Integrating planning, transport and environmental health for better air quality

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Chartered Institution of Highways and Transportation

Challenge and change: Air Quality Conference
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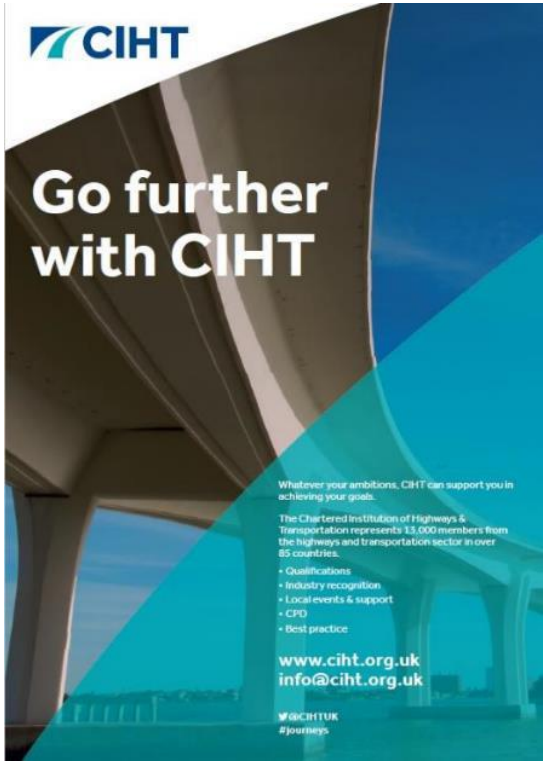
- 14,000 members from across the highways & transportation sector
- 1,000+ members based outside the UK
- 80 Corporate members
- Offers training, information, professional development and support
- Promotes the value added to society by the profession
- Acts as the focused voice on transport infrastructure to Governments and other decision makers

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World-class transportation infrastructure and services
Our Mission
– Be committed to excellence
– Support our members and advance their professional standing
– Inspire lifelong learning
– Generate and share knowledge
– Demonstrate transport infrastructure's contribution to a prosperous economy and a healthy and inclusive society

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An accessible Institution that values diversity and supports all its members and regions

