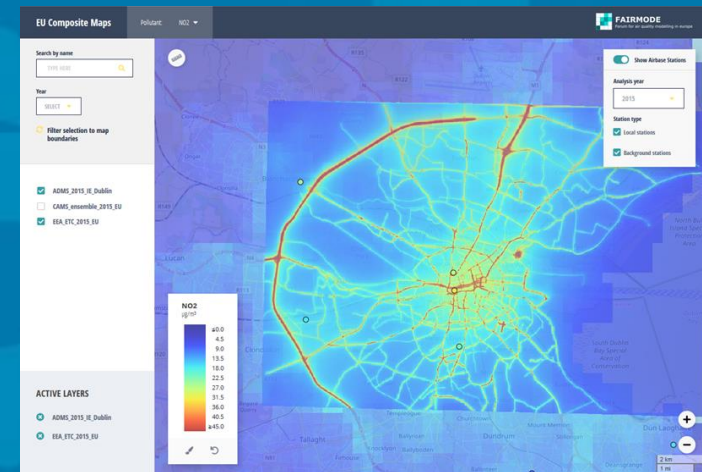


Urban Air Quality Modelling of Dublin

Kevin Delaney
EPA Ireland - National Ambient Air Quality Unit
11th December 2019



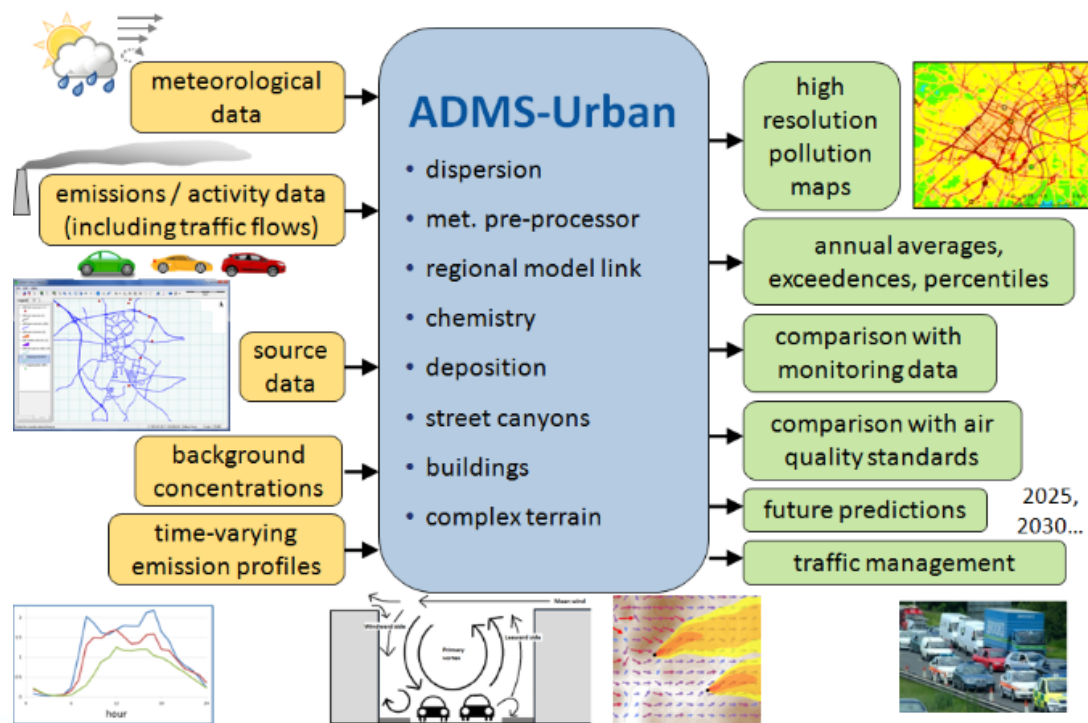
Contents

- What is an air quality model?
- Existing monitoring information
- Model inputs
 - Emissions
 - Meteorological Data
 - Background Data
- Results
 - Contour plots

What is an air quality model?

