Pilot Environmental Zone in Maribor

The Pilot Environmental Zone (POC) of the city of Maribor is expected to reduce the air pollution from PM10 and NOx coming from road traffic and to change the old habits of the population (driving to the city centre by car).

- The traffic regulations are changed in the pilot environmental zone, and vehicles whose emissions standards do not meet the requirements will only have limited access.
- The pilot environmental zone covers the city centre on the left bank of the Drau river. It was opened on 1 October 2012 and applies on workdays during the heating season up to 30 April 2013.
- Cars, trucks as well as vehicles up to 3.5 tons that do not comply with the EURO 2 emission standard at least are banned from entering on workdays. There are, however, selective exceptions to the rule.
- Regardless of the EURO standard, vehicles of public utility companies and also light commercial vehicles are exempt from this ban from 5 a.m. to 9 a.m. and 8 p.m. to 10 p.m. in order to avoid negative effects on business activities in the city.
- Neighbours with entry approