Improving Air Quality and Reducing Transport Related Pollution

Air quality and pollution related medical complaints in the UK are definitely one of the latest 'hot topics' for many industry commentators and media as they reflect on the impact such issues are having on the health of the nation.

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While this is certainly a long term problem that has been worsening for many years, it has really only drawn close attention – and media headlines - since the cocktail of man-made pollutants and Saharan dust hit the country in early April. More recently diesel used in road transport has emerged as possibly the major cause of some of the more serious elements, particularly harmful particulate matter and a range of other noxious elements.

But while much is said and written about the dangers to public health, few commentators have looked beyond the negatives to see what possible solutions there might be and to lend weight to encourage their greater adoption.

Driven by concerns that we are not meeting critical air quality standards, over which the EU has already launched legal proceedings against the UK, much has been made of the government's proposals to implement 60 mph speed limits at some locations on our motorways in an attempt to reduce emissions from the hundreds of thousands of vehicle using these stretches of the network daily.

For the transport world, this is not a new challenge. Design and technical innovation are generally delivering performance enhancements across the board, with Euro 6 vehicles being deployed that represent excellent improvements in air quality emission performance along with electric and hybrid vehicles proving most promising at the lighter end of the spectrum. However, at the heavier end containing the nation's fleet of heavy goods vehicles (HGVs), there exists a conundrum of maintaining efficiency levels while improving air quality emissions and balancing against CO_2 emissions. Perhaps this, the CO_2 benefits, is where the real problem lies – and where the next big step change will only really come from vehicle conversions to run on lower emission gas fuels, either as dedicated gas or with expansion of existing dual-fuel fleets.

Although only representing one per cent of UK road vehicles, HGVs produce a disproportionate 17 per cent of the carbon emissions from UK road transport and a significantly higher proportion of the more dangerous particulate matter and other noxious elements.

Many transport haulage fleet operators recognise the need to make substantial cuts in their carbon emissions. As the UK government's Low Carbon Emissions Task Force has recognised, this requires increased availability of low carbon fuels such as biomethane - a second generation bio-fuel (i.e. waste derived) and not from a crop based source. No other fuel currently exists in commercial quantities for this size and weight of vehicle that can be sustainably produced to meet this need, including natural (fossil) gas, although this does constitute a valuable role in the mix with biomethane as long as the biomethane content in the mix is sufficiently high.

The heavier loaded and longer distance HGVs which tend to use the most fuel and therefore create more carbon emissions need this biomethane in liquefied (LBM) rather than compressed (CNG) form in order to be able to achieve their driving range requirements. Substantially reducing these emissions will contribute significantly to the UK's overall carbon reduction commitments and, because so much of the technology required to produce and use biomethane in this sector is currently British, it should also drive economic growth.

Over the last 10 years, Gasrec has pioneered the use of liquefied

UK Focus - Air Monitoring

The UK's first Bio-LNG open access station opened last year and is now delivering over 1000 truck fills per week

biomethane as a transport fuel and is now the largest supplier of liquefied gas fuel to the road transport sector. The company currently supplies more than 60 per cent of gas powered HGVs on UK roads and operates 11 refuelling stations around the country. It also secured European funding at the end of 2013 to build a further four in the UK and two mobile stations in continental Europe.

The company owns and operates its own biomethane liquefaction plant – supplied by sustainable landfill gas – and owns a fleet of road tankers which deliver to its refuelling stations.

Its product, Bio-LNG, is a blend of liquefied biomethane with conventional (fossil) LNG and today it supplies, installs and manages open access and customer dedicated on-site refuelling facilities for its many transport customers, which include Sainsburys, B&Q, DHL, Waitrose, Tesco, the Stobart Group, Kuehne + Nagel, Arla Dairies and Muller Wiseman.

What are the Advantages of LNG and Bio-LNG?

The simple answer is that both LNG and Bio-LNG are much cleaner and also less costly than diesel.

Firstly, LNG in its pure fossil form produces about 12% less of the greenhouse gas, CO_2 than diesel. Premium Bio-LNG, where the bio component of the fuel is at just 15%, produces 25% less CO_2 than diesel. Where the bio content of the Bio-LNG blend is higher, CO_2 savings can reach as much as 70% versus diesel. There is no other current transport fuel or technology that can be deployed today that reduces CO_2 as cost effectively.