- *Air quality models use mathematical and numerical techniques to simulate the physical and chemical processes that affect air pollutants as they disperse and react in the atmosphere - USEPA.*

- **ADMS URBAN**

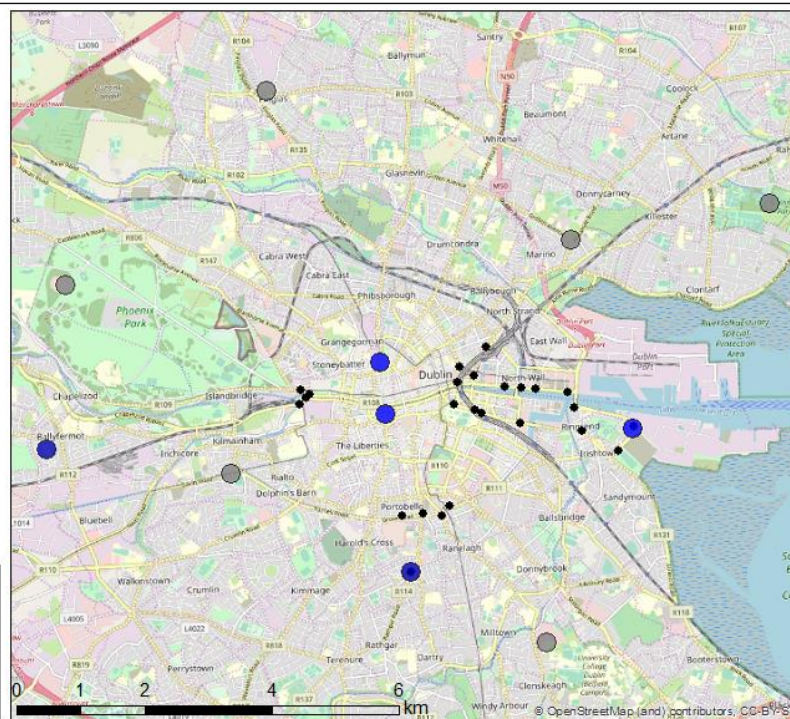
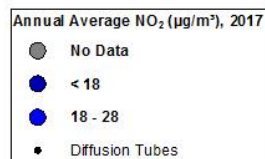


Monitoring sites

Automatic Monitoring Sites and Diffusion Tubes in Dublin, 2015 & 2017

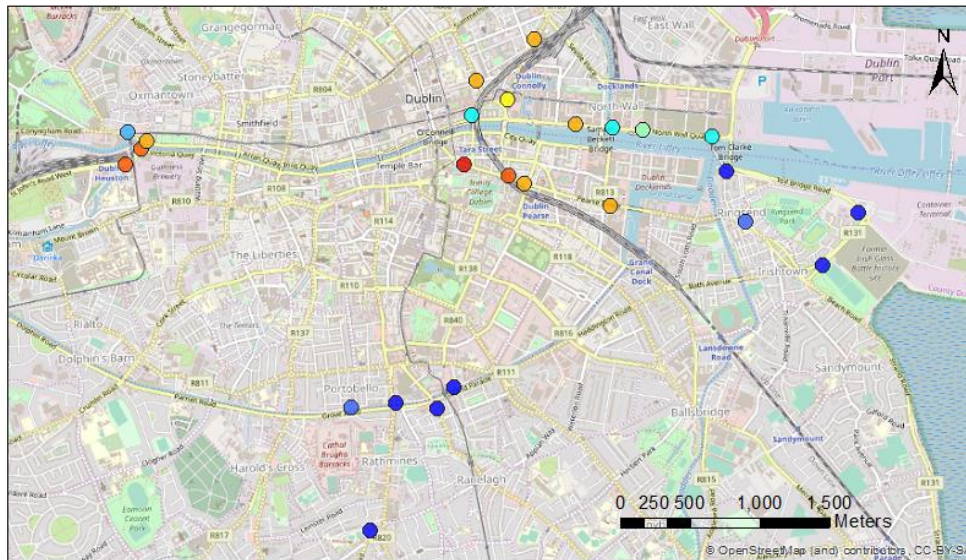
- Type:
 - 4 roadside
 - 2 suburban
 - 5 urban background
 - 25 diffusion tubes (2017 only)
- Temporal data capture:
 - Mostly hourly
 - Some daily PM

