

Environment, Climate Change and Land Reform Committee**Inquiry into air quality in Scotland****Written submission from NERC Centre for Ecology & Hydrology****Does Scotland have the right policies (Clean Air for Scotland Strategy), support and incentives in place to adequately tackle air pollution?**

The Clean Air For Scotland Strategy provides a comprehensive framework to address air pollution with a focus on transport-related sources. However, a wider, more integrative and cross-sectoral policy initiative incorporating sources such as agriculture, residential combustion and a focus on reducing population exposure to air pollution rather than achieving compliance at monitoring sites would be more effective in achieving long-term air quality objectives. Air pollution overall is comparatively low across Scotland compared to much of Europe. However, the current policy has a strong emphasis on hotspots of nitrogen dioxide concentrations in urban areas, rather than overall reduction of exposure to all pollutants. In particular, it does not address key areas such as interactions between renewable energy targets leading to increased use of wood in residential combustion for carbon saving purposes, but contributing to local air quality challenges due to the release of fine particulate matter in densely populated areas.

Overall the CAFS strategy covers most areas but the majority of the proposals are at a Authority level rather than encouraging individual behavioural change and direct information to society - though the website basis is required, rolling out much more active and near real time communication strategies could be encouraged.

Are the policies sufficiently ambitious?

With the CAFS launch, setting the ambitions for Scottish air quality to become the best in Europe can be regarded as feasible, considering the overall low levels of air pollution observed. The specific declaration to attain the World Health Organisation's guideline value of $10 \mu\text{g}/\text{m}^3$ for fine particulate matter ($\text{PM}_{2.5}$), a more stringent objective than the current limit value of $12 \mu\text{g}/\text{m}^3$ does appear feasible, with currently annual mean values not far away. However, no ambitious targets have been set specifically for emissions e.g. of ammonia or primary particles, in the context of the UK wide ceilings agreed under the EC National Emission Ceilings Directive. Here, a wider policy initiative, integrating across all policy domains and taking a public health focused approach and ensuring that both climate change and air quality policies are harmonised to achieve policy objectives, realise synergies and avoid potential unintended consequences of single-focus policies would be welcomed. Adopted of resource use efficiency for economic health as well as decreased pollution can be applied across sectors including farming, domestic activities, industrial activities. Best Available Technology (BAT) approaches can be built upon further to include system efficiency.

3. Are the policies and delivery mechanisms (support and incentives) being effectively implemented and successful in addressing the issues?

No response

4. Are there conflicts in policies or barriers to successful delivery of the air quality objectives?

No response

A. How does the Scottish policy fit with the UK and EU policy on air quality?

The Scottish policy fits well with UK and EU policies, although EU and UK level strategies have differences, all the strategies have similar aims. Linking up Transport for Scotland, Highways England and other transport agencies is very important and is reflected in the UK Air Quality plan published in July 2017. However, compared to some country plans, there appears to be less emphasis on citizens and active management of driving behaviour and traffic flows to reduce emissions now, rather than implementing plans in the next few years.

It is noted that the wider view status and impacts of air pollution is available in various reports and ideally should be cross-referenced with the current policies. This includes the Review of Transboundary Air Pollution (RoTAP) which was published in 2012, and also the annual European Monitoring and Evaluation Programme (EMEP) reports¹. The aim of the RoTAP report was to review the state of rural air pollution issues in the UK, to evaluate the extensive measurements of atmospheric pollutants and their effects, and to produce a synthesis of current understanding, which will be used to determine air quality policies.

The review focused on the main chemicals causing acid deposition, eutrophication, ground level ozone and heavy metal pollution in the UK, namely sulphur dioxide (SO₂), nitrogen oxides (NO_x), ammonia (NH₃), aerosols (particulate matter), heavy metals, nitric acid (HNO₃) and ozone (O₃). The RoTAP report reviewed all of the current data available to the group on these pollutants and their contribution to acidification, eutrophication, ground level ozone and heavy metal deposition in the UK, covering:

- Trends in emission, concentration and deposition of the main atmospheric pollutants.
- Changes in the atmospheric processing of pollutants and their significance for policy.
- Changes in the exceedance of critical loads and levels for all pollutants and UK ecosystems for which this methodology applies
- Evidence of chemical and biological recovery from the effects of acid deposition, changes in the eutrophication of UK ecosystems, timescales to improve the

¹ http://emep.int/publ/emep2017_publications.html

heavy metal status of soils and changes in the effects of ground-level ozone on UK ecosystems.

