Leading the way on Rail Sustainability

SAQN Annual Meeting 2022 - Air Quality Challenge in Rail

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Structure of presentation

- Introduction
- The Sustainable Rail Strategy and Air Quality Strategic Framework
- Why air quality is a priority in rail
- CLEAR
- Air quality onboard trains, in stations, and abrasion emissions
- Summary: key further research areas
Introduction

- **Rail Safety Standards Board (RSSB)**
  - Established in 2003
  - Vision: A better, safer railway
  - Not-for-profit company owned by major industry stakeholders
- To actively **help the industry work together** to drive improvements in the GB rail system
- Six strategic business areas, including **sustainable rail**
The Sustainable Rail Strategy and Air Quality Strategic Framework

- **Sustainable Rail Strategy (SRS)**
  - The SRS is a comprehensive sustainability strategy for the rail industry across both **environmental and social** topics
  - A key input to Great British Railway’s **Whole Industry Strategic Plan**
  - 11 sustainability topics, including Air Quality, each having its own **flagship goal**

  **Flagship goal: A railway that supports a positive impact on air quality**

  - **Consultation** on the Prototype is being held right now: Sustainable Rail Strategy (rssb.co.uk)

- **Air Quality Strategic Framework**
  - Setting the future path for rail to achieve the flagship goal
  - Underpinned by a **collaborative research programme (CLEAR)**
Why air quality is a priority in rail

- Rail contributes approx. 2% of total UK NOx and <1% of total UK PM emissions at a national level
- Generally not considered to be a key contributor to local air quality issue
  - Nonetheless rail’s contribution known to be more significant locally in certain areas, e.g. stations
- Road sector is improving quickly
  - Rail needs to be proactive to maintain its position as one of the most environmentally friendly modes of transport
- Air quality issues known at certain locations within rail
## CLEan Air Research (CLEAR) Programme

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<td><strong>Mitigation</strong></td>
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<td>Where (and why) do we have emissions hot-spots?</td>
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<td>What does AQ look like in key rail locations?</td>
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<td>Worker exposure, depots, onboard trains</td>
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<td>Baseline of Station AQ across network</td>
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<td>Are rail standards sufficient?</td>
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<td>What legislation applies to rail?</td>
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<td>How will AQ improve over time</td>
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<td>What are we aiming for (and by when)?</td>
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<td>Industry modelling capability to improve onboard AQ</td>
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<td>What do we need from mitigation technology and how do we test it?</td>
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<td>What are rail’s external AQ costs?</td>
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<td>How do we incentivise emissions reductions?</td>
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### AQ Strategic Framework - v2
Air quality onboard trains

Pollution on some new UK trains ‘13 times one of London’s busiest roads’

Nitrogen dioxide levels far exceed average recorded on traffic-clogged Marylebone Road, according to a study

- Elevated concentrations of NO$_2$ seen on some rolling stock
- Improvements being investigated
- No current legal limits exceeded
- Review of standards and targets is in progress

Key questions:
- Ongoing monitoring: continuous vs spot checks, and how?
- What about PM level? How to carry out source speciation for PM onboard train?
Air quality in stations

- High level of NO\textsubscript{2} seen at some key stations
  - PM is less well understood
- RSSB is operating a national Stations Air Quality Monitoring Network (AQMNN) covering 105 stations
- Targets, Priority Locations and Air Quality Improvement Plans

**Key questions:**
- Interaction of ambient and internal AQ for enclosed stations, approach for source apportionment study
- Data from AQMN - what academic study can be carried out?
- Deployment and best use of low cost sensors
Abrasions emissions

- **Less well understood** for GB rail
  - Research has been / is being carried out elsewhere (e.g. UIC)
  - Applicability of such research in the UK?

- **Key questions:**
  - Emission rates / emission factors for abrasion emissions from trains in the UK
  - Chemical composition
  - Health effect (if not known)
Summary: key further research areas

- **Onboard trains**
  - Approach for ongoing monitoring: Continuous vs spot checks and appropriate methodology and equipment
  - Further study on PM levels onboard trains, source speciation to differentiate PM different sources, e.g. exhaust/abrasion emissions and human activities

- **Train stations**
  - Interaction of ambient and internal AQ for enclosed stations, e.g. setting up approach for source apportionment studies for representative stations
  - Further academic study making use of the vast amount of data from the AQMN project
  - Deployment and best use of low cost sensors

- **Abrasion emissions**
  - Determination of emission rates or emission factors for abrasion emissions from trains in the UK
  - Determination of the chemical composition of abrasion emissions from GB rail, and their health effects.
Thank you!

- Any other research ideas are welcomed!
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