MODELLING FOR URBAN ENVIRONMENTS AND CITY PLANNING

The air quality in cities can be complex, depending on the infrastructure and the numerous emission sources. This is why calculation models are useful tools for city planning in regards to air quality. We offer several services within modelling of air quality in urban environments, in which field we work with a large range of issues; from advanced three dimensional models for calculations of dispersion of air emissions in street canyons to empirical models for estimations of urban background concentrations.

Dispersion calculations can be used for simulation of city, block or street canyon environments. Many issues can be treated using dispersion modelling, for example:

- How is the ventilation and pollution level affected by densification of the city?
- What is the best location for building a wind turbine in an urban environment?
- Where should urban vegetation be placed and what type of vegetation is best suited to increase comfort and optimize effect on urban air quality?

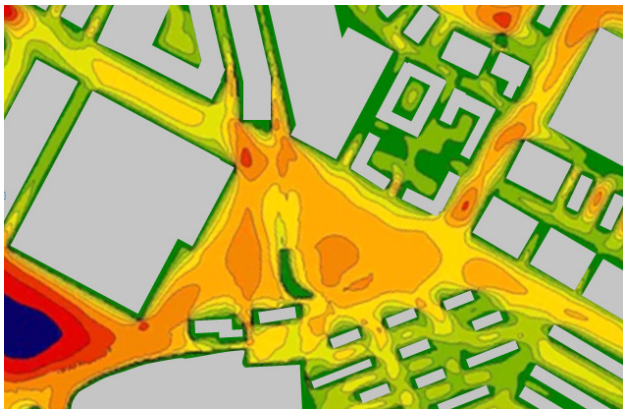
The models can also be used for simulation of various measures, such as redirection of traffic, erecting noise barriers and so forth.

Emission sources that can be modelled using dispersion models range from one single point source to all emissions associated with for example road traffic. Combinations of different emitted pollutants can be calculated simultaneously and the dispersion models also take into account chemical processes, such as the formation of ozone, which can arise as a consequence of the emissions.

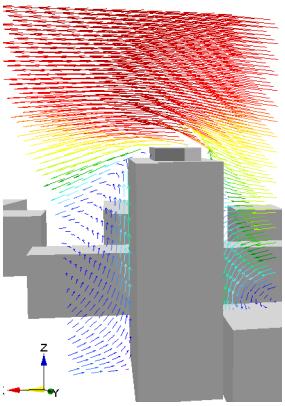
In models such as MISKAM, buildings and street canyons can be modelled in three dimensions, and the wind flow and dispersion of pollutants can be simulated with a high space and time resolution. If modelling of a larger geographically area is desired the TAPM model, a three dimensional meteorological model, is to be preferred.

All issues do not call for dispersion modelling. Based on air quality measurements within the Swedish urban air quality network, IVL has developed an empirical model for somewhat coarser estimations of the urban level of nitrogen dioxide and particles, named the LUR model (Land Use Regression). The model includes a geographical distribution of pollutant levels. Hence, it takes into account the fact that pollutant levels are not equally distributed in a city but decreases in relation to the distance from the city centre based on population density. This model can be used for general calculations of exposure of nitrogen dioxide and particles, which the city population are subjected to.

More information on our models is included in the information sheet regarding modelling tools.



Simulated pollutant dispersion in an urban environment.



Three dimensional wind flow around a skyscraper.

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