#### WM-AIR **UNIVERSITY**OF BIRMINGHAM



## **Modelling Scenarios**

Jian Zhong, Andrea Mazzeo, Xiaoming Cai University of Birmingham Christina Hood, Kate Johnson, Steve Smith, Jenny Stocker CERC

WM-AIR CLEAN AIR SCIENCE FOR THE WEST MIDLANDS

#### Scenario modelling: the approach

### Identify scenarios of interest

- Air pollution levels annual averages? time period? what area?
- Health impacts long term or short term exposure? which population? LSOA, ward levels?

### **Design representation of** scenarios

- Local Authority Applications (e.g. CAZ, LTN)
- Commonwealth Games 2022
- □ Net zero policy
- Clean Air Strategy
- Any more...

Sol

Yes

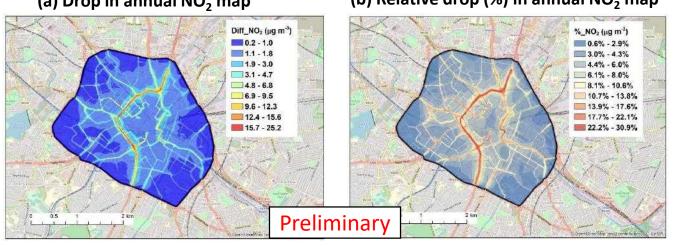
#### Translate model output

(e.g. analysing model output – various ways to interrogate, plot, and / or visualise) Implement scenario in model & run model

#### Assess technical feasibility

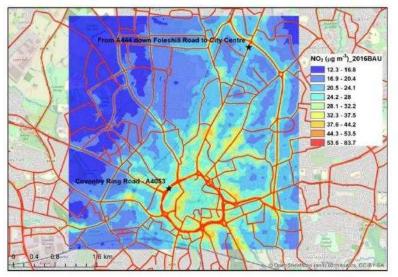
- ✓ Can model represent it?
- ✓ Data available?
- ✓ Assumptions justifiable?

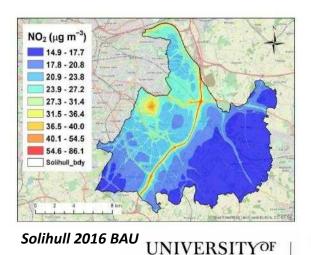
#### Local (ADMS) Model - Local Authority Applications (a) Drop in annual NO<sub>2</sub> map (b) Relative drop (%) in annual NO<sub>2</sub> map



Birmingham Clean Air Zone – NO<sub>2</sub> reduction if all non-compliant vehicles upgrade (2021 BAU)

#### Coventry 2016 BAU





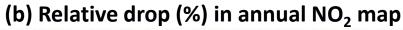
BIRMINGHAM

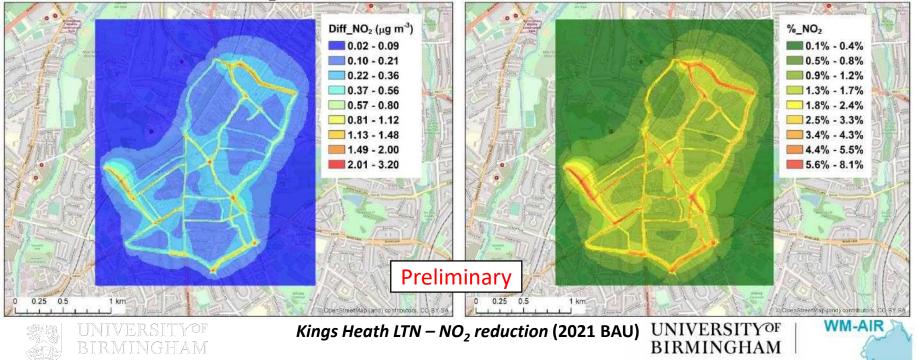
WM-AIR

## Local (ADMS) Model - Kings Heath Low Traffic Neighbourhood (LTN)

- Active Travel / "Build back greener"
- $\Rightarrow$  BCC Emergency Transport Plan: Low Traffic Neighbourhoods

 $\Rightarrow$  WM-Air inputs: What are the air quality benefits associated with LTNs? (a) Drop in annual NO<sub>2</sub> map



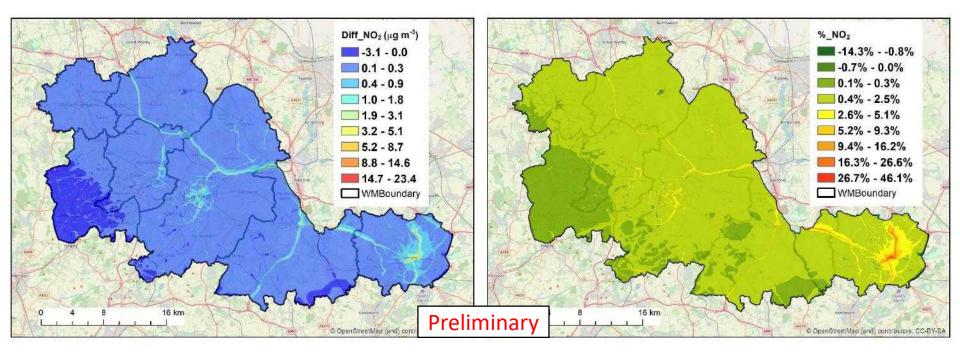


# Local (ADMS) Model -Commonwealth Games 2022

(a) Change in annual NO<sub>2</sub> map Case Day1 AM- Case Ref AM (b) Relative change (%) in annual NO<sub>2</sub> map (Case Day1 AM- Case Ref AM)/Case Ref AM

