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Pollution Assessments as an Agent for Change

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Transport and Pollution

Pollution as an agent for change:

- Why is pollution important?
- What should can we do about it?

Transport and Pollution

- Transport is the fastest growing source of pollution!

Pollutant	Hazard	% National Emissions
CO	Toxic	69
PM ₁₀	Respiratory, Carcinogen	20
CO ₂	GHG	21
NO	Respiratory	48
NM VOC	GHG, Carcinogen	24
Benzene	GHG, Carcinogen	47
1,3 Butadiene	GHG, Carcinogen	81
SO ₂	Toxic	1

Transport and Pollution

- Secondary emissions too...
- COMPLEX!
 - Emissions (Speed, flow, volume, fleet...)
 - Atmospheric Chemistry
 - Meteorology (sunlight, temperature, wind...)
 - Street topography (Street canyon, open road...)
- ***Understanding*** is important

Air Quality History

Then:

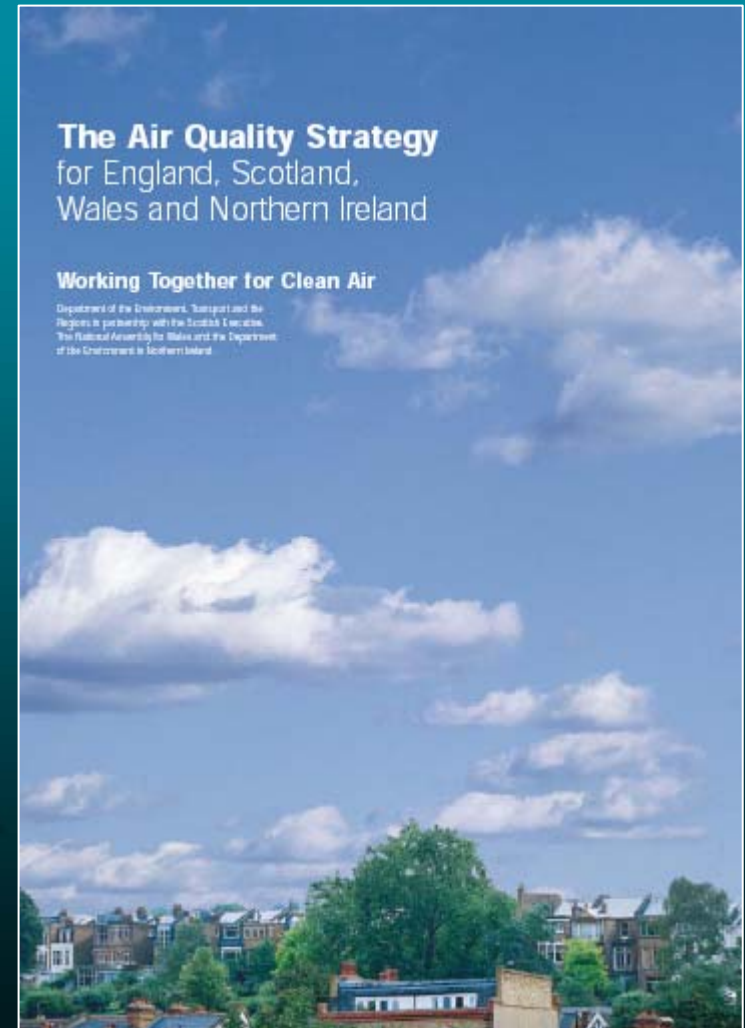
- London Smog of 1952 – 5 days, 4,000 deaths
- Industrial smog largely SO₂ from coal
- 12,000 deaths by 2002
- First Clean Air Act 1956

Now:

- Nitrous fumes and particles at roadside locations
- Summertime smog – ozone
- Legislation – ‘Reduce as to render harmless’
- Less dramatic but not less devastating!