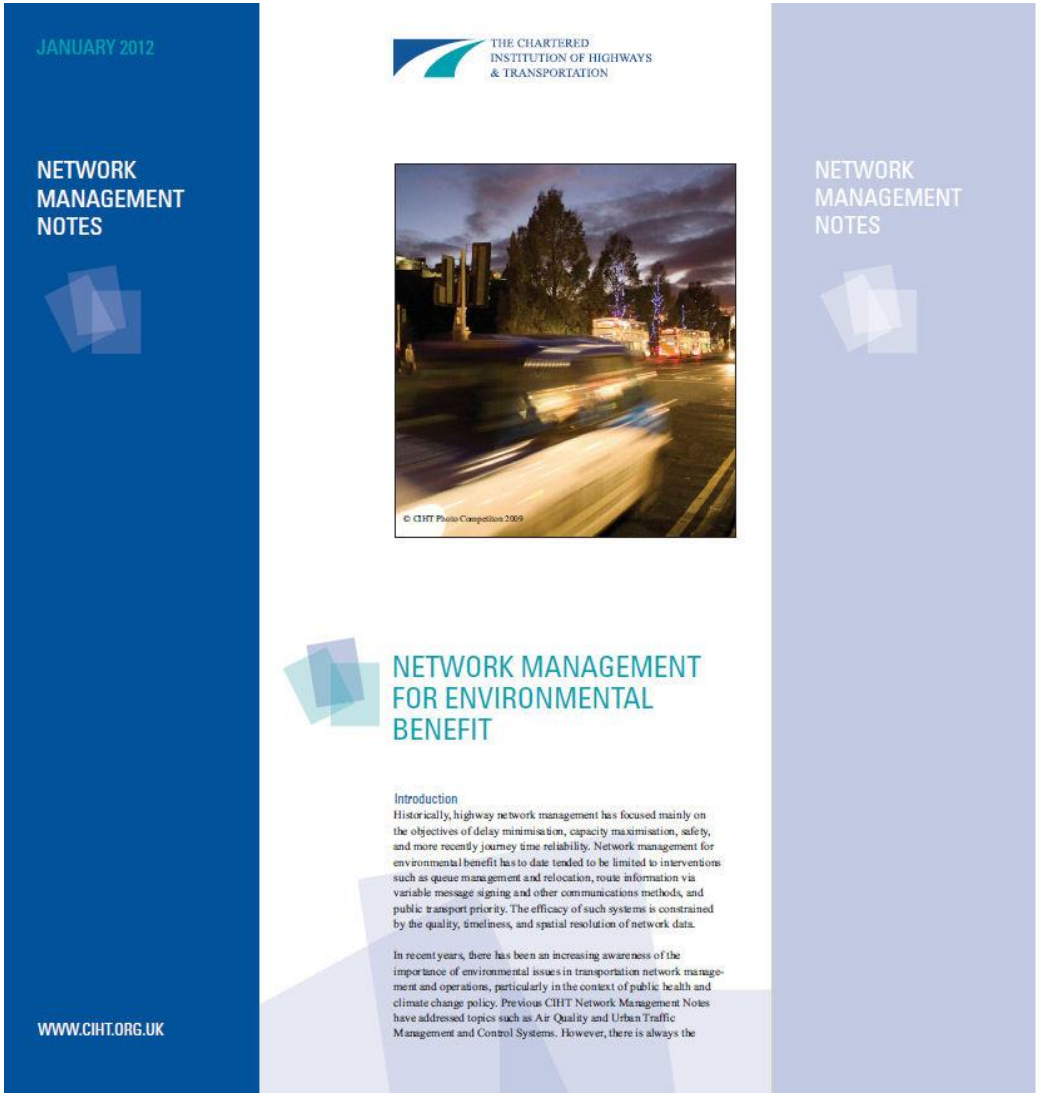
Collaborative

A membership body that engages with stakeholders, supports common interests and seeks to inform and influence decision makers

Progressive

An ambitious and innovative Institution committed to positive change

Network Management for Environmental Benefit


JANUARY 2012

NETWORK MANAGEMENT NOTES

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NETWORK MANAGEMENT FOR ENVIRONMENTAL BENEFIT

Introduction

Historically, highway network management has focused mainly on the objectives of delay minimisation, capacity maximisation, safety, and more recently journey time reliability. Network management for environmental benefit has to date tended to be limited to interventions such as queue management and relocation, route information via variable message signing and other communications methods, and public transport priority. The efficacy of such systems is constrained by the quality, timeliness, and spatial resolution of network data.

In recent years, there has been an increasing awareness of the importance of environmental issues in transportation network management and operations, particularly in the context of public health and climate change policy. Previous CIHT Network Management Notes have addressed topics such as Air Quality and Urban Traffic Management and Control Systems. However, there is always the risk that such issues will be seen in isolation, with traffic engineers dealing with traffic issues, and environmental scientists addressing issues such as local air quality and noise. Emerging technologies, combined with innovative communications and data processing applications, present an opportunity to develop far more sophisticated network management tools for policy makers and network managers. The next generation of network management systems will have the potential and flexibility to internalise all of these multi-disciplinary factors, and so the objective of this note is to facilitate the development of a bridge between these disciplines, and at the same time take the opportunity to provide an update on relevant legislation, guidance, and techniques, which is of course constantly evolving.

The focus of the note is on road network management and operation, and not on planning and construction, although often the location of the demarcation line is not easily determined. The environmental issues explicitly considered in the note include local air quality, greenhouse gases (especially CO_2), and noise, but exclude road safety and urban form / streetscape, these latter issues probably meriting publications of their own.

NETWORK MANAGEMENT NOTES

The Cost of Environmental Damage – Why is it important?

Traffic Congestion

UK legislation such as the Traffic Management Act 2004 and related secondary legislation have placed significant emphasis, through the Network Management Duty, on securing and facilitating the expeditious movement of traffic, and reducing traffic congestion. Estimates of the cost of traffic congestion to the UK economy have ranged widely from £7bn to £20bn per annum depending on methodology and price base (Goodwin 2004). More recently, the Eddington Report estimated the cost to the economy of lost travel time due to congestion to increase by £23-£24bn in future years to 2025 unless mitigating action is taken (Eddington 2006).

Poor air quality = Reduced life expectancy

At the same time, the Department for Environment, Food and Rural Affairs has estimated that poor air quality (in particular manmade particulate matter) reduces average life expectancy in the UK by six months, with equivalent health costs estimated to be £15bn per annum, within the range £8-£17bn (DEFRA 2010).

CIHT working paper produced in January 2012

- Costs of environmental damage
- Congestion
- Air quality
- Noise
- CO_2
- Dieselisation
- Health impacts
- Monitoring
- Interventions
- AQMA's

The Challenge of Emissions Compliance

Emissions compliance proves a major challenge for the UK

Efforts to reduce emissions from vehicle exhausts is proving to be a tough ask as the UK struggles to meet European directives on air quality, says Dr Glyn Rhys-Tyler.

Dr Glyn Rhys-Tyler FCIHT is a consultant and researcher specialising in road transport and environmental impact. He has been a member of the CIHT Network Management & Operations Panel since 2004.

material influence on future developments

Introduction

Greater attention has been placed on the environmental impact of transport in recent years and the fact that poor air quality has a significant negative impact on human health.

The two main air pollutants of current concern from road transport in the UK are nitrogen oxides (NO_x) and particulate matter. This article focuses on NO_x from vehicle exhausts.

NO_x from vehicle exhausts primarily comprises two components: nitric oxide (NO) and nitrogen dioxide (NO_2). From a health perspective NO_2 is of most concern. However NO readily converts to NO_2 in the atmosphere, so to reduce ambient concentrations of NO_2 it is necessary to control emissions of total NO_x.

Road transport is responsible for about 46% of total NO_x emissions in England. However in locations with poor air quality, for example some parts of the highway network, the relative contribution of road transport to the NO_2 air quality problem can be up to 80%. NO and NO_2 emissions are particularly associated with diesel engines.

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The legal context

Legal limit values for nitrogen dioxide in ambient air were defined and adopted in European legislation (Directive 99/30/EC) in April 1999.

These include a one hour mean limit value for the protection of human health of 200 µg/m³ not to be exceeded more than 18 times a calendar year and an annual mean limit value for the protection of human health of 40 µg/m³. Both limit values were to be met by member states by 1 January 2010.

However a review in 2005 had shown that compliance with the Directive would be difficult for a significant number of member states. A new Directive 2008/50/EC was adopted which, while keeping the limit values unchanged, introduced the possibility of extending the compliance date by up to five years (to 1 January 2015).

In addition the Directive imposed a general duty on member states to prepare 'air quality plans' for areas where the limit values were not met. Directive 2008/50/EC was made law in England through the Air Quality Standards Regulations 2010.

The problem

Despite the fact that air quality legislation was introduced in 1999 and that European governments have had 16 years (to date) to take remedial action the problem of NO_2 pollution in ambient air persists.

In September 2011 the UK Government produced projections for ambient NO_2 concentrations and published expected dates for compliance with the legislated annual mean limit values. For the purpose of air quality assessment and compliance reporting the UK is divided into 43 geographic zones. The September 2011 projections indicated 27 zones would be compliant by 2015, 42 compliant by 2020 and all 43 compliant by 2025.

However in July 2014 the UK Government published updated projections which indicated that only five zones would be compliant by 20 2030. The remai London Urban / Area and West Y not be compliar

The UK Government has stated that one of the reasons for the worsening position is the failure of the European vehicle emission (Euro) standards to deliver the expected reductions in emissions of oxides of nitrogen from diesel vehicles.

The UK Supreme Court ruled in April 2015 that the Government had failed to meet its legal obligation to comply with the NO_2 air quality limit values contained in Directive 2008/50/EC and must submit new air quality plans to the European Commission no later than 31 December 2015.

Local air quality and road transport in practice

In 2012 surveys of real world vehicle emissions were carried out in the London Borough of Ealing using roadside remote sensing techniques. The surveys permitted the quantification of both NO and NO_2 emission rates from different groups

> "It remains to be seen whether the recent revelations of the use of emissions testing 'defeat devices' by Volkswagen will have a material influence on future developments in the market or regulations."

reductions in air pollution within a local authority area.

Euro 5, to 0.46 g/kW.hr at Euro 6.

transport emissions will necessarily form

The introduction of the Euro 6 emissions standard

The new Euro 6 emissions standard for light vehicles came into force on 1 September 2015 for the registration and sale of passenger cars in the EU. The new emissions standard reduced the type approval test limit for NO_x from diesel

Roadside remote sensing techniques are used to survey vehicle emissions

> The challenge is complex, involving issues of science, technology, economics, social equity and public health and will require cross disciplinary solutions.

CIHT Transportation Professional article published in October 2015

What are we trying to achieve?

Legislated 40µg/m^3 NO_2 limit values?

Or wider public & environmental health?

