Green Infrastructure and Near-Road Air Quality: Findings from the iSCAPE Project

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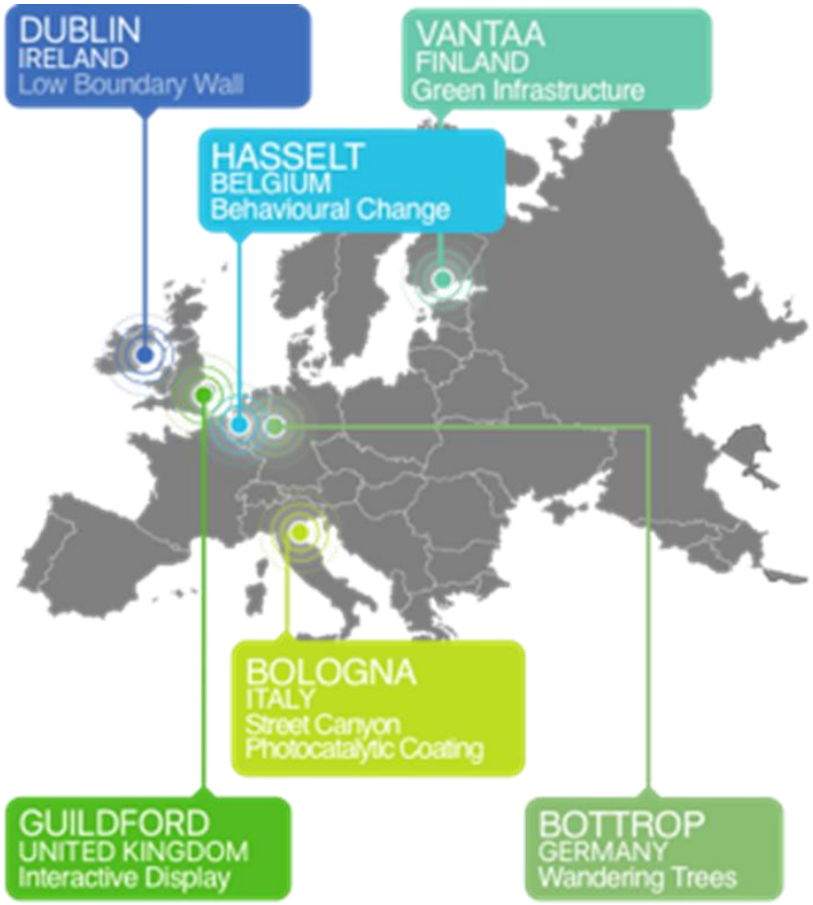
iSCAPE: Improving the Smart Control of Air Pollution in Europe



THE OVERALL OBJECTIVE is to develop an integrated strategy for air pollution control in European cities that is grounded on evidence-based analysis.

iSCAPE AIMS at reducing urban pollution and climate change negative impacts by leveraging:

PASSIVE CONTROL SYSTEMS

- **affect air pollution dispersion:** trees, hedges, green walls & roofs, low boundary walls, photocatalytic coating

BEHAVIOURAL CHANGE

- **reduce emissions**

Website: https://www.iscapeproject.eu/

University of Surrey in iSCAPE

Green infrastructure based solutions for improving air quality

- Experimental Campaigns: GI impact on air pollution in near-road environments
- Local and City scale modelling studies assessing influence of GI physical characteristics
- Development of Generalised solutions for urban infrastructure and related decision-makers

Guildford Living Lab (#GuildfordLivingLab)

Aims to raise citizens' awareness about air quality and impact of green infrastructure to reduce air pollution and improve health and well-being

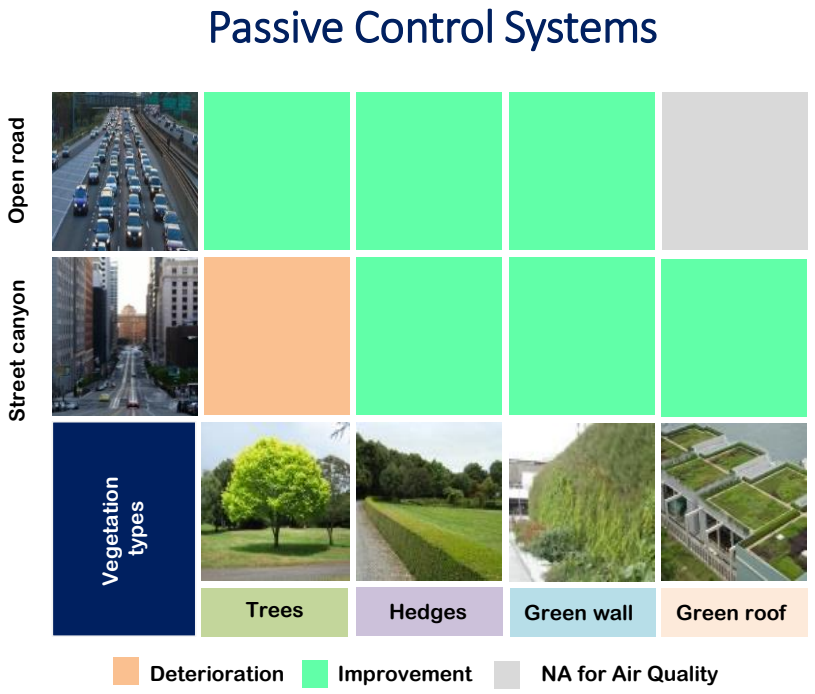
…..Citizen science using low-cost sensors