National
Ambient Air
Quality
Network



Monitoring Sites

Diffusion Tube Sites, 2017



EPA data

Annual Average NO₂ (µg/m³)

- < 28
- 28 - 30
- 30 - 35
- 35 - 38
- 38 - 40
- 40 - 45
- 45 - 50
- 50 - 60
- > 60

Model Inputs

- **Emissions:**

- Road traffic emissions
- Industrial emissions
- National Emissions mapping model

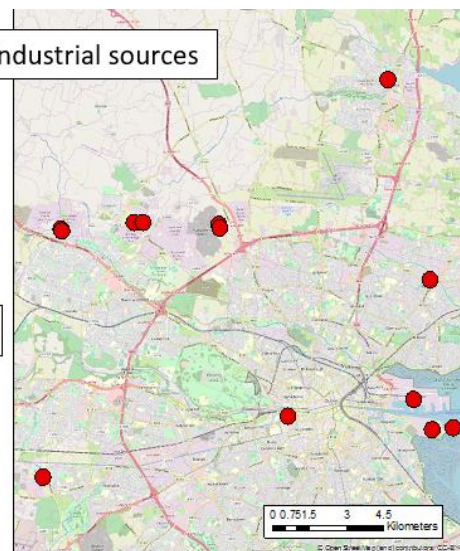
- Meteorological data

- Background pollutant data

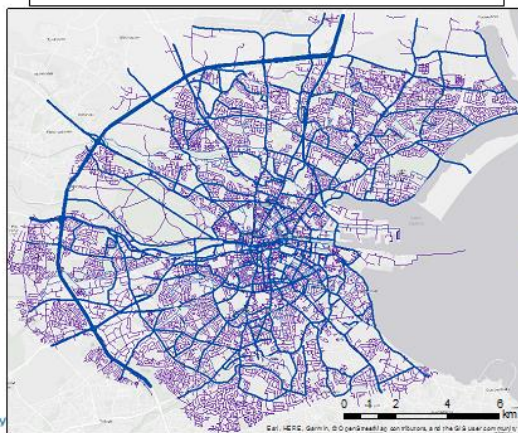
Explicitly modelled industrial sources

EPA

● Industrial Sources



Modelled traffic



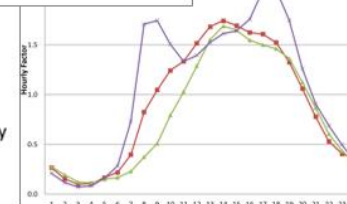
Roads < 2500 AADT
 Roads > 2500 AADT
 AADT
 — 2,500 - 10,000
 — 10,000 - 50,000
 — 50,000 - 75,000
 — > 75,000

DCC SCATS
 traffic
 management
 system

Diurnal profiles for road
 traffic emissions

TII

— Sat
 — Sun
 — Weekday



Model Inputs

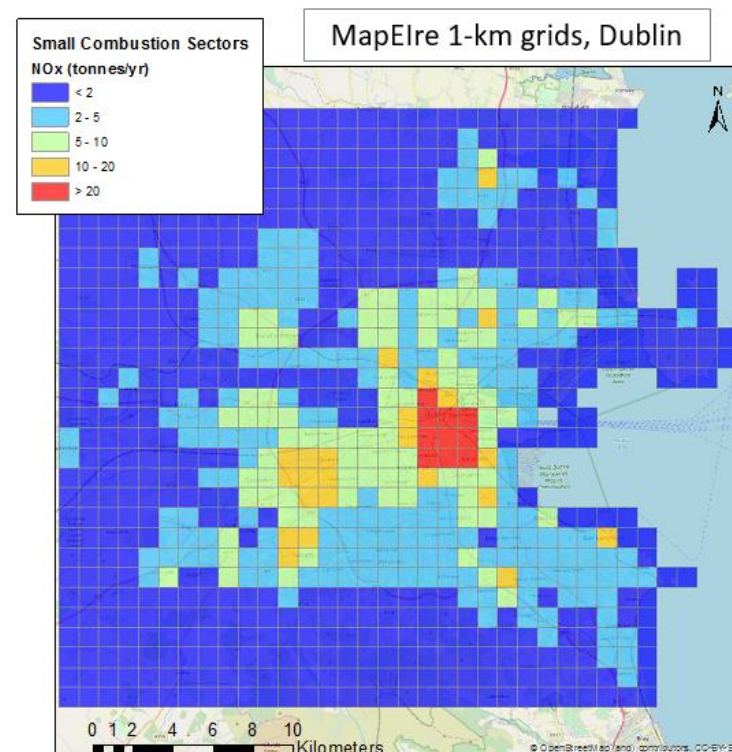
- **Emissions:**

- Road traffic emissions
- Industrial emissions
- **National Emissions mapping model**