The Draft UK Air Quality Plan for tacking NO_2

"Impact on Public Health -

Poor air quality is the largest environmental risk to public health in the UK. It is known to have more severe effects on vulnerable groups, for example the elderly, children and people already suffering from pre-existing health conditions such as respiratory and cardiovascular conditions. Studies have suggested that the most deprived areas of Britain bear a disproportionate share of poor air quality." (page 3)

The range of potential interventions……

Table 3.4: Short-listed options to reduce NO_x emissions	
Option	**Description**
Clean Air Zones (CAZs)[39]	A geographically defined area bringing together immediate action to improve air quality. CAZs can include a charging element for vehicles that enter that do not meet the required standard.
Clean Air Fund (CAF)	A clean air fund could provide financial support for Local Authorities to fund local measures such as implementing sustainable transport strategies.
Scrappage	National targeted car and van scrappage scheme that would incentivise the move to a cleaner fleet; increasing turnover by targeting the removal of the oldest and dirtiest vehicles.
Retrofit	Providing national support for the installation and operation of abatement equipment on existing buses, taxis, and heavy goods vehicles.
Ultra Low Emission Vehicles (ULEV)	Providing additional support to purchasers of Ultra Low Emission Vehicles (ULEV).
Tax	Adjusting vehicle excise duty, fuel duty and company car tax to create incentives towards less polluting vehicles. This is a reserved matter for the Treasury and will be assessed independently of this exercise.
Speed limits	Reducing speed limits on motorway links that are not complying with the legal air quality obligations.
Government buying standards for transport (GBS-T)	Expanding the use of GBS-T[40] to include emissions of NO_x and PM.
Vehicle labelling	Reflect air quality performance of vehicles on their labelling to allow consumers to make decisions that are more informed.
Influencing driving style	Encouraging less polluting driving styles through reducing aggressive driving.
Government independent assurance	Establishing a body to review and support the delivery of air quality improvements. This is not a measure that would in itself deliver air quality improvements and so is not analysed in this report.

Table 3.4 from Technical Report (May 2017)

Issues to consider:

- Managerial
- Behavioural
- Technological
- Land use planning / urban design
- Fiscal

Timescales for implementation.

Need for an holistic approach. For example….

THINK Road Safety

Climate change / CO_2

Air quality

Risks of target fixation / tunnel vision.

…Unintended consequences

Transport and Health

Whilst increased aerobic activity can increase exposure to pollutants such as PM and NO_2 (and potentially traffic mortality), current research evidence indicates that any increased risk is more than offset by the large benefits gained from active travel in a typical UK context.

In the UK, active travel is generally always going to be beneficial.

And of course, it's a virtuous circle.

See recent research by Dr Audrey de Nazelle and colleagues at Imperial College.

Uncertainty (Example 1) – Consumer Behaviour

Vehicle labelling scenarios vs observed consumer behaviour

The Technical Report (May 2017) includes a vehicle labelling scenario.

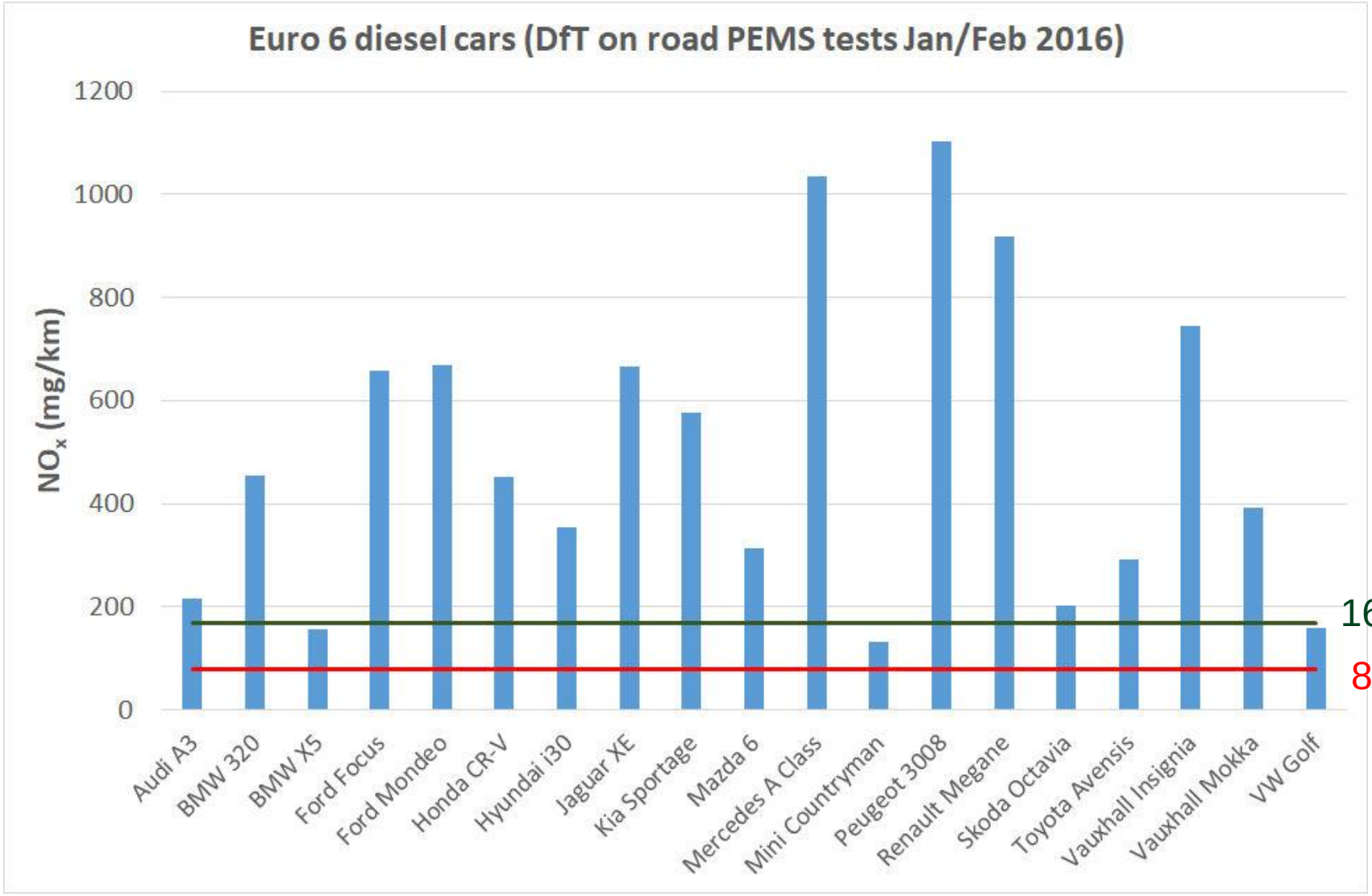
Scenario A assumes a **0.5% shift** in purchasing decisions from new diesel cars to new petrol cars from April 2018;