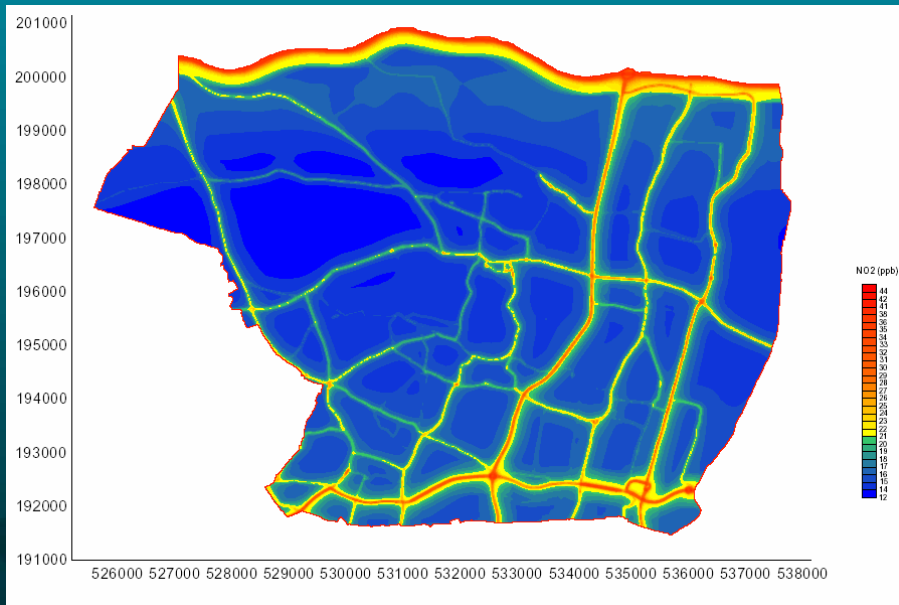
UK Air Quality Strategy (1997 & 2000)

- Standards and Objectives
- e.g. NO₂ –
 - Hourly mean - **105 ppb**
(not to be exceeded more than 18 times a year)
 - Annual mean – **21 ppb**
- Both to be achieved by 31st Dec 2005
- Few UK roads will meet this objective