- Meteorological data

- Background pollutant data

1 km data for all sectors (power, industry, other stationary combustion, solvents, road transport, off-road transport, fugitive emissions, waste, aviation, shipping, livestock, other agriculture, land use)

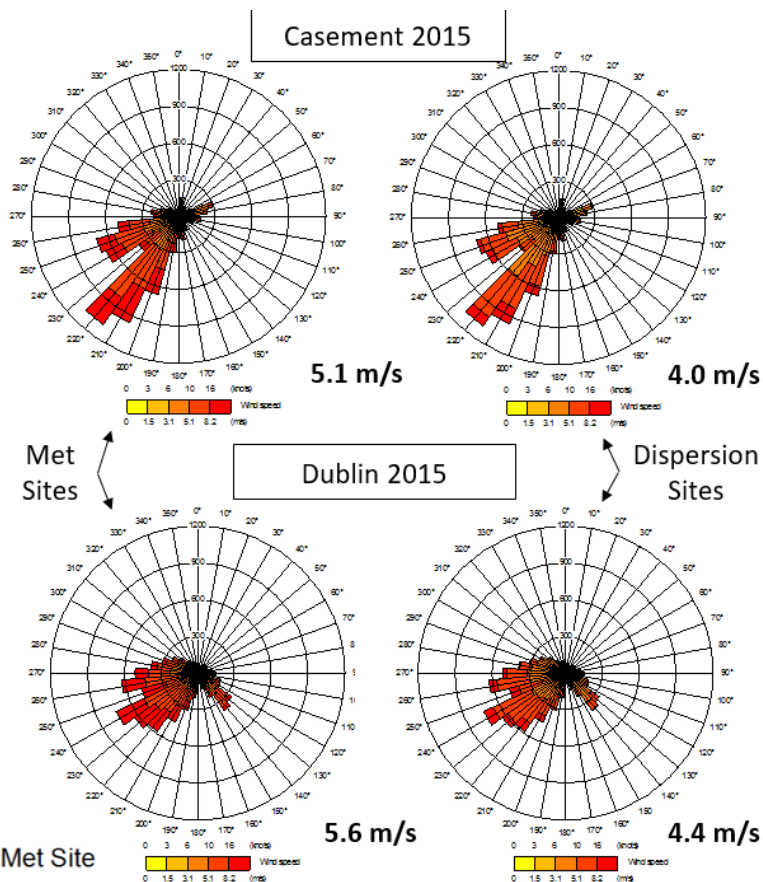


Aarhus University - MapElre:
<https://projects.au.dk/mapeire/>

Model Inputs

- Emissions
- **Meteorological data:**
 - Casement Airport
 - Dublin Airport
- Background pollutant data

Meteorological Sites

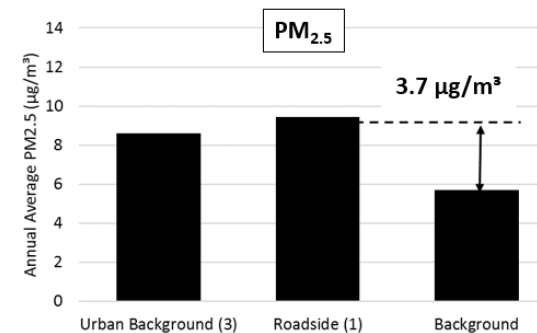
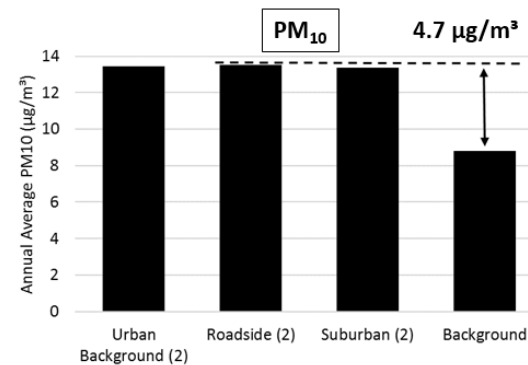
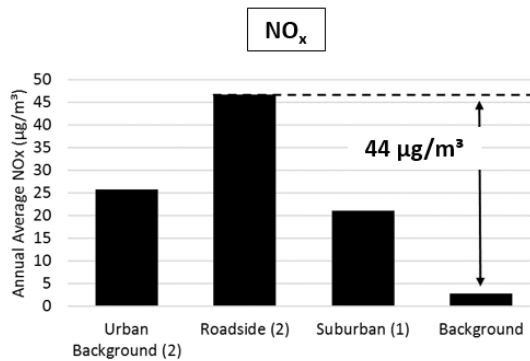