Scenario B assumes a **1% shift**.

*But, according to the latest available data from SMMT, the diesel passenger car market share (new car registrations) declined from **47.5%** in June 2016, to **42.5%** in June 2017 (i.e. a -**5% shift**).*

Consumers appear to be already responding to information in the public domain, and changing their purchasing decisions accordingly.

Uncertainty (Example 2) – Vehicle Emissions

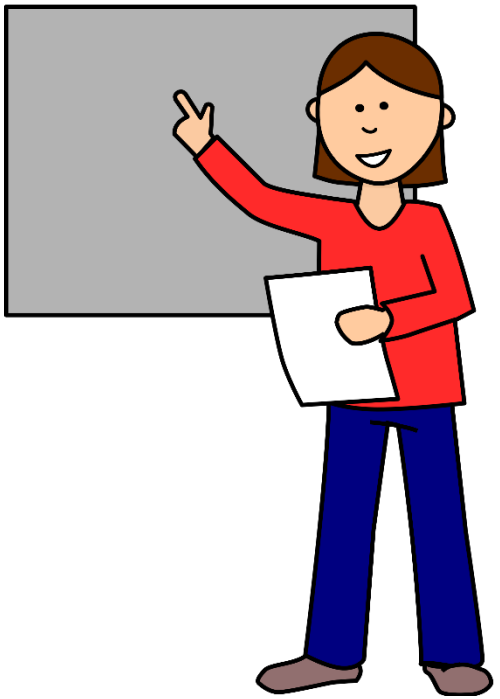


Note: Emission results sensitive to ambient temperature

The importance of effective and systematic monitoring (Air Quality & Vehicle Emissions)

People, experience, skills and capacity

- Do we have people with the right skills to deliver?
- Cross disciplinary knowledge required to solve cross disciplinary problems;
- Local authority budgets generally under significant pressure;
- This may place significant pressures on staff to deliver the required schemes and initiatives;
- Training and staff development will be important.



The role of professional institutions

- Stakeholder collaboration and engagement; inform and influence;
- Proactive engagement with membership;
- Facilitating and encouraging science and research;
- Recognise excellence;
- Facilitate / organise professional development events;
- Cooperate and collaborate with like minded institutions.

Conclusions

- Complex, cross disciplinary challenges, requiring innovative cross disciplinary solutions;
- Need to be clear about what we are seeking to achieve (objectives);
- Requires a ‘joined up’ approach from government at all levels;
- Requires an holistic approach to policy development (avoid the mistakes of the past);
- Identify and manage uncertainty;
- Ensure that appropriate and systematic monitoring is in place;
- Support and develop your people.

Thank you for listening

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