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What is Air Quality?

Historic Trends in Air Quality

The introduction of the Clean Air Acts of 1956 and 1968 were responsible for bringing about significant improvements in air quality across West Yorkshire, reducing the smoke and sulphur dioxide pollution created by the burning of coal at industrial premises and on domestic fires. The acidic gases and mixture of smoke and fog (smog), particularly during winter, had previously led to increased hospital admissions for those already in poor health and poor visibility for those people who had to venture outdoors.

By the end of the 1970s, urban air quality has changed in nature to become dominated by emissions of petrol and diesel engines used to power road transport. Although technological improvements continue to reduce pollution levels, nitrogen dioxide and microscopic particles (known as PM_{10} particles) are now the main pollutants of concern. While atmospheric visibility has greatly improved, photochemical smogs produced by reactions of these and other pollutants in sunlight during hot summers can reduce visibility and result in the formation of ozone at ground level.

Factors that Affect Air Quality

Many factors affect local air quality, the most important are related to transport emissions and are listed below:

Weather conditions: Poor dispersion of air pollutants, caused by temperature inversions or low wind speeds can cause pollutants to become trapped in lower atmosphere resulting in poor air quality. Much better mixing and dilution of the pollutants occur with high wind speeds.

Traffic Flow Characteristics: When traffic flows become congested with frequent stop/start movements, vehicle emissions can be greatly increased and can lead to local air quality problems.

Traffic Composition: Emission factors for vehicles will depend on vehicle class and engine type (HGV, van or car), fuel type and Euro standard (permitted emission rates for vehicle type and age).

Background Concentrations of Air Pollutants: Urban areas will contain higher levels of background pollutants, due to increased traffic densities, congestion and associated vehicle emissions.

Rural and Urban Topography: Valley bottoms and contained street canyons can affect the dispersion of emissions, sometimes leading to elevated concentrations of pollutants. However, on windy days the orientation of valleys and street canyons can induce funnelling, leading to greater dispersion of pollutants.

Heat Wave Conditions/Climate Change: During heat wave conditions, photo-chemical reactions can modify road traffic emissions and produce acidic particulate matter and low level ozone, in areas downwind of conurbations. The frequency of heat wave conditions is likely to increase with climate change.

Legislation

The National Air Quality Strategy (NAQS) 2007 is the UK's response to enact the EU Air Quality Directives that place responsibilities on all Member States. The Strategy describes health based standards and objectives for 10 different air pollutants.

Further information on NAQS

Further information on EU Air Quality Directives

Urban Air Quality Monitoring

A comprehensive audit of air quality has been instigated by the requirements of the NAQS. Each Local Authority within West Yorkshire has performed a combination of air quality monitoring and modelling, to enable comparison against relevant air quality standards.

Follow links below to view air quality monitoring graphs:

Monitored Nitrogen Dioxide Levels in Urban Areas (17kb pdf)

Monitored PM_{10} Levels in Urban Areas (16kb pdf)

Related Links:

Local Authorities Air Quality web pages include monitored air quality monitoring data and explanations of the pollutants of concern.

Follow the links below for further information:

Leeds
Kirklees
Bradford
Wakefield
Calderdale

Air Quality Auditing Process

All West Yorkshire Local Authorities used a combination of real-time air quality monitoring equipment and diffusion tubes to monitor air quality at specific sites across their Districts. In order to audit air quality across whole of West Yorkshire and for future years, air quality dispersion models were used by each Local Authority.

For full details of each Local Authorities air quality monitoring regime follow the link below:

West Yorkshire LTP2 2008 Progress Report Section 2: Air Quality Update (Draft) (53kb pdf)

Air quality dispersion models require details of pollutant emission sources, which form the emission database. This database includes detailed information regarding traffic flow characteristics and from industrial emission sources. This information was used to help predict air quality across West Yorkshire.

For maps of pollutant concentrations for PM_{10} (Particulate matter), NOx (Oxides of nitrogen) and NO_2 (Nitrogen dioxide) follow the links below:

For map depicting PM_{10} levels (4.5mb pdf)
For map depicting NO_x levels (4mb pdf)
For map depicting NO_2 levels (4.5mb pdf)

For further information on predicted background pollutant concentrations

Air Quality in West Yorkshire

Under the NAQS Review & Assessment process, all Local Authorities have identified air quality concerns specific to their district. In cases where relevant air quality standards & objectives are at risk of exceedance, Air Quality Management Areas (AQMA s) have been declared. In other cases, Areas of Concern (AoC) have been established where the air quality audit process has identified potential problems, but need further evidence to quantify whether an AQMA should be declared. So far, all AQMA s have been associated with high background levels of nitrogen dioxide from road transport.

Map of AQMA's and AoC can be found in the link below:

West Yorkshire LTP2 2008 Progress Report Section 1: Air Quality Update (Draft) (212kb pdf)