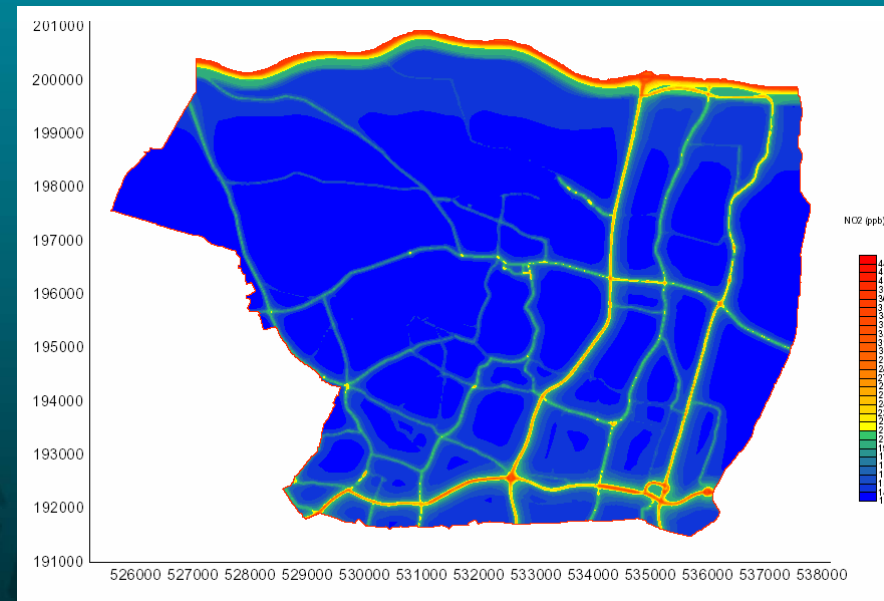


London – A Problem

Annual Average NO₂ expected for 2005

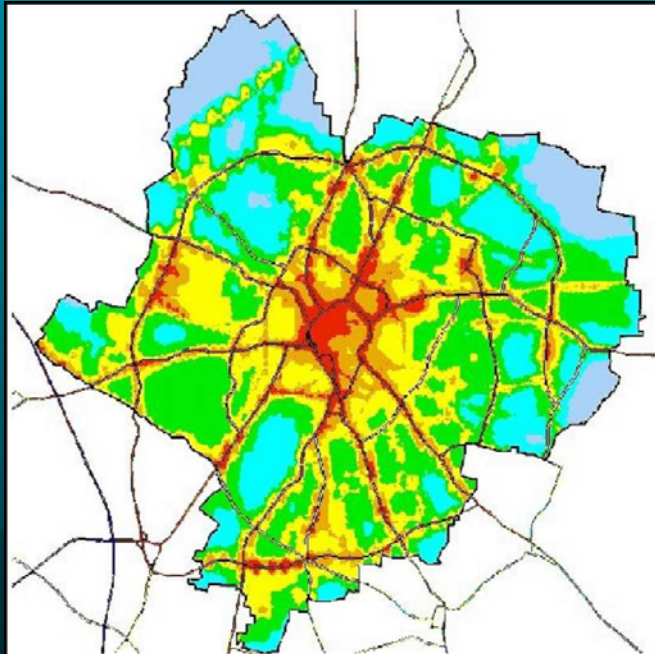


Enfield – No LEZ

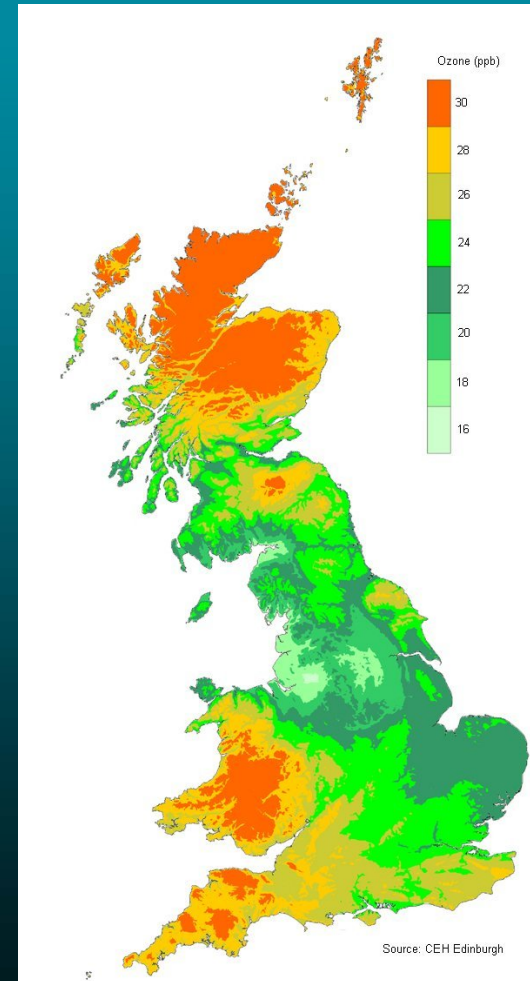


Enfield – LEZ

Scale of Problem...



