APRIL Transport group

Meeting at City Hall, London SE1 2AA on Friday 16 March 2018 at 2:00pm.

Present: Finn Coyle (TfL, co-chair), David Hutchinson (Urban Research, co-chair), Rosalind O'Driscoll (GLA), Helen ApSimon (Imperial College), Tim Williamson (Aether), Alison Pridmore (Aether), Gabrielle Galea (PLA), Mark Peckham (Cambustion), Leon Hibbs (Reigate & Banstead BC), Tim Scarbrough (Ricardo), Aidan Farrow (Air Quality Consultants), David Lemon (Independent consultant), Bill Lagassick (LB Southwark), Paul Newman (LB Southwark), Carol Lee (LB Richmond upon Thames), Mino Woo (Imperial College), Alex Ben-Egham (Wood Group), Nick Marlis (LB Tower Hamlets), Riswan Yunus (LB Hammersmith & Fulham), Anna Cane (LB Barnet), Emily Shovler (LB Ealing), Ana Ventura (LB Camden), Tom Parkes (LB Camden), Stefanie Hughes (City of London), David Miles (DfT), Lili Karapetian (DfT), Mike Webley (Enviro Technology), Gill Cotter (Southdowns), Pablo Achurra (Imperial College), Napameth Phantaesak (Imperial College), Andrew Curry (Temple Group), Richard Lane (Temple Group), Zhe Tian (Atkins), and Justin Bishop (Arup).

1 Introductions

Finn Coyle welcomed everyone to the meeting and invited them to introduce themselves.

2 Update from the GLA on current transport projects and policies

Rosalind O'Driscoll, from the Greater London Authority, said that the T-Charge (officially the Emissions Surcharge) now applies within the Congestion Charge zone, and the Mayor's Transport Strategy has been published. This sets out the Mayor's policies and proposals for transport in London over the next two decades. It can be found at: https://www.london.gov.uk/sites/default/files/mayors-transport-strategy-2018.pdf

There are now 100 electric vehicle rapid charging points, with 200 more planned for this year. Two low emission bus routes are now in operation, with three more due to be introduced this year. The Newer Vehicle Checker shows how much NO_X newer cars and vans emit in real-world driving conditions. The Mayor announced in January that he was collaborating with King's College to improve the way the public are warned of poor air quality. King's will directly warn schools, and potentially care homes and GPs' surgeries, of pollution episodes.

3 Research using fast-response emissions analysers on-board a variety of vehicles

Mark Peckham, from Cambustion, began by explaining that his company evaluates and calibrates vehicle engine and after-treatment systems, and also develops and manufactures specialised analysers and other emissions-related equipment. He then explained that the original European Drive Cycle for testing vehicle emissions was a very stylised version of commuter driving in Belgium in 1971. The New European Drive Cycle simply added a higher speed section to the original cycle. This does not reflect current vehicles and driving conditions.

FID (flame ionisation detector) is a technique, originally developed in the 1940s, which is the automotive emissions industry standard method for measuring every single stroke of the engine, showing the immediate effect of transient such as accelerating, breaking and gear changes. A slide compared the real-time FID measured engine-out and tailpipe hydrocarbon emission occurring during a cold start and drive compared to what a conventional bench analyser would show. The latter simply did not show the pronounced but relatively short-lived peak emissions.

Fast response Real World Driving emissions equipment can now be fitted into the boot of a car. The main advantage of this over a standard on-board PEMS analyser is that the response time is 10 milliseconds which, at 30mph, corresponds to travel distance of 14cm whereas the response time of a PEMS analyser is 3 seconds which corresponds to 42 metres travel. Two channels allow both pre- and post-catalyst measurements simultaneously, which enables the catalyst conversion efficiency to be measured as well as allowing easy and accurate correlation with Engine Control Unit. Perfect running conditions for a petrol engine are with air:fuel ratio of

14.7:1. This is known as Lambda = 1. A Lambda <1 is 'rich' (excess fuel) whereas Lambda >1 is 'lean' (excess air). At Lambda = 1 a 3-way catalyst is 99.9% efficient, when the catalyst is hot.

Mark Peckham then showed, with the aid of videos, how events such as speed humps, merging traffic at a junction, a converging bus lane, and joining the M1 affected NO_X emissions from both a Euro 6 Plug-in Hybrid Electric Vehicle and a Euro 5 diesel car over the TfL West London Route. He also showed the results for a Euro 6 diesel passenger car equipped with SCR on a test route in Cambridge during which NO_2 was about half of total cumulative NO_X, with particularly high levels at the start and end of the trip. The overall conformity factor was 2.48.

In conclusion, Mark Peckham said that vehicles were generally getting cleaner, but real-world driving presents unpredictable transients. Fast response analysers can measure these transient emissions and correlate them with other engine parameters. He considered that the observed emissions problems were solvable using conventional means as they mostly appear to be Lambda control related.

4 Shipping emissions in the London context

Alison Pridmore, from Aether, began by explaining that the tidal River Thames is the busiest inland waterway for freight transport in the UK with over 3 million tonnes of cargo moved in and out of its terminals in 2016. There are also around 10 million passenger trips annually. It is important therefore to understand the contribution of shipping to air pollution, particularly in relation to the improving performance by HGVs and buses.

NO_X, CO_2 and PM_{10} emissions data was collected by SGS International from two freight vessels each making two journeys during May 2017, but only NO_X data was collected from a single passenger vessel making one journey. Analysis was undertaken by TNO and Aether. This showed that emissions from vessels on the Thames contributed approximately 1% of total London emissions in 2013, but this varies between pollutants. Freight vessels produce less CO_2, and the same or less PM_{10}, than the equivalent road transport. NO_X may be higher at source but lower at the point of exposure, which was assumed to be at 90 metres. This was true both on the basis of the London freight vehicle mix and an all Euro 6 vehicles fleet.

Tim Williamson, also from Aether, then described the development of the port-wide emissions inventory which covers the whole tidal Thames, including the LAEI area, eastwards to Southend. It was developed by Aether and TNO, with PLA being the main data and expert information provider. The base year is 2016, with back casting to 2013 and 2010 and projections to 2020, 2025 and 2030.

AIS (Automatic Identification System) data provides vessel ID, location, speed and direction whereas LLI (Lloyds List Intelligence) provides vessel characteristics, down to the engine manufacturer. The generic emission factors are modified by individual vessel characteristics including the dimensions, the number, type, age and manufacturer of the engines, and the fuel type. Data on auxiliary engines and the fuel used is one of the significant uncertainties. The projections take into account global shipping trends such as vessel size, efficiency, cargo types and tonnages, and passenger trips. Also current policy measures, such as the fuel quality required in the current North Sea (SECA) Sulphur Emission Control Area) and the NECA (NO_X Emission Control Area) which will come into effect in 2021.

The three resultant reports prepared by Aether and published by the PLA can be found at: https://www.pla.co.uk/environment/Air-Quality-and-Green-Tariff/Air-Quality

5 Date of the next meeting

The next APRIL meeting will be on Tuesday 17 April, from 09:30 to 16:00 at the National Physical Laboratory at Teddington. This will be workshop on low-cost sensors.

The next meeting of the APRIL Transport group is likely to be in June or early July 2018.