UCD Impact Case Study

# iSCAPE: improving the smart control of air pollution in Europe

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ACADEMIC · EDUCATIONAL · ENVIRON-MENTAL · HEALTH · SOCIAL · TECHNO-LOGICAL

## SUMMARY

The iSCAPE project advanced the control of air quality and carbon emissions in European cities. It brought together a wide range of stakeholders – including citizens, environmental agencies and policymakers – to co-design nature-based and behavioural solutions to the problem.

This approach had environmental and health impacts by providing evidence on effective air pollution control measures, informing a wide range of guidelines across Europe. It had social impacts by involving citizens and other stakeholders in research activities, raising awareness of air pollution and its impacts. And it had technological impact by developing new low-cost sensors to empower local communities.

## RESEARCH DESCRIPTION

Air pollution is one of society's greatest challenges, killing around 7 million people every year. 400,000 of these premature deaths are in Europe. Every day, 9 out of 10 people breathe air with high levels of pollutants. Air pollution also contributes to climate change and causes a range of environmental effects, like acid rain, ozone depletion, and damage to crops, forests and wildlife. Addressing this challenge requires a concerted effort across society.

The iSCAPE project, coordinated by Associate Professor Francesco Pilla, was a European research project that worked on advancing the control of air quality and carbon emissions in European cities. It tackled the problem by studying policy interventions, behaviour changes of citizens' lifestyles, and "Passive Control Systems" (PCSs) – things like trees, hedges and coatings that can affect air pollution without using any power.

Crucially, the project pioneered a "co-design" approach, developing solutions with a wide range of stakeholders using a so-called "living lab framework". This means collaborating with citizens and decision-makers to develop and trial measures in real places.

The work was carried out in 6 fully operating European cities, demonstrating the effectiveness of bottom-up approaches compared to more traditional top-down approaches to tackling pollution.

*A low-cost pollution sensor developed through the project.*

The team looked at different measures in each city:

- Bologna, Italy (trees and photocatalytic coating)
- Bottrop, Germany (urban design and planning)
- Dublin, Ireland (low-boundary walls)
- Guildford, UK (hedges)
- Hasselt, Belgium (behavioural interventions)
- Vantaa, Finland (green roofs and walls)

These studies were enhanced by scientific simulations to evaluate the measures at three different scales: the street, the neighbourhood, and the urban scale. iSCAPE also looked at how successful these measures would be in future climate scenarios, which enabled the team to develop air pollution control strategies that are effective in the short and the medium-long term.

This combination of approaches allowed Dr Pilla and colleagues to produce robust scientific results (over 50 peer-reviewed publications) and leverage the support of the wider community (over 100 citizens actively involved in producing the evidence) to influence policymakers to put the findings into practice.

## RESEARCH TEAM, COLLABORATORS AND FUNDING

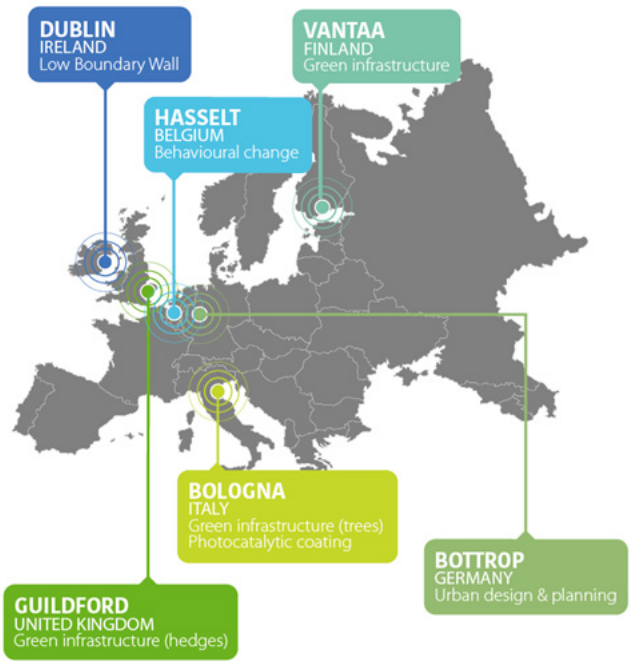
### Research team and collaborators

- Francesco Pilla, Associate Professor (Coordinator and Principal Investigator for the iSCAPE project)
- Santa Stibe, Project Manager (Living Lab lead for the iSCAPE project)
- Bidroha Basu, Postdoctoral Fellow (Expert in air pollution modelling for the Dublin Living Lab)
- Jamie Cudden, Smart City Lead, Dublin City Council (Stakeholder supporting all Living Lab Activities in Dublin)

iSCAPE also had 13 other partners across Europe. Additional collaborators were acquired during the project lifetime, as stakeholder engagement activities are a core part of the Living Lab framework.

### Funding

iSCAPE has received funding from the European Community's H2020 Programme: https://www.iscapeproject.eu/




*The six cities in which this work was carried out.*

## RESEARCH IMPACT

### Policy impact

Local stakeholders – including decision-makers, environmental agencies, and city administrations – were directly involved in the process of producing guidelines for the measures developed through iSCAPE.