● Met Site

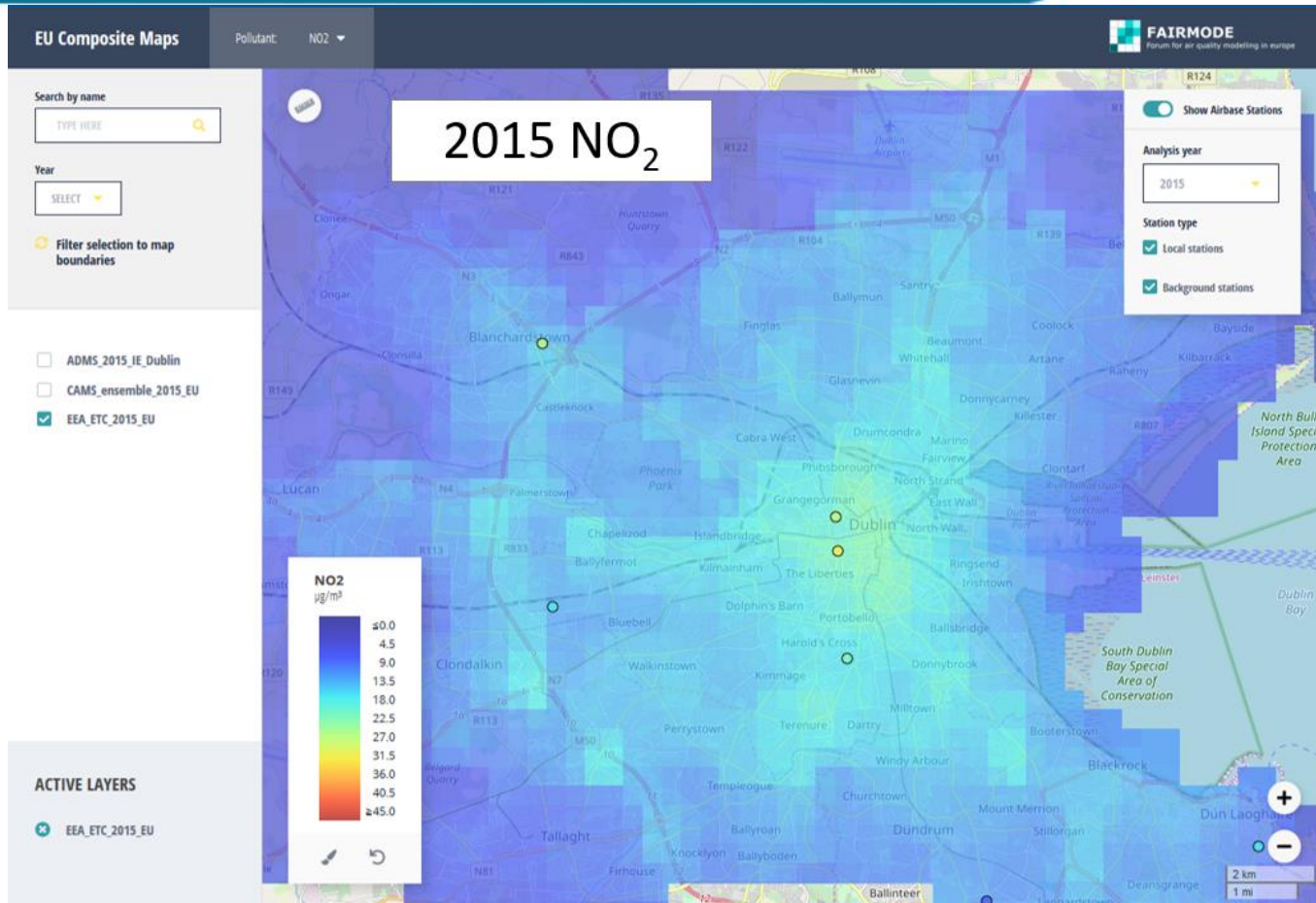
Model Inputs

- Emissions
- Meteorological data
- Background pollutant data:
 - Urban increment

