

Case Study

Leicester City Council

Client

Leicester City Council are a governing body in the East Midlands of the United Kingdom, responsible for the city of Leicester.

Overview

EarthSense worked with Leicester City Council to create a pollution map of Leicester which focused on identifying wood burning smoke emissions within the City.

Using a combination of the MappAir® 10-metre resolution city model, a wood burning smoke estimate, traffic data, Computational Fluid Dynamics (CFD) and a network of Zephyr® air quality sensors, the Council were able to identify particulate levels within the City, enabling improved guidance towards reduced smoke emissions and improved public health.

The Challenge

Many people around the UK may be unaware that burning wood in domestic burners contributes to particulate pollution levels and poses significant risks to public health as it increases the likelihood of suffering from and worsening adverse health impacts, such as chronic obstructive pulmonary disease (COPD), asthma and diabetes.

With this in mind, Leicester City Council wanted to gain further insight into wood burning smoke emissions, in particular, the extent to which solid-fuel burners contribute to PM2.5 exposure across the city and use this data to communicate such risks to the residents of Leicester to drive behavioural change.

The Council released a tender to procure both mobile and static air quality sensors with measures for fine particulate matter (PM2.5), and a detailed 10-metre near real-time (NRT) air



Figure 1: Wood burning smoke from domestic burning

pollution modelling service with source apportionment and emission estimating capabilities. EarthSense successfully met the requirements with their MappAir® 10-metre city model and Zephyr® sensors, so were awarded the project to work alongside the Council.



Figure 2: Zephyr® air quality sensor deployed in Leicester to a lighting column powered by solar panel.

The Solution

Since 2015, Leicester City Council have been working towards their Air Quality Action Plan (AQAP) “Healthier Air for Leicester” which aims to lower particulate matter (PM2.5) concentrations in the city. To create further reductions in PM2.5 levels as part of the initiative, the Council worked with EarthSense to produce a model that delivered insight into wood burning smoke emissions coming from domestic wood burners alongside other traditional sources.

To do this, a collection of data was used to feed into the model, including Computational Fluid Dynamics (CFD) for calculations of how pollution flows throughout urban canyons and buildings in Leicester, source apportionment to identify each of the particulate matter sources, a traffic layer as well as a wood burning smoke estimate created by EarthSense for the Council. Leicester City Council also used MappAir®’s historic pollution data and up to three-day

air quality forecasting, which was used to notify members of the public of days predicted to experience elevated levels.

The highest concentrations were measured on cold days likely to increase usage of log burners or public celebrations such as bonfire night. The EarthSense solution is designed to deliver guidance in advance of high pollution events, and behavioural changes for personal and community benefit.

The Council also established a network of 11 Zephyr® air quality sensors to provide measurements of particulate matter coming from domestic combustion, traffic and background sources. This was achieved by deploying 6 static units around Leicester together with 2 mobile units connected to electric vehicles, 2 attached to bicycles and 1 outside the city boundary.

Utilising a Zephyr® network meant the Council were able to generate estimates for locally-sourced PM2.5 emissions from wood burning smoke in real-time throughout their areas of interest and identify areas which were experiencing the highest concentrations. Taking PM2.5 measurements every 10 seconds, Zephyr® pollution measurements were integrated into the MappAir® model for added context into how wood burning smoke was impacting air quality levels in Leicester.

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This ambitious project will play a vital role in helping us build a clear picture of the sources of PM2.5 pollution, which parts of the city are most affected and the impact that domestic wood burning is having on local air quality.