These guidelines include "Using Green Infrastructure to Protect People from Air Pollution", published by the Mayor of London, and "Implementing Green Infrastructure for Air Pollution Abatement: General Recommendations for Management and Plant Species Selection". The various guidelines fostered widespread adoption and application of nature-based solutions to tackle local air pollution challenges.

iSCAPE also produced 9 actionable policy briefs, and promoted them through the WHO network, to facilitate the uptake of all the other key results of the project.

### Environmental impact

Ultimately, these guidelines being adopted around Europe has had multiple benefits in terms of alleviating climate change impacts, increasing biodiversity, enhancing people's wellbeing, and increasing resilience to flooding and other risks. All the produced results and actionable policy briefs are freely available, ensuring further policies around the world will benefit from the research, and helping additional cities tackle air pollution and climate change.

### Social impact

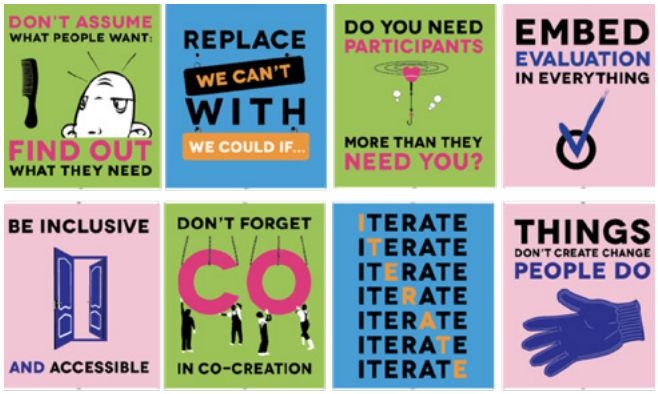
iSCAPE Living Labs brought together a great variety of urban stakeholders, including city representatives, researchers, businesses, and citizens, to solve complex city challenges around air pollution and climate change.

During the course of the project, iSCAPE Living Labs delivered numerous engagement activities, increasing citizen awareness and knowledge of air pollution, its impacts, and how to address it. The events involved a wide range of activities, from creating pop-up green spaces as part of the "wandering trees" initiative in Bottrop, to citizen science workshops with low-cost sensors in all the 6 Living Labs.

One such activity took place in a school, where children co-developed passive control systems for air pollution using LEGO bricks. This has since been formalised in a framework which will be replicated by the International Red Cross in schools in over 50 Countries in Eurasia.

### Technological impact

iSCAPE developed two low-cost sensors to facilitate these activities: a citizen science sensor (Smart Citizen Kits) for grassroot activities with local communities aimed at raising awareness of air pollution, and a more advanced monitoring station to assess the impacts of the piloted interventions. The team developed an online guide to facilitate wider use of the Smart Citizen Kits.




*Living Lab toolkit to co-design interventions with citizens.*

### Academic impact

iSCAPE produced several impactful results, advancing the state-of-the-art and significantly contributing to scientific knowledge about the effectiveness of nature-based solutions and behavioural-change initiatives to tackle air pollution and related climate change issues. More than 50 publication have arisen from the project.

A sustainability plan for extending the lifespan and impact of the project was developed to ensure that the Living Lab components – including physical and virtual infrastructure, knowledge, and skills – are sustained beyond the project and continue contributing to local urban innovation activities.

## REFERENCES


1. Actionable Policy Briefs: iSCAPE produced a range of policy briefs to facilitate the uptake of the project's results. These recommendations and guidelines for city stakeholders and decision-makers proved to hold a great potential for facilitating evidence-based decision making and policy change. Nine policy briefs were produced and promoted through the WHO network.

2. Low-cost sensing technologies: During the course of the project, two types of low-cost sensors were developed. Smart Citizen Kits were used in citizen science workshops conducted in each iSCAPE city to increase awareness of personal exposure to air pollution. More advanced monitoring stations were used to validate the sensor performance and to assess the effectiveness of passive control systems.

3. Open source documentation for sensing kits: An online resource to facilitate market uptake of the developed technology.

4. iSCAPE Citizen Science Guide: A step-by-step guide to increase awareness of the processes and approaches to tackle air pollution, facilitating citizen engagement and co-creation to drive policy change from the bottom up.

5. A book on air pollution for children: A book collecting drawings made by primary school children during co-design workshops in Dublin, where children co-developed passive control systems for air pollution using LEGO bricks.

6. Guidelines for London City: Guidelines on using green infrastructure to protect people from air pollution, developed as part of iSCAPE and then adopted by London City.

7. Guidelines for London City 2: Guidelines on implementing green infrastructure for air pollution abatement: general recommendations for management and plant species selection, developed as part of iSCAPE and then adopted by London City.

8. Podcast for Living Labbers: Podcasts sharing the iSCAPE experience in deploying living labs and engage stakeholders to tackle air pollution, available on Spotify.

9. Living Lab Guidebook: A widely disseminated guidebook for cities fighting against air pollution.

10. iSCAPE Playbook and Planning Game: The iSCAPE experiences in Living Labs were also summarised in the "iSCAPE Playbook", containing an "iSCAPE Living Lab game" which includes Living Lab Tips & Tricks Cards.