> UNIVERSITY OF BIRMINGHAM

WM-AIR





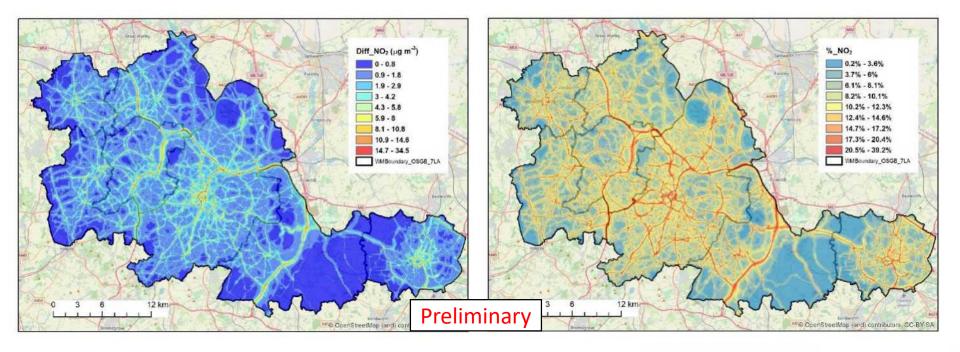
# Local (ADMS) Model - Net zero policy: WM transport strategy

#### Air-quality co-benefits

Impact of bus electrification + 50% light vehicle electrification

(a) Drop in annual NO<sub>2</sub> map

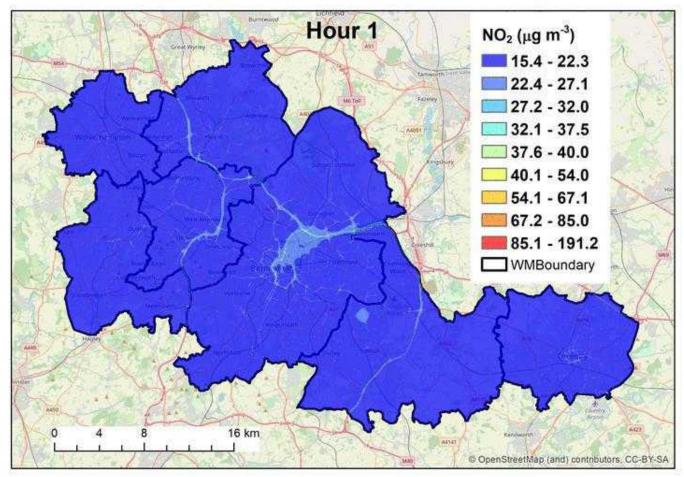
#### (b) Relative drop (%) in annual NO<sub>2</sub> map







#### Local modelling animation



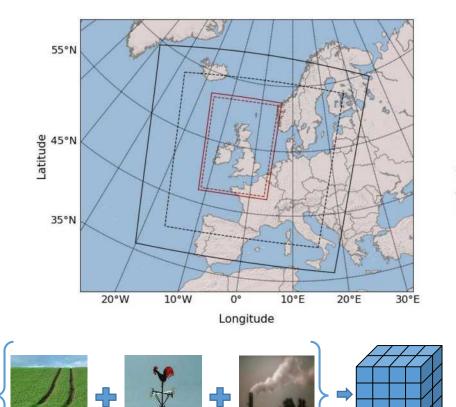
2016 BAU (Zhong et al, 2021)

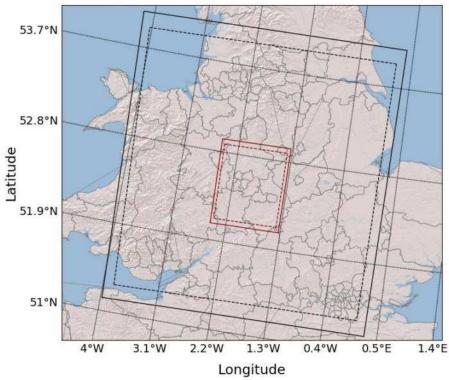
#### **Regional/National Modelling to be continued...**





# **Regional/National Modelling**







Land-use



# Initial Scenarios– sensitivity to within-region policy changes

• Scenarios Design: anthropogenic emissions reduced only inside the West Midlands area according to the Clean Air Strategy 2019 (3x3, 1x1 domains)