Councillor Adam Clarke
Deputy City Mayor

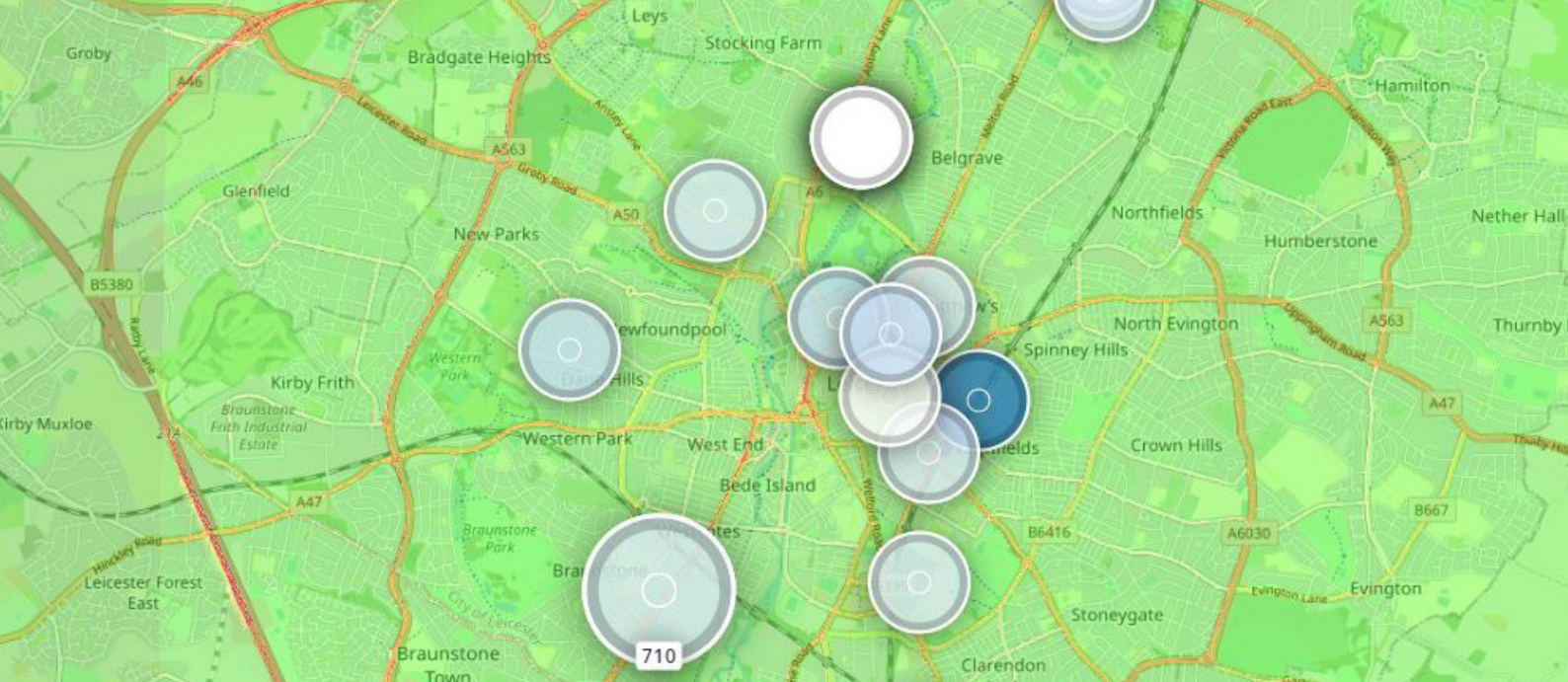


Figure 3: Mapped Zephyr® locations in MyAir®, alongside modelled MappAir® data for domestic combustion (PM2.5) in Leicester

Outcomes

Through utilising the complete EarthSense air pollution monitoring service including hardware, software, data provision and public information tools, a pollution model for Leicester City's wood burning smoke emissions was successfully developed and meant the Council were able to take early measures to manage smoke emissions and support their "Healthier Air for Leicester" initiative.

What's more, with forecasting capabilities and integrated weather data, the model has helped to highlight locations and days in Leicester experiencing elevated levels of air pollution, aiding the Council's decisions about how to manage domestic wood burning on cold days through communicating useful information to members of the public and encouraging behavioural changes.

Future Plans

Leicester City Council are trialling and testing demonstrations of an interactive map with a supporting mobile phone app to deliver members of the public with informed guidance about wood burning and the risks met with such activities. The aim of the mobile application is to provide easily accessible data about Leicester's PM2.5 levels to encourage local changes towards cleaner air in the city and is being trialled with members of the public in early 2021.

Get in Touch

Want to learn how our complete air quality monitoring service can help you manage air quality in your city? email us!
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