NO₂ – local effects

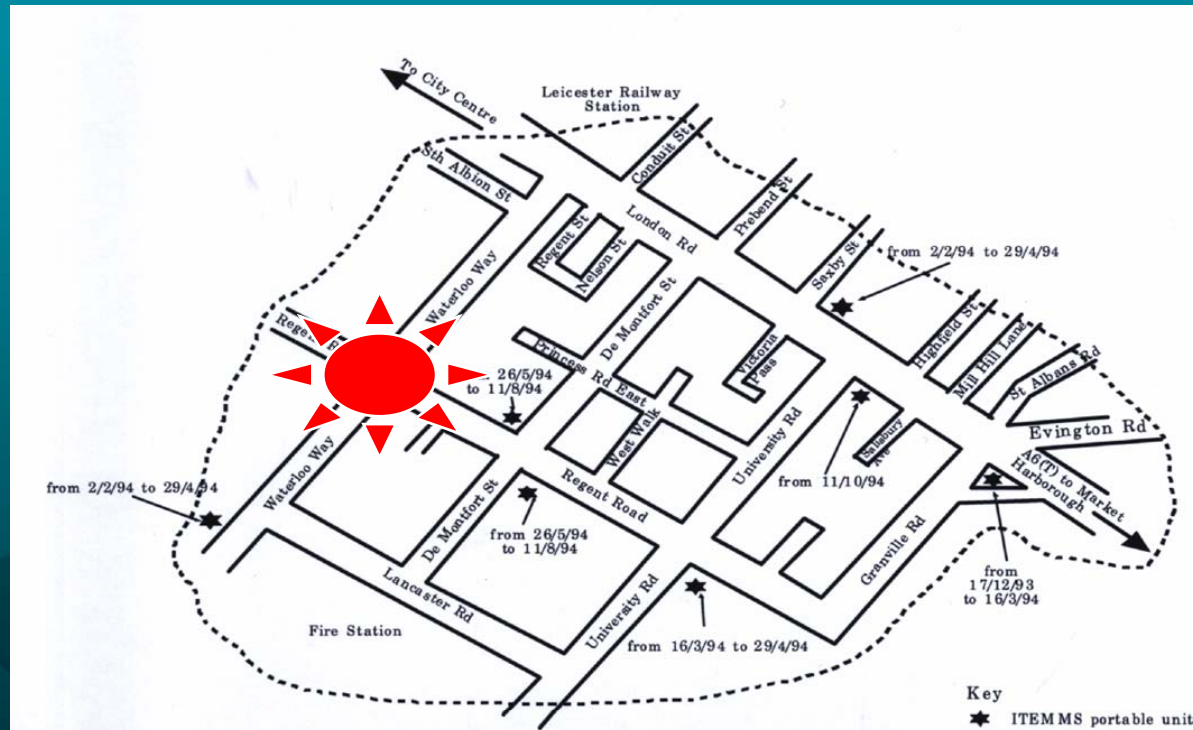


O₃ – regional effects

...Scale of Solution!

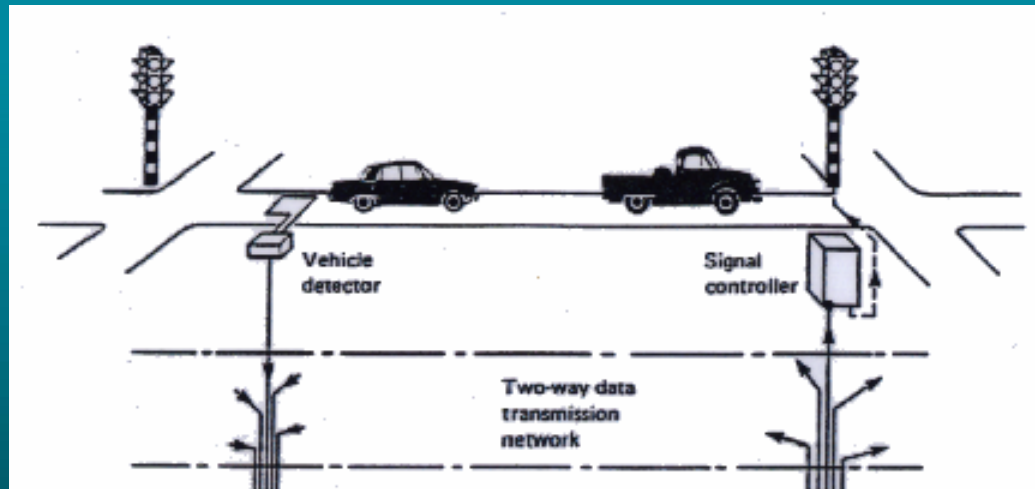
- Local/Street level solutions
- Traffic calming, bus priority, park and rides, etc.
 - DMRB screening from traffic data
 - Paramics emissions (as above, but integrated)
 - More complex dispersion modelling if required (ADMS)
 - Street canyon modelling
- Make pollution a design consideration

An example – Leicester



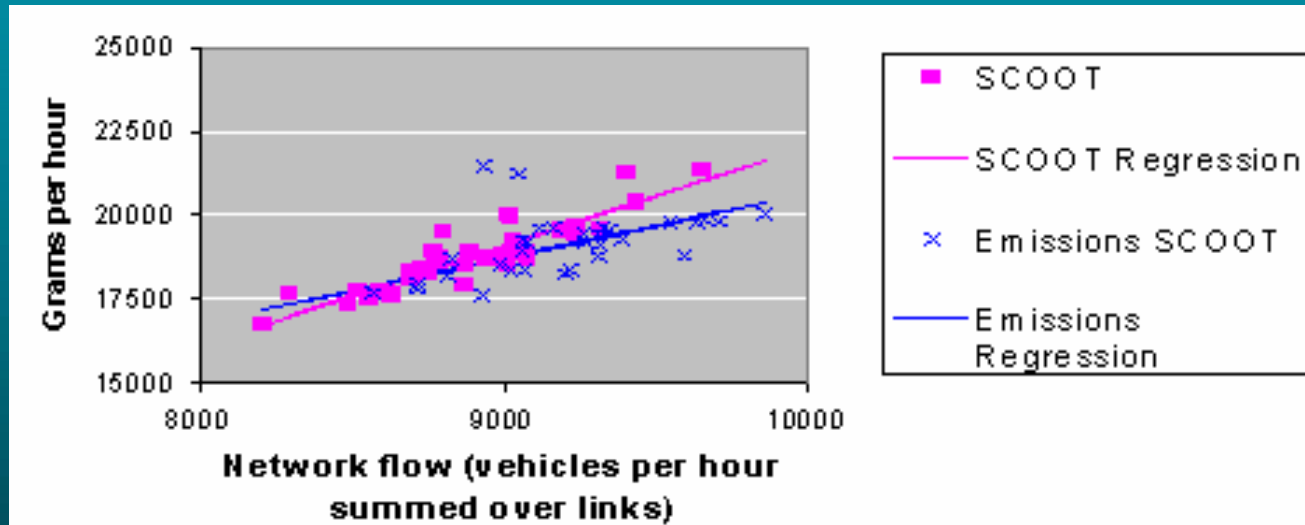
- Leicester – UK's first Environment City
- Improve AQ in Region R (ITS and LCC)

