



# Tools for assessing emissions and urban air quality abatement studies

Harold Mc Innes, Hildegunn T. Blindheim Jablonska, Bodil Innset og Herdis Laupsa  
Norwegian Institute for Air Research (NILU) • www.nilu.no

## AirQUIS is a system for air quality management developed by NILU.

The system has functionality for collection and statistical evaluation of data from monitoring stations, a module that provides a user-friendly way of treating emission data as well as models for calculating emissions, wind fields, dispersion and exposure. The integrated Geographical Information System (GIS) platform provides



easy access to the data and gives a user-friendly and understandable data presentation tool. New functionality has been implemented in AirQUIS in order to provide efficient ways for assessing emissions and studying air quality abatement.

Project	Region ID	Consumption	Emission
OSLO_2003_TUEM	3013816	0.000	0.389033
OSLO_2003_TUEM	3013701	0.000	0.448311
OSLO_2003_TUEM	3013702	0.000	0.662446
OSLO_2003_TUEM	3013703	0.000	2.800377
OSLO_2003_TUEM	3013704	0.000	0.420953
OSLO_2003_TUEM	3013705	0.000	0.925448
OSLO_2003_TUEM	3013706	0.000	0.413022
OSLO_2003_TUEM	3013707	0.000	1.129122
OSLO_2003_TUEM	3013708	0.000	3.004422
OSLO_2003_TUEM	3013709	0.000	0.116462
OSLO_2003_TUEM	3013710	0.000	0.107099
OSLO_2003_TUEM	3013711	0.000	0.436604
OSLO_2003_TUEM	3013801	0.000	0.275722
OSLO_2003_TUEM	3013802	0.000	0.239891
OSLO_2003_TUEM	3013803	0.000	0.814823
OSLO_2003_TUEM	3013804	0.000	0.647118
OSLO_2003_TUEM	3013805	0.000	0.386532
OSLO_2003_TUEM	3013806	0.000	1.126221
OSLO_2003_TUEM	3013807	0.000	0.691444
OSLO_2003_TUEM	3013808	0.000	1.762446
OSLO_2003_TUEM	3013809	0.000	1.198226
OSLO_2003_TUEM	3013810	0.000	1.271244
OSLO_2003_TUEM	3013811	0.000	1.073222
OSLO_2003_TUEM	3013812	0.000	1.706118
OSLO_2003_TUEM	3013813	0.000	0.244441
OSLO_2003_TUEM	3013814	0.000	1.016300
OSLO_2003_TUEM	3013815	0.000	0.204411
OSLO_2003_TUEM	3013901	0.000	0.145666

Figure 1: Total emission of PM<sub>10</sub> from area sources and point sources in regions in Oslo (tons/year).

## The Aggregation Functionality

The Aggregation Functionality gives the user a general view over emissions from area sources and point sources. The user may view consumption and emission data aggregated within geographical regions, source sectors, industrial plants, owners and stacks. Figure 1 shows the total emission of PM<sub>10</sub> from point sources and area sources aggregated within geographical regions in Oslo.

## The Abatement Functionality

The Abatement Functionality has been implemented in AirQUIS in order to provide an efficient tool to study the impact of different measures on air quality. This functionality makes it possible to alter emissions from

line sources, area sources and point sources at the same time. It is possible to carry out changes within selected areas for all sorts

