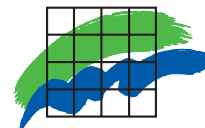


AIR POLLUTION

From emissions over dispersion to impact assessment:

- Regulation
- Monitoring
- Modelling
- Enforcement



A Joint Venture covering all aspects of air pollution engineering and research

Denmark's two leading institutions in the field of Air Pollution Engineering And Research have joined forces in order to offer a highly skilled and versatile support to international clients in all fields of air pollution. Both the National Environmental Research Institute (NERI) and dk-TEKNIK ENERGY & ENVIRONMENT are appointed by the Danish EPA as National Reference Laboratories and have about 40 years of experience within research and development in the field of air pollution.

About NERI

The National Environmental Research Institute (NERI)/ Danmarks Miljøundersøgelser (DMU) is a research institution under the Ministry of the Environment, responsible for acquiring knowledge building by research, monitoring and consultancy regarding the environment. Air pollution is one of the main subjects, where NERI investigates and describes the complex relationships between emissions of harmful substances and their impacts on humans and environment. This task is carried out in collaboration with both national and foreign institutions as well as international organisations. NERI has representatives at expert level in a number of national and international organisations re. Air pollution (EU, EMEP, etc.). The total number of employees at NERI is 440.

About dk-TEKNIK ENERGY & ENVIRONMENT

dk-TEKNIK ENERGY & ENVIRONMENT was founded in 1918 and is a non-profit, self-governing applied research organisation, approved as an "Authorised Technological Service Institute" by the Danish Ministry of Science, Technology and Innovation. As such dk-TEKNIK's task is to build a bridge between research and industry in order to promote the development and use of new technology, management and market knowledge and promote innovation in companies.

Air Pollution is one of dk-TEKNIK's main areas of work, and dk-TEKNIK conducts consultancy, research and development within Air pollution and its sources, including measurements and assessment of fuels, combustion processes and residues. dk-TEKNIK is accredited by DANAK in the fields of air emissions, air quality and odour measurement. Dk-TEKNIK participates in a number of expert groups at National and International level, e.g. CEN, ISO and DS working groups on air pollution. The total number of employees at dk-TEKNIK is 157.

From source emission over dispersion to impact assessment

Air pollution is a complicated phenomenon that starts with emission of polluting compounds from a series of sources. Emitted compounds are dispersed, and sometimes also transformed, in the atmosphere, before they are deposited and have unwanted impacts. A rational abatement requires knowledge of all links in this chain. This knowledge is covered at all levels in the NERI & dk-TEKNIK joint venture.



Emission monitoring

dk-TEKNIK has extensive experience in all aspects of emission monitoring and has performed emission monitoring for private and public clients for more than 40 years and holds an accreditation in this field.

The Danish EPA has assigned dk-TEKNIK as the Danish Reference Laboratory for monitoring of air emissions to the atmosphere. The overall scope of the Reference Laboratory for Air Emission Monitoring is to improve the quality of sampling and necessary laboratory works in Denmark within air emission monitoring. This is achieved by dk-TEKNIK through technical assistance to laboratories, enterprises, authorities and the Danish EPA. Furthermore, the Reference Laboratory assists the authorities and the Danish EPA in regulatory legislation.

Emission inventories

As the National Reference Center for Air Emissions under EEA, NERI is responsible for the elaboration of the Danish emissions inventory. The results are reported internationally to the Climate Convention, the Convention on Long-range, Transboundary Air Pollution and EU. Inventories are worked out for acidifying and eutrifying compounds, heavy metals, particles, PAH's and greenhouse gasses covering essentially all sources. The results are used both nationally and internationally in the efforts against air pollution and to evaluate if reduction targets are fulfilled and emission ceilings are met.

NERI develops projection models for acidifying and eutrifying compounds, and greenhouse gasses. The models are used to estimate the effects of various emission reduction measures and as a guidance to find the most cost-effective strategy to meet the emission ceilings.



Modeling air quality and human exposure

NERI has developed a number of mathematical models for dispersion, conversion, and deposition of air pollution on a local scales up to global. Many of these models are now standard tools for monitoring and regulating air quality in Denmark. The models can be used to assess the air pollution from industries and power plants and for evaluation of the impacts of various regulatory actions. Finally, models are important tools in the understanding of the physical and chemical processes in the atmosphere governing the air quality.