Secondly, SOx and NOx emissions, the harmful gases that contribute to ozone depletion and smog in urban areas, are reduced by a staggering 85-95% versus the use of diesel fuel. While both LNG and Bio-LNG perform well in this respect, the bio-fuel is once again cleaner than fossil LNG. This aspect of poor air quality is strongly linked to the sharply rising incidence of asthma, bronchitis and emphysema particularly in the vulnerable young and old age groups in our cities.

Thirdly, emissions of soot or particulate matter from diesel engines, are practically eliminated by using LNG or bio-LNG in place of diesel fuel. Taken together with SOx and NOx emissions, it is difficult to exaggerate the human cost of the failure to address poor air quality across the country. Added to human suffering is the economic cost of lost time at work or school due to respiratory conditions and of course the direct cost to the NHS of treating these conditions.

Fourthly, there is the matter of noise. Vehicles with gas engines, particularly heavy vehicles such as HGV's, buses and refuse trucks, are much quieter than diesel-powered equivalents. Quite apart from reducing the general nuisance of ambient traffic noise, the major benefit of lower engine noise almost certainly resides in the enabling of more deliveries of goods during night time hours. Shifting deliveries to the night time will reduce day time congestion and, potentially deliver a knock-on benefit in terms of improving the road safety for vulnerable groups such as cyclists by reducing their exposure to HGV traffic.

Finally, and of critical importance, both LNG and Bio-LNG are cheaper than diesel and for that matter, much cheaper than other clean fuel solutions such as electric vehicles. The economics of purchasing a vehicle with a gas engine or converting a diesel engine to gas are compelling particularly for heavy loaded and high mileage vehicles.

Favourable economics are underpinned by two fundamentally important facts.

- Firstly, gas is abundant and is significantly cheaper than oil. Gas is predicted to remain cheaper than oil for the foreseeable future, and:
- Secondly, the fuel duty charged on gas is only half that charged on diesel. The Government has realised the many benefits of gas use in transportation and have helpfully frozen the favourable duty differential for gas versus diesel for the next ten years. This action has guaranteed the favourable cost advantage of gas versus diesel fuel for the next decade.

Liquid LNG and Bio-LNG are Both Very Safe.

Gas used for vehicle fuel is transported as a very cold liquid in specially constructed cryogenic road tankers. It is delivered to bunkering sites or service stations and sold either as a liquid from a pump similar to a diesel dispenser or, "re-gassed" and sold as a compressed gas from a similar dispenser. The cold temperature and intrinsic properties of the fuel mean that the product is less volatile than other commonly used fuels and is therefore very safe when handled in the proper manner.

Other countries, where gas has been used as a transportation fuel for longer and on a much larger scale than hitherto in the UK, have experienced an excellent safety record in both the transportation and dispensing of gas at the point of sale.

Is LNG and Bio-LNG Available?

Today, only relatively small amounts of LNG are available for road tanker loading in the UK at National Grid's Avonmouth storage and liquefaction terminal. These supplies are supplemented by imports from larger LNG terminals located in Zeebrugge and Rotterdam. This situation is however about to change.

The UK already has three world scale LNG import terminals. The Isle of Grain terminal, situated in the Thames estuary just 40 miles from central London, is the largest LNG facility in Europe and it will commission road-loading facilities by the second quarter of 2015. It is likely, that as demand grows for LNG as a road fuel, road-loading facilities will be added to the two massive LNG import terminals located at Milford Haven. LNG supply is thus plentiful and assured for the long term.

Presently, Gasrec operates the only source of UK liquefied biomethane from a large landfill site at Albury in Surrey. This facility has the capacity to produce approximately 5,300 tonnes of liquid biomethane per annum (equivalent to around 20 million litres of diesel at a standard bio-LNG blend). However more bio-gas and bio-LNG for transportation fuel will certainly be produced from other landfill sites, anaerobic digestion facilities and sewage plants as demand for the fuel grows and as end users commit to off-take contracts which will help underwrite the capital investment required to bring these plants on stream.

What is really needed is for the significant industry and media attention on this subject to be re-focussed on the need to encourage faster development of a strategic supply network of biomethane filling stations across the motorway network, and the faster conversion of the country's commercial HGV fleet to operate on dual-fuel or gas only. Such encouragement could really bring very real and rapid benefits to the health of the nation.