SCOOT loops



- SCOOT loops control signal timings
- Minimise (delay + w.stops)
- Inherently reduces pollution!
- Minimise emissions? ($w \cdot \text{CO} + w_1 \cdot \text{NO}_x + w_2 \cdot \text{PM}_{10}$)

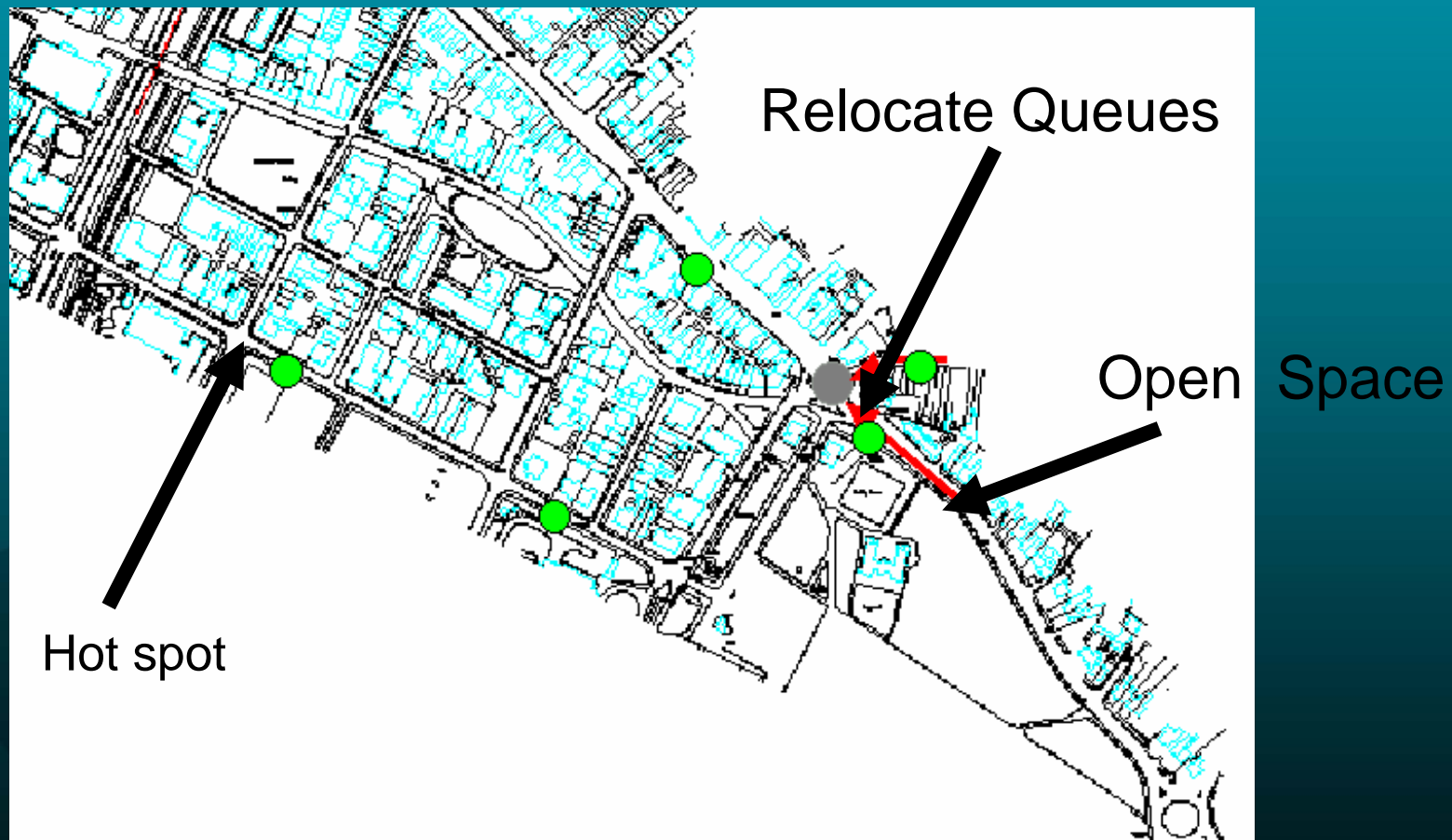
Set SCOOT to reduce emissions?