- The use of long range transport models to assess the prospects for further change in concentrations, deposition and ecosystem impacts.
- The European and Global perspective on transboundary air pollution

While the report had a specific UK and wider-international focus in terms of data and policy initiatives, Scottish data were included in the synthesis. Further information, including both the full RoTAP report and a separate Summary for Policy Makers report are available at: <http://www.rotap.ceh.ac.uk/>

B. Are the powers and resources of Local Authorities and SEPA to address air pollution adequate?

The focus of activities to curb local air pollution in the UK and in the rest of Europe is currently on reducing population exposure to nitrogen dioxide (NO₂) levels exceeding limit values set for the protection of public health. While exceedances of NO₂ limit values are not widespread in Scotland, hotspots of high concentrations persist in densely populated and high traffic urban areas. Low emission zones and reducing traffic volumes by other means in these areas are within the remit and control of local authorities. However, UK and European regulations regarding the quantification of emissions from road transport vehicles and emission testing have been proven to be inadequate, leading to a high degree of uncertainty in projecting the effectiveness of policy measures to achieve substantive reductions of population exposure. Current resources invested into monitoring and modelling of urban air quality, in particular under the Clean Air For Scotland strategy are a step in the right direction. However, a Scotland-wide, consistent approach to provide high resolution, timely and meaningful information to the population in general, and vulnerable groups specifically, is lacking. To achieve this, resource investment into modelling activities at appropriate spatial scales would be an efficient way to provide early warning to citizens, as well as improve the utilisation of health care facilities and infrastructure. A current pilot project investigating the use of air quality modelling to inform GP practices and hospital A&Es about forecast air pollution events, funded under the Environmental Data and Human Health initiative by the Chief Scientific Officer for Scotland, NERC and MRC could provide a blue-print for such activities. In addition, the use of a website for communication, though a useful resource does not actively engage the population with what the government and SEPA are trying to achieve. Therefore a step change in the level of communications through health services, educational institutes and even on public information boards (both physical and on social media) could enable the LAs and SEPA to achieve their targets. However, this would require adequate resourcing.

Is Scotland on target to have a pilot low emission zone (LEZ) in place by 2018 and should there be more than one LEZ pilot?

No response

How should the improvement of air quality be prioritised in areas where there have been persistent breaches of NO₂ limit values?

Current strategies focus on the reduction of limit value breaches identified by few selected air quality monitoring sites. However, the overarching objective to improve public health will require a paradigm shift towards prioritising the reduction of population exposure. In the scientific literature, the associations between air pollution and human health effects have been thoroughly investigated, and recent research specifically for Scotland by Willocks et al. (2012²) has indicated that current monitoring networks are not adequate and sufficiently spatially representative to assess how air pollution, or reduction of ambient concentrations at few monitoring sites, may affect public health. In this context, prioritisation should focus on improving overall exposure both in hotspot areas, but equally for the wider urban population. In parallel, establishing the monitoring and modelling capability to robustly assess such improvements would be essential to quantify improvements and to validate the effectiveness of such measures. While LEZs or traffic bans in hotspot areas may contribute to a reduction in NO₂ concentrations locally, the potential displacement effect may well lead to increased exposures in other areas, which will not be identified due to the lack of monitoring sites, or model results. A wider area view, incorporating urban as well as rural transport measures, integrated infrastructures for active transport and park & ride/public transport solutions would need to be underpinned by infrastructure and investment to improve the spatial representativeness of observations at adequate scales. In addition, an integrated modelling approach incorporating urban scale and regional/national scale air quality modelling would be required to design and validate integrated air quality strategies.

E. Is adequate consideration given to air pollution from agriculture?

Both at the UK and European, but as well at the Scottish scale, the contribution of agricultural emissions to air pollution specifically through emissions of ammonia (NH₃) has not been adequately addressed to date. Evidence from observations³ and modelling⁴ identify that Scotland receives a substantial contribution to fine particulate matter (PM_{2.5}) concentrations, which originate outside of Scotland, elsewhere in the UK and continental Europe.

Ammonia emissions from Scottish agricultural activities, combining with nitrogen oxides from combustion sources, contribute to in-country and UK and Europe-wide PM_{2.5} levels through long-range transport to locations far away from the sources. Based on most recent scientific findings from the World Health Organisation and

² Willocks et al. <https://doi.org/10.1186/1471-2458-12-227>

³ e.g. Twigg et al.: <https://www.atmos-chem-phys.net/15/8131/2015/acp-15-8131-2015.pdf>; Malley et al. <https://doi.org/10.1016/j.envint.2016.08.005>

⁴ e.g. Vieno et al. 2016a - <https://doi.org/10.1088/1748-9326/11/4/044004>; Vieno 2016b <https://doi.org/10.5194/acp-16-265-2016>, and Vieno et al. 2014: <https://doi.org/10.5194/acp-14-8435-2014>.

COMEAP, PM_{2.5} does not seem to have a threshold below which no harmful effects occur, . As a result, even the comparatively low levels of exposure of the Scottish population pose a substantial health risk.

Air pollution from agriculture needs to be urgently addressed in the wider context of nitrogen pollution across ecosystems and nutrient management as well. The release of ammonia into the air is part of the wider challenge of managing the environmental impacts of intensive agricultural activities, which affect air, water and soil quality. Through an integrated nitrogen management, as it has been successfully introduced e.g. in the Netherlands and Denmark, losses of reactive nitrogen into the environment can be reduced, leading to both substantial savings for farmers, as well as significant environmental and human health benefits. A European scale assessment of options and benefits for such an integrated management of the nitrogen cycle has been led by CEH and published in the 2011 European Nitrogen Assessment report⁵. Such an assessment, conducted at the appropriate national and local scale for Scotland, could have a significant positive impact on identifying solutions for air pollution from agriculture, as well as wider benefits for sustainable agricultural production, water quality and nutrient management across the country.

⁵ <http://www.nine-esf.org/node/204/ENA.html>