Review and questions?

Review indicated potential of GI in reducing air pollution

For providing suggestions or development of recommendations for local Governments and policy makers more evidences are required

- Different types of GI
- Considering different pollutants and meteorological conditions
- GI mechanism of removal: dispersion and deposition
- GI physical characteristics on air pollution removal



… clearly show a need for field studies

Abhijith, Kumar et al., 2017. Air pollution abatement performances of green infrastructure in open road and built-up street canyon environments - A review. Atmospheric Environment 162 ,71-86)

Field campaign

Six sites; 3 vegetation configurations

- Hedges
- Trees
- Tree + Hedge

Pollutants

UFP, PM_1, $PM_{2.5}$, PM_{10} and BC

Traffic counting

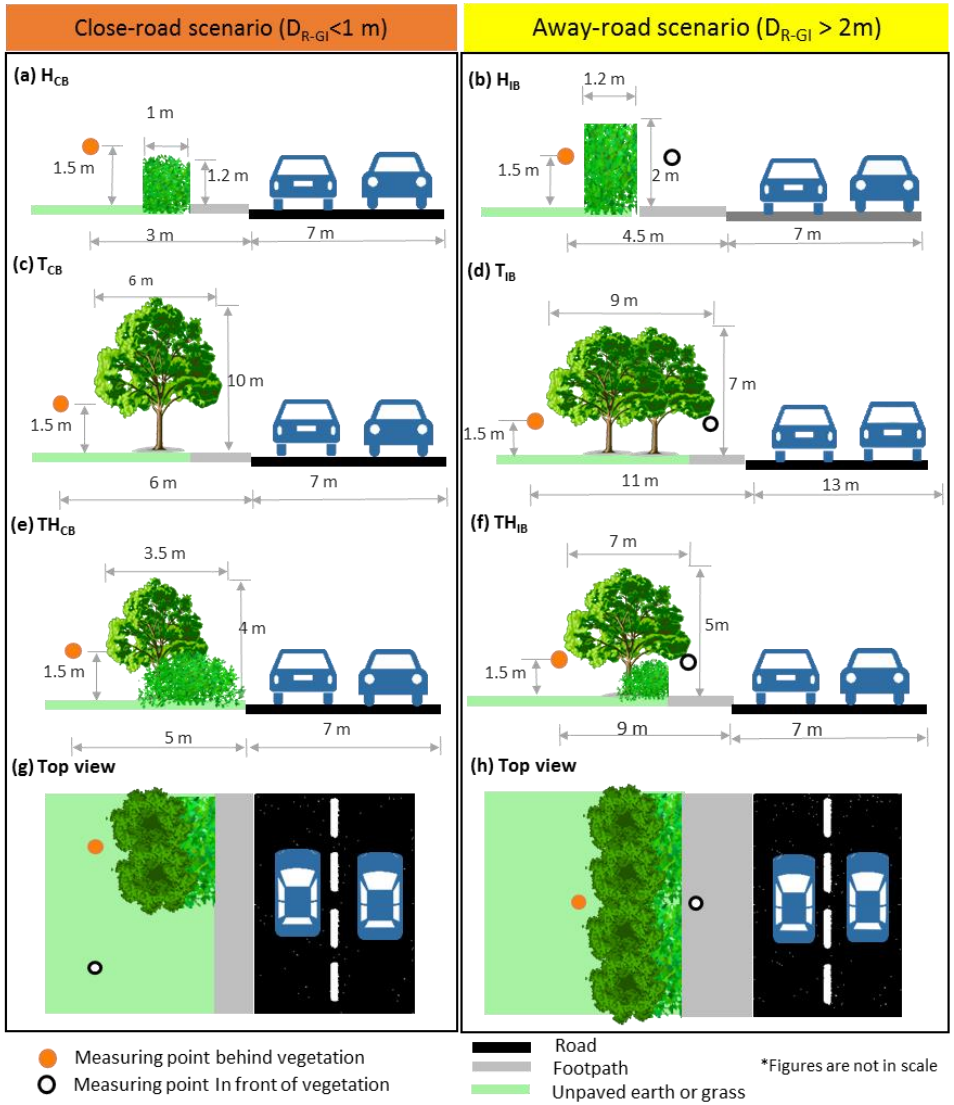
SMART Traffic Counter App

Leaf area density

Accu-PAR LP80

Duration

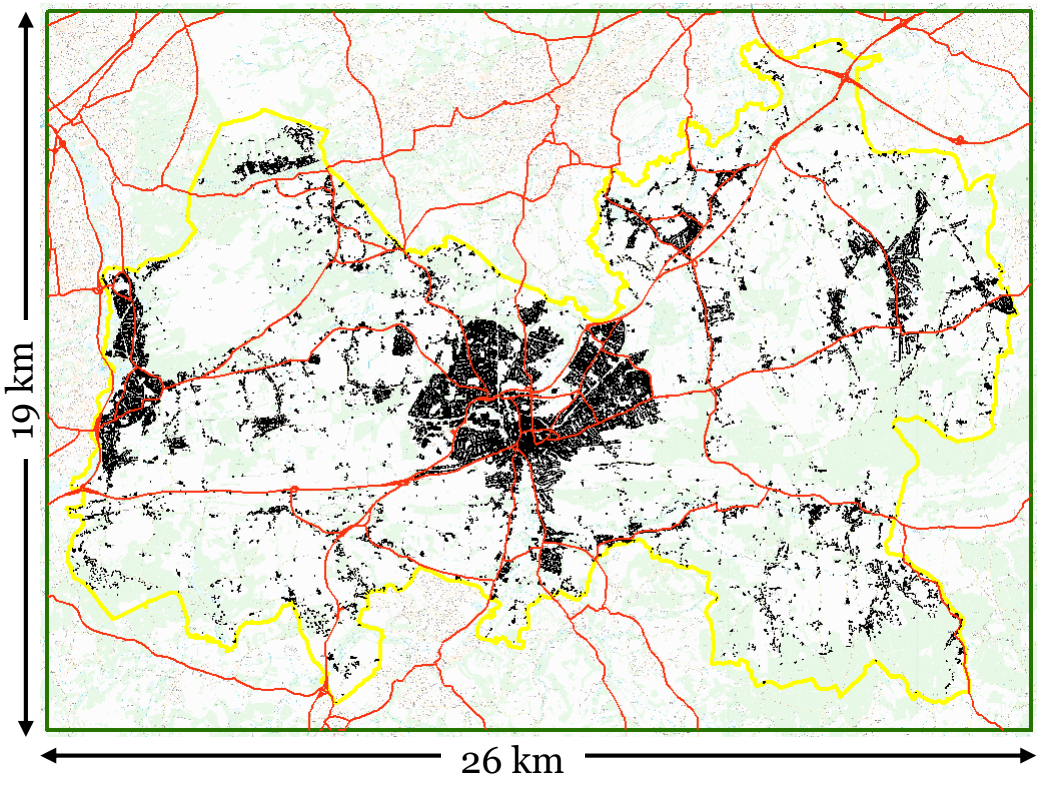
30 days in total @8-10 hours/day



Abhijith & Kumar (2018). Atmospheric Environment (under review)

City scale modelling - Guildford

- Air pollutant concentration has spatial temporal variation.
- Deposition velocity is not constant.
- Computational models are not available to simulate combined effect.



Gaussian plume dispersion modelling in ADMS-Urban

Air pollution sources

- Traffic (major source): 2135 major road links and 4245 minor road links
- Others from National Atmospheric Emissions Inventory (NAEI) database

Major roads
Model extent
Buildings
Guildford boundary

Summary

- The air pollutant reduction is depended on change in surface roughness as well as deposition velocity.
- Air pollutant deposition are more near the source
- The deposition amount increase with particles size
- Field experiments indicated GI may reduce up to 50% depending upon pollutant , type of GI and meteorological conditions
- GI are effective in reducing traffic originated elements

Acknowledgements

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Guildford Living Lab: https://livinglabs.iscapeproject.eu/guildford/

iSCAPE Project: https://www.iscapeproject.eu/

Twitter: @AirPollSurrey @iSCAPEproject

Thank you ....

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'to realise a collaborative global vision of 'clean air for all'

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