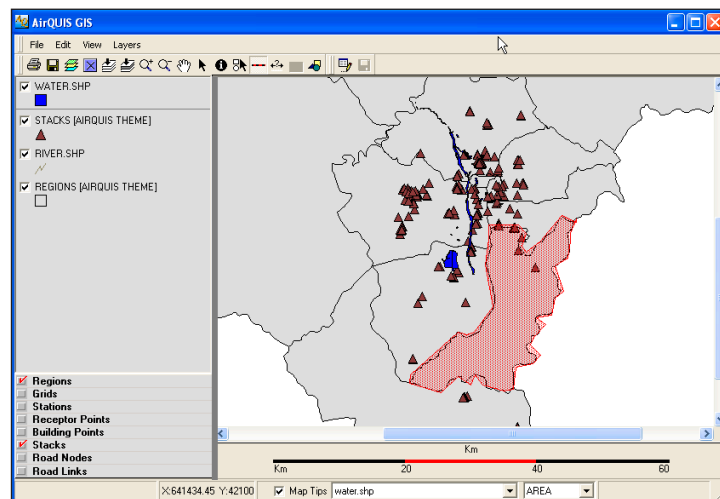


Figure 2: Selection of polygon containing Xiaodianqu in Taiyuan.

of sources by using the GIS. For line sources the user may introduce changes on ADT, speed and vehicle distribution. Emission-, dispersion- and exposure calculations can be performed based on an abatement scenario. The Abatement Functionality has been used to study the impact of altered emissions from industry, domestic heating and traffic in Taiyuan (China) and some Norwegian cities.

The burning of coal in domestic boilers is a major source of SO<sub>2</sub> emission in Taiyuan. The Abatement Functionality was used to study the impact of burning briquettes instead of raw coal in Xiaodianqu, a part of Taiyuan. The change from raw coal to briquettes gave a 40 % reduction in the SO<sub>2</sub> emission. The abatement study was carried out by reducing the emission of SO<sub>2</sub> due to raw coal by 40 % in the specified area.

Figure 2 shows how Xiaodianqu is selected from the GIS in AirQUIS. Figure 3 shows the calculated average SO<sub>2</sub> concentration in Taiyuan in the period 07.02.2002 – 14.02.2002 with original emission sources, while Figure 4 shows the SO<sub>2</sub> concentration for the same period with abatement on raw coal in Xiaodianqu. The change of fuel for domestic boilers had a large

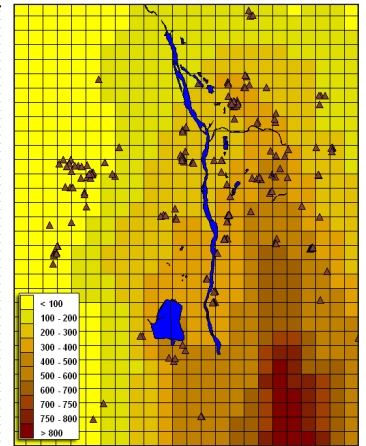


Figure 3: Average calculated SO<sub>2</sub> concentration in µg/m<sup>3</sup> in the period 07.02.2002 – 14.02.2002. Calculation is without abatement.

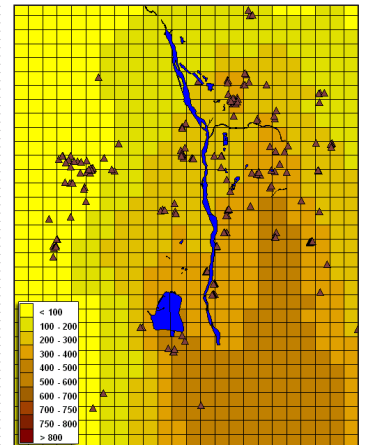


Figure 4: Average calculated SO<sub>2</sub> concentration in µg/m<sup>3</sup> in the period 07.02.2002 – 14.02.2002 with briquettes instead of raw coal in Xiaodianqu.

impact in this part of Taiyuan. Abatement studies were also performed on point sources, reducing emissions of SO<sub>2</sub> from these sources. This had a positive impact on the air quality, but the simulated difference was smaller than in the case of change of fuel for domestic boilers.

## References

Mc Innes H., Jablonska H. T. B., Innset B. (2006) *Tools for emission assessment and abatement studies*. Norwegian Institute for Air Research, TR 01/2006

AirQUIS: [www.nilu.no/airquis/](http://www.nilu.no/airquis/)