



Emission distribution of particles less than 1 micron in Europe (2005) with key sources like roads, shipping routes and urban centres clearly visible. Point sources are also discernible. They include drilling platforms in the North Sea with their burn-off particulate emissions. The total emission of particles of less than 1 micron in Europe is estimated at 600 million kg annually.

Illustration: TNO

Emission modelling produces more accurate predictions

We've known for some time that particulate matter and heavy metals like lead and copper in the atmosphere can be harmful to humans, animals and the environment. But for the first time we are able to identify this very accurately, and to link cause and effect. With detailed geographical emission maps of just a few square kilometres, for example.

A good particulate matter policy requires plenty of research, for instance, into the components that make up the particulate matter 'repository' or how much of this matter and other substances get into the atmosphere and where exactly. When we know this, we can predict the air quality using models and tackle (the policy of) emissions, both nationally and pan-European.

Emission research and air quality predictions are nothing new. The difference lies, according to TNO project leader Dr Hugo Denier van der Gon, in the today's models that have the benefit of much greater resolution. Not so long ago the European standard was still 50 x 50 km; it's now closer to 5 x 5 km. This makes it possible to be much more accurate in predictions. For areas of 5 x 5 km an even 1 x 1 km, which will be able to pinpoint the perpetrator of environmental harm (the emission) with real

accuracy. These emission maps are actually 'cause maps'. They reveal, for instance, that on a European scale residential wood combustion for heating is a much more substantial source of particulate matter than previously thought.

ULTRAFINE PARTICLES

'We still have only limited research on ultrafine particles,' Denier van der Gon says. 'These particles are nanoscale, less than 100 nanometres in diameter. Due to their numerous quantity and ability to penetrate deep within the lung, ultrafine particles are a major concern for respiratory exposure and health. Those small particles are also central to climate research since they are involved in cloud formation. We are now working really hard on an emissions map of ultrafine particles in Europe. We will be the first to compose such a map and will be supplying it to leading research groups

throughout Europe.'

Ultimately it's about the quantity of environmental pollutants, where and when they occur. The distribution models reveal cause and effect, thereby forming the basis for specific environmental policy at both national and European level so that the targets set by Brussels, for example, can be met and, at the same time, do so in the most cost-efficient and effective way.

CLOSE COLLABORATION

There is much international interest in the TNO's emission predictions, especially given that the Netherlands leads Europe in this respect. Denier van der Gons explains. 'We have always modelled emissions, so we have accumulated plenty of knowledge. And our modellers and researchers work very closely together on, in this case, emissions. This enables the findings to effortlessly go from one to the other and adjustments to be made quickly. We can find new routes because we know where the needs lie. And that makes us such a leading player.'

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