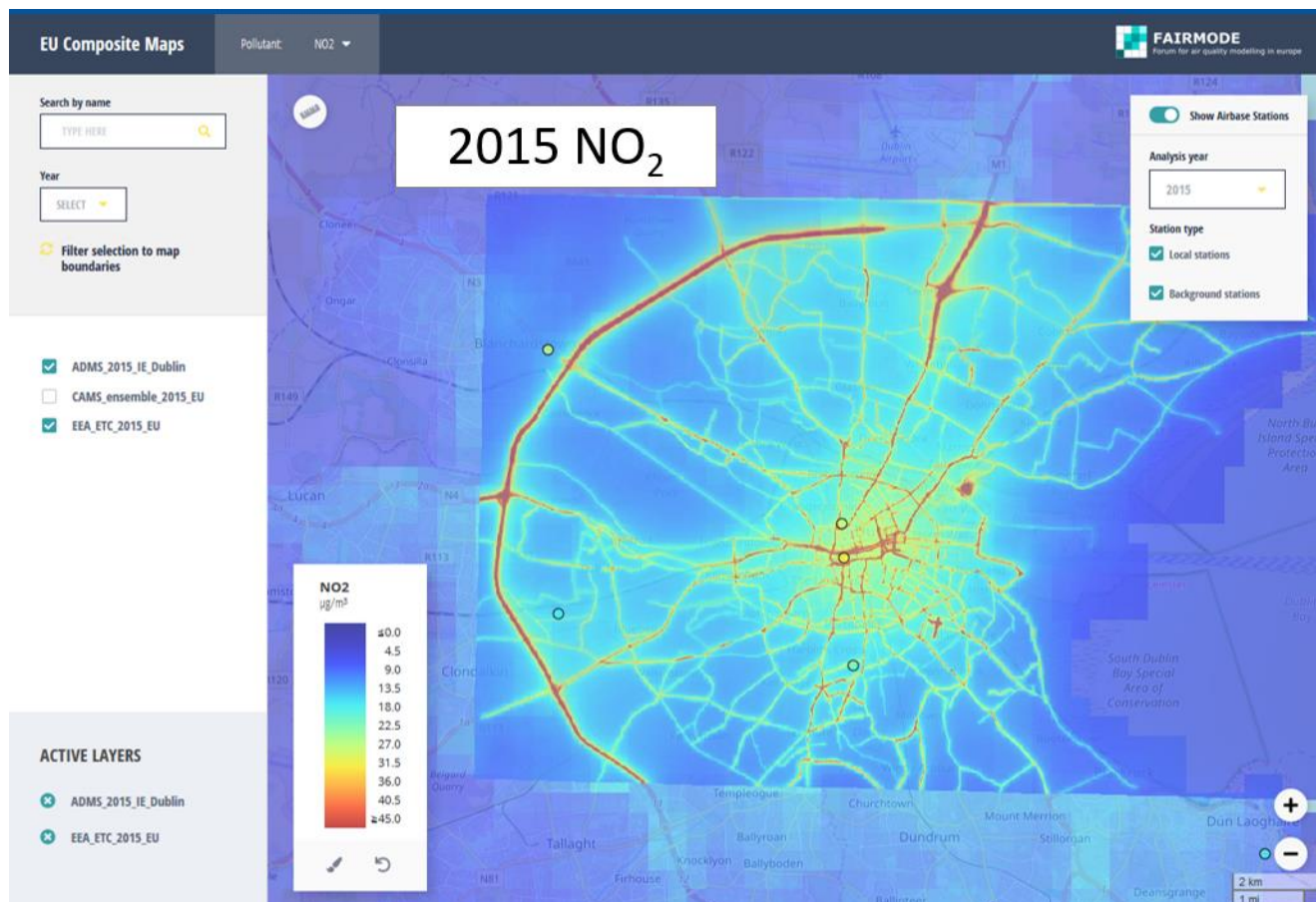
Year	Statistic	Kilkitt					Claremorris
		NO _x	NO ₂	O ₃	PM ₁₀	SO ₂	PM _{2.5}
2015	Annual average	2.7	2.2	59.6	8.8	2.2	5.7



