



Understanding Ireland's Air Pollution: Evidence from the AEROSOURCE Network

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SUMMARY FOR POLICYMAKERS

Air pollution is a major health concern in Ireland, linked to heart disease, respiratory illness, dementia and mental health conditions. Over 1,600 premature deaths each year are associated with poor air quality. While overall air quality has improved, wintertime remains a problem—particularly in urban areas. This Ryan Institute Policy brief highlights new evidence from the AEROSOURCE monitoring network to help inform better policy decisions.

KEY MESSAGES

- Domestic solid fuel use remains the leading cause of poor air quality in Ireland during winter.
- On cold days in Dublin, burning peat and oil can cause major spikes in harmful air pollution levels.
- Pollution sources vary by region and time of year, highlighting the need for location-specific and seasonally timed policy responses.

WHAT THE DATA SHOWS

The AEROSOURCE network, funded by the EPA and Department of Climate, Energy and the Environment, continuously monitors air pollution at three sites across Ireland:

- Dublin (urban background)
- Carnsore Point (regional background)
- Mace Head (clean coastal site)

Despite generally good air quality on account of prevailing oceanic air masses, the research revealed that extreme air pollution events, spanning the entire country, occur frequently in wintertime. These events are known as ALARM Days, i.e., when the Air pollution Levels are Above the World Health Organization Recommended Mass threshold for health.



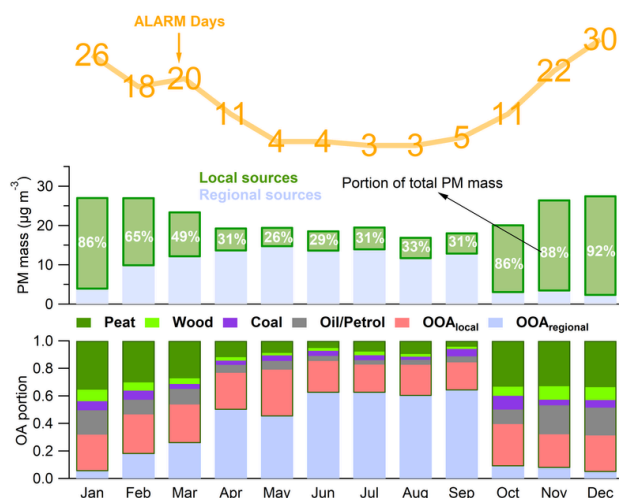


FIGURE 1. SEASONAL CHANGES IN THE NUMBER OF ALARM DAYS (TOP); THE PM MASS AND CONTRIBUTION FROM LOCAL VS. REGIONAL SOURCES (MIDDLE), AND MAJOR SOURCES OF ORGANIC POLLUTION (OA) (BOTTOM)

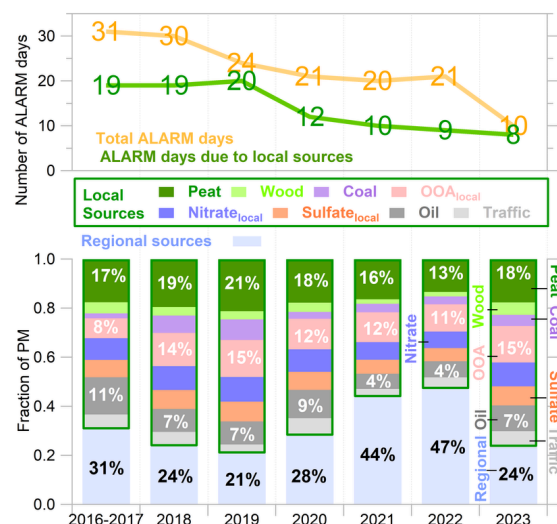


FIGURE 2. MULTI-YEAR TRENDS OF TOTAL ALARM DAYS (ORANGE) AND ALARM DAYS ARISING FROM LOCAL SOURCES (GREEN) (TOP). SPECIFIC SOURCE CONTRIBUTION TO PM DURING ALARM DAYS IN DUBLIN (BOTTOM). LOCAL SOURCES ARE OUTLINED WITH THE GREEN BOX.

The data highlights the following:

- Air pollution **events in Dublin exhibit distinct seasonal variations, with 81% of the total 157 ALARM days** (over 2016-2023 period) occurring during cold months.
- In **Dublin**, 8 out of 10 ALARM days are caused by local residential heating (mainly peat and oil).
- Dublin sees much cleaner air in warm months with only 19% of the ALARM days occurring in this season, and which are largely driven by the pollution carried in by wind from another countries.
- Between the period 2016-2023, Dublin reduced its ALARM days from over 30 to 10 per year. But the **main drivers—peat and oil heating—still account for the majority of the remaining ALARM days.**
- **Carnsore Point** sees very few ALARM days (3-9 per year), and these are mostly due to **pollution carried in from Europe and the UK.**
- **Mace Head** rarely exceeds pollution thresholds due to its remote coastal location.
- **Carnsore Point** and **Mace Head** air quality remains steadily good over the years without any significant changes.

TRENDS & CONCERNS

- **Solid Fuel Use:** The contribution from peat burning has declined, but recent data suggests changes in fuel type and potential non-compliance with solid fuel regulations.
- **Imported Pollution:** Pollutants from abroad are becoming a larger share of the total. Their chemical signature is now more visible in Irish air, especially on warmer days.
- **Shifts in Chemistry:** An increase in processed pollutants and inorganic compounds (like sulphates) may signal a growing regional transport influence and evolving fuel use patterns.

POLICY IMPLICATIONS

Change is possible and bringing ALARM days down to single digits all year around is possible. To meet WHO air quality guidelines, Ireland must:

- **Strengthen policies to reduce solid fuel use** for home heating.
- Improve enforcement of existing solid fuel regulations.
- **Support cleaner alternatives**, particularly in urban areas during winter.
- **Enhance public awareness** of the health impacts of indoor and outdoor air pollution.
- **Invest in long-term monitoring** to track evolving pollution sources and regional transport trends.
- Coordinate air quality management with neighboring countries to address cross-border pollution flows.

Centre/Cluster: **Centre for Climate and Air Pollution Studies (C-CAPS)**

Theme: **Climate Change**

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