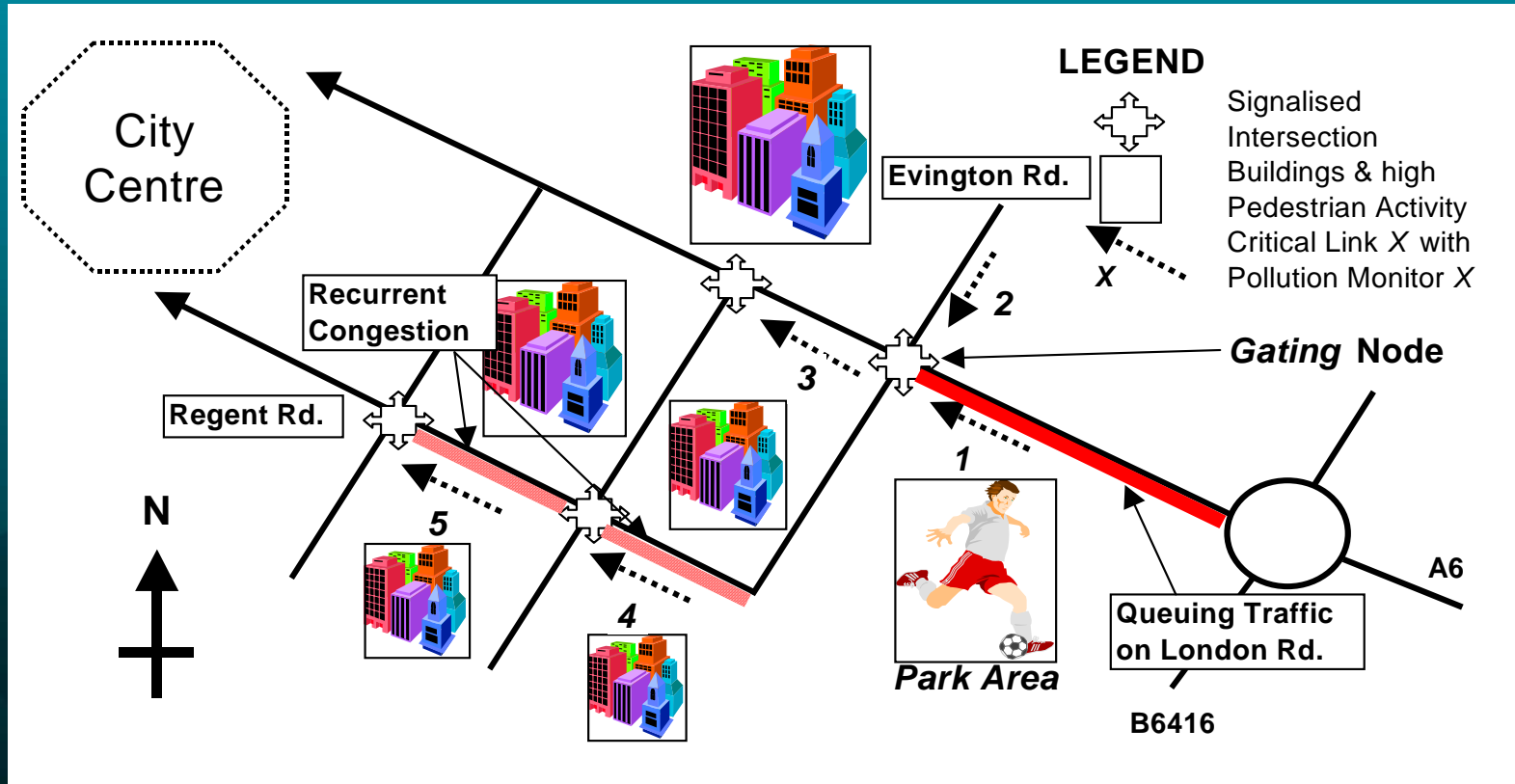
- Not a significant improvement – there is still ***congestion***
- It is congestion we need to manage

➔ TDMS!