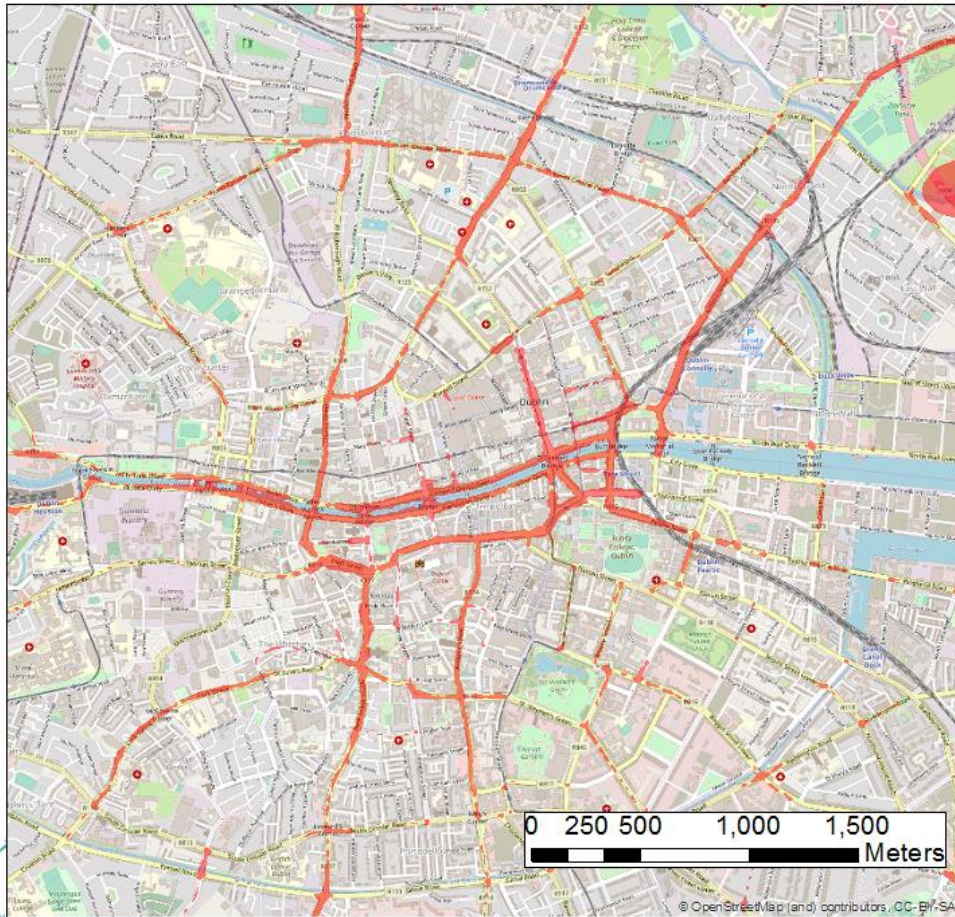
EU Composite Mapping



EU Composite Mapping



Modelled Exceedance Areas



2017 NO₂:
modelled
areas of
exceedance

Annual Average NO₂ (µg/m³)

< 40

> 40

FAIRMODE, October 2019

Thank you

- Get the report

<https://www.epa.ie/pubs/reports/air/quality/>

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- Twitter: [@epaairquality](https://twitter.com/epaairquality)
- Website: www.epa.ie/air/quality

Urban Environmental Indicators

Nitrogen dioxide levels in Dublin
How we assessed them
What the results showed
Next steps

EPA report 2019