NERI has developed a human exposure modelling system based on geographical information systems (GIS) that are able to calculate exposure at address level and at a given route.

NERI continuously develops new models, combine models for air quality with other models and construct large decision support systems.

dk-TEKNIK and NERI have co-operated in the field of dispersion modeling for more than 30 years.

Air quality monitoring

As the institution responsible for the National Ambient Air Monitoring Network in Denmark, NERI continuously monitors the air pollution, and operates the nation-wide air quality monitoring networks in urban and rural areas. The monitoring networks are in accordance with the EU requirements and obligations to other international conventions. NERI is national reference center for air quality and delivers Danish data and reports to the international organisations. The measurements are carried out by accredited methods. The monitoring network is equipped with modern automatic measurement instruments and online presentation of data at the Internet available for the public. The assessment of the air quality is strongly supported by application of NERI's air quality models.

dk-TEKNIK also holds an accreditation in the field of ambient air monitoring and co-operates with NERI in monitoring campaigns in Denmark, and in international activities covering the implementation of air quality networks, including all stages from assessment of needs to procurement and training.

Fine particles - PM2.5 and PM10

In recent years there has been increasing attention on impacts of particles on human health. NERI and dk-TEKNIK have extensive activities in this field. Activities comprise of field studies of the size distributions and chemical properties of particles from different sources, determination of contributions from different types of sources (traffic, residential heating, long range transport, industries etc.), measurements of source emissions, emission inventories for particles and development of particle modules for NERI's air quality and exposure models. The activities include PM10, PM2.5, ultra-fine particles as well as other particle parameters.

Examples of NERI research studies are investigations of the influence of fuel quality and engine technology on the emission from petrol and diesel vehicles, of indoor particle pollution as a consequence of the outdoor pollution, and investigations of the relationship between hospital admissions and the pollution with ultra-fine particles.

Deposition

NERI measures the deposition of a number of air pollution compounds by collection of samples at 8 monitoring stations placed in rural areas in Denmark. The results are included in both national and international surveillance of nature and environment.

Integrated Air Pollution Forecasting and Scenario Management System

NERI has developed a comprehensive and unique integrated air pollution model system. The system is capable of accurate and high resolution three-day forecasting, monitoring, assessment and management of air pollution from hemispheric scale to European scale, urban background, and down to individual streets. The system is used for information, to warn the public of high air pollution levels, and for policy management of many different chemical compounds in periods, where the concentration can exceed limits set by international institutions (EU and WHO). The system can be applied operationally throughout the world. Further information: <http://thor.dmu.dk>. NERI provides hourly updates of measurement results on the Internet (www.luft.dmu.dk).

Pesticides in the air

When agricultural fields are treated with pesticides, a part may be transformed to gasses or bound to particles in the air. They may thus be transported over long distances. NERI investigates the concentrations in the air and precipitation and develops models for atmospheric transport.



Environmental assistance

NERI and dk-TEKNIK have developed expertise in environmental assistance to countries in Eastern Europe, Africa, and Asia. Assistance is given on assessing air quality in other countries, establishing and operating air pollution measurement programs, laboratories and measurement methods, use of models, and action plans for technical and administrative procedures. EU, UN, DANIDA, DANCED or DANCEE fund the projects, and they are carried out in co-operation with other institutions and private consulting companies.



Services rendered

- Assistance to the establishment of a Reference laboratory for measuring air emissions
- Assistance to the establishment of a Reference laboratory for measuring ambient air pollution
- Assistance to implementation of standard operating procedures needed for obtaining accreditation of measurements used in monitoring programs
- Training and capacity building within the field of, model calculations, and assessments of air quality in accordance with EU directives on air quality
- Assistance in the establishment of Air Quality Management systems
- Assistance in the establishment of prognoses for ambient air pollution

Further information

NERI and dk-TEKNIK contribute to national and international journals. They further publish reports with scientific and technical results, and in addition more popular reports and books. For details see: www.dmu.dk and www.dk-teknik.com

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