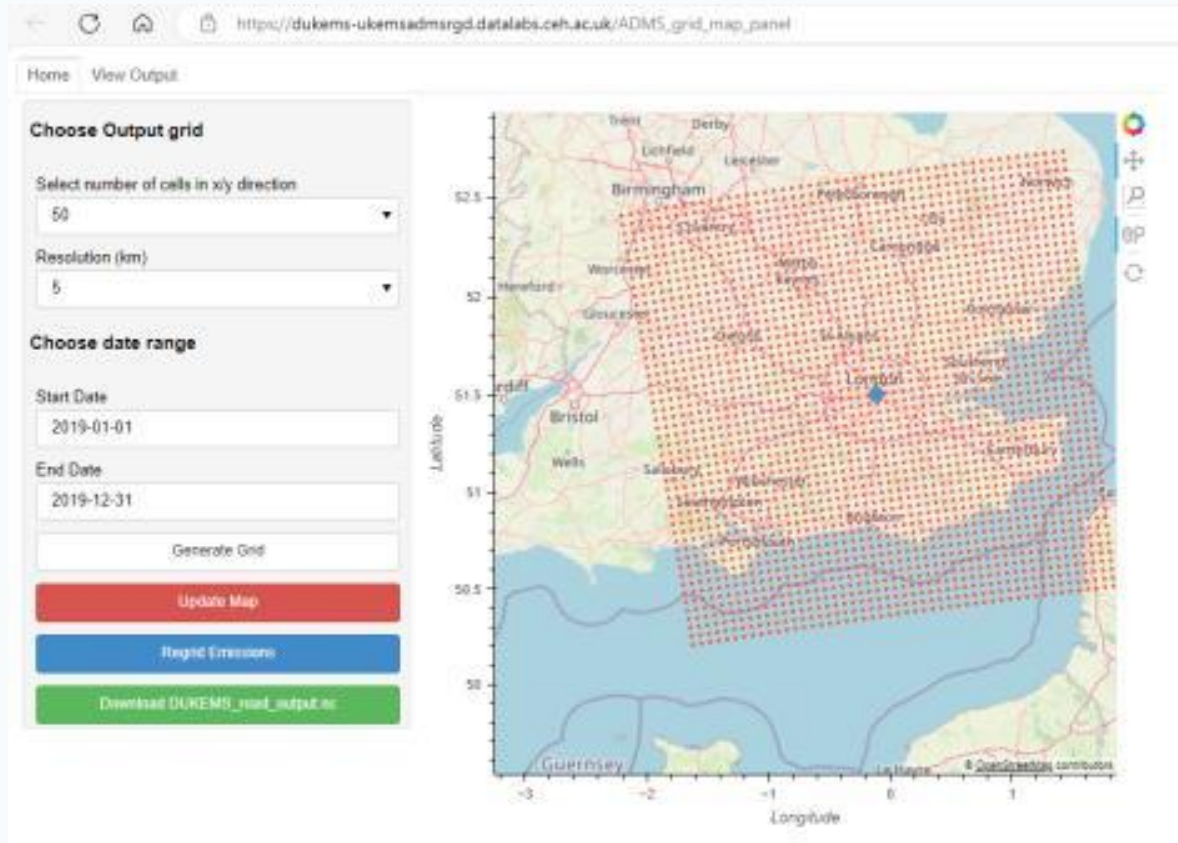
Add a year range, or leave blank for all years: Start year: 2019, End year: 2030

Define an area of interest using the map's rectangle tool: West: 0000, East: 0001, South: 0000, North: 0001

Download (NetCDF file)



# NAEI data on custom grids.



NAEI 1km BNG\* standard grid.