Relocate congestion to open space?



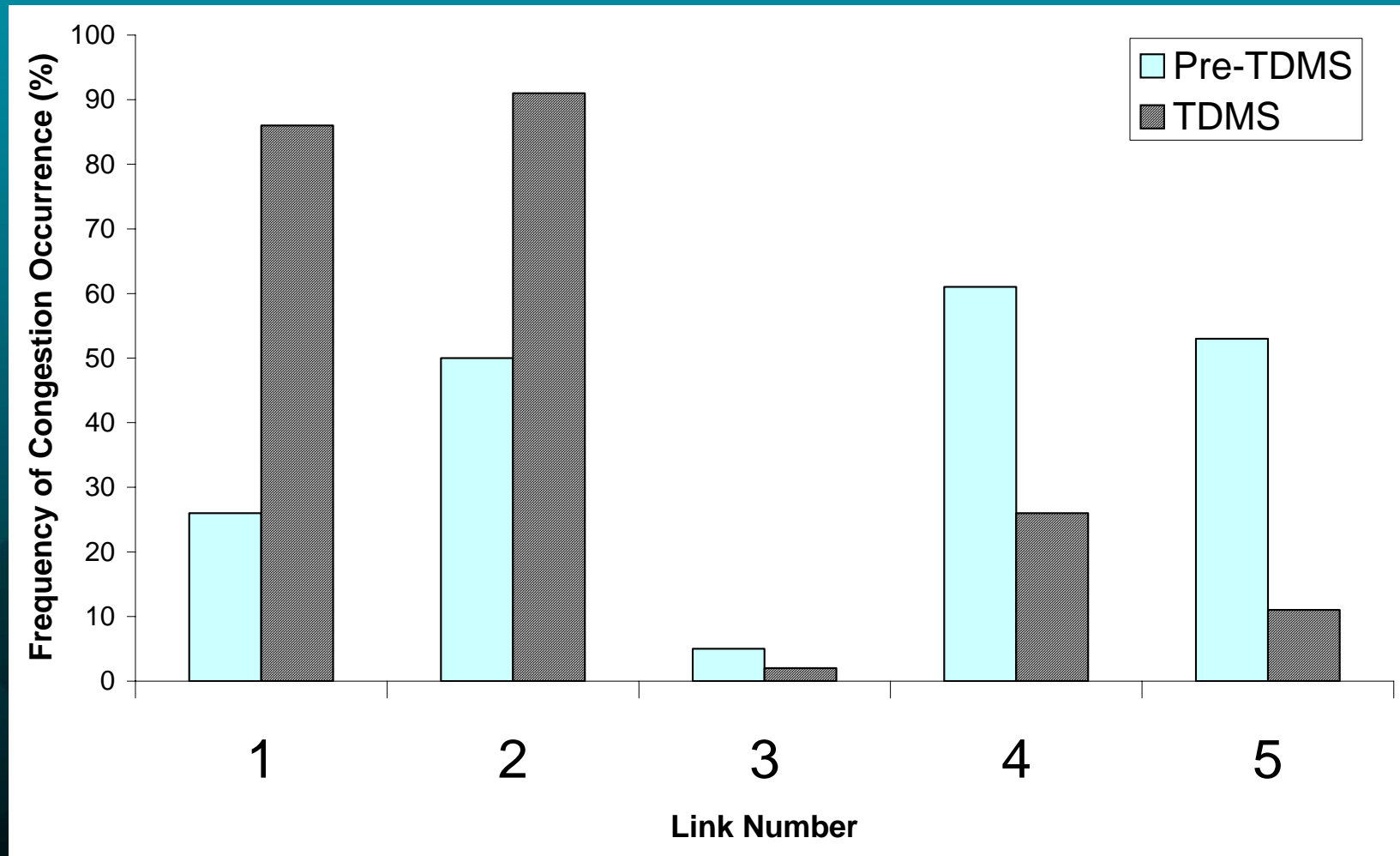
Relocate congestion to open space?



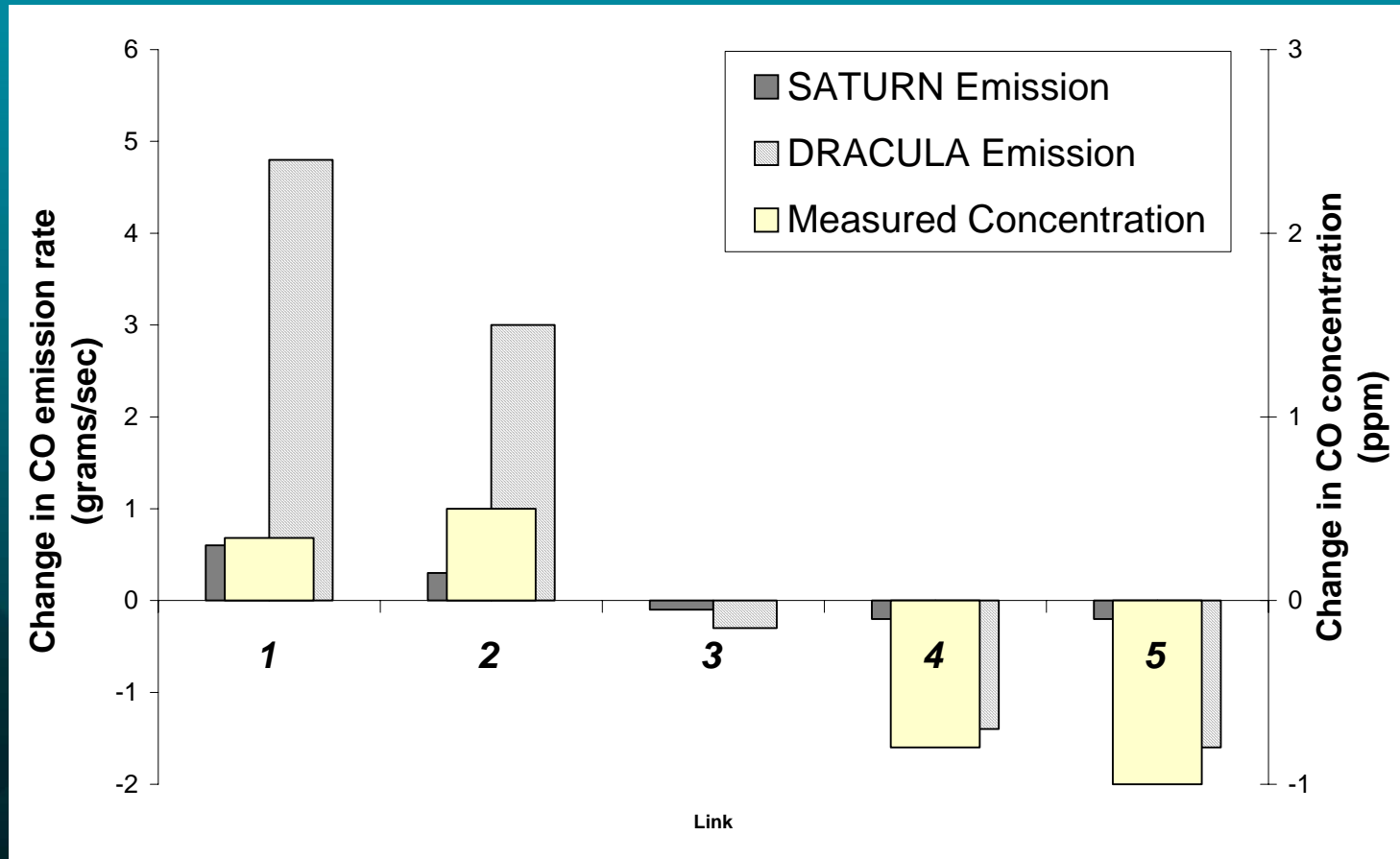
Evaluation

- Used SCOOT, TRANSYT and SATURN to develop TDMS
- 2 month periods - before and after picture
- Monitored traffic and pollution conditions
- Recorded every congestion occurrence
- Used SAM to identify outlier days
- Used SATURN and DRACULA to model emissions

Change in congestion



Change in Air Quality



Summary

- Queue relocation successful in displacing pollution to open space
- Emissions at hot spot were reduced 3% – 10%
- However, complaints received
- Perception of problem worse!
- Attitudes and politics

Public Information on Air Quality



Food for thought...

- What about setting SCOOT with a 60s delay?
 - Increase congestion – eventually gridlock
 - Traffic would decrease!
-
- Even if all cars are 'green'...
 - Solving the POLLUTION problems of today means solving congestion problems of the future?



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