Create custom 5km LCC\*\* grid centred on London

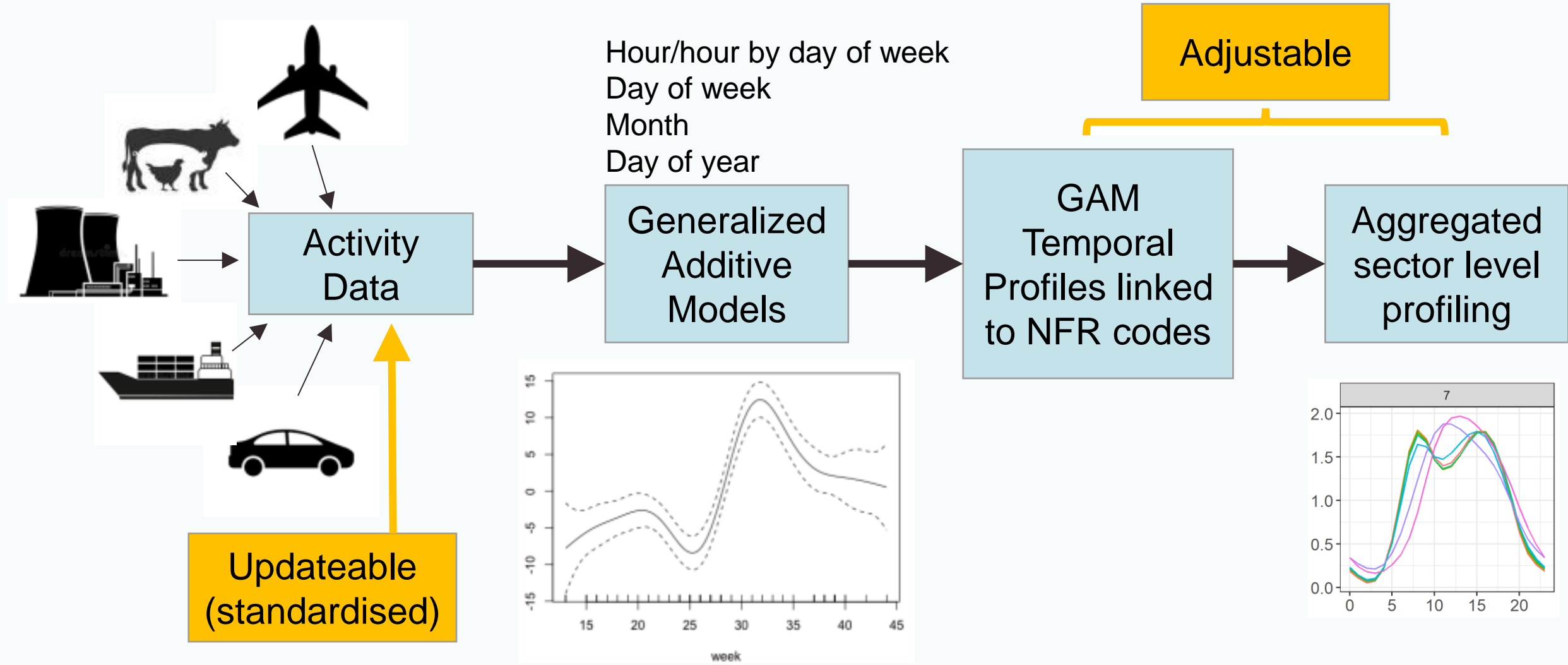


Regridding tool



Model ready netcdf output\*\*\*

# Temporal emission profiles developments





# Outlook and next steps

- Proof-of-concept project that demonstrated potential for step change in way modellers and policy makers access emissions data.
- Co-designed with the modeller community to provide a useful framework to ask what-if scenarios from the NAEI
- The UK-EMS has the potential to run in parallel to the NAEI adding support for modellers to obtain model ready data
- As a community driven platform provides a useful forum to gather the collective efforts of modellers to further advance the underlying science
- As a proof-of-concept project fully operational product does not yet exist but could provide some useful tools
- We welcome discussions with relevant policy groups about how we could make UK-EMS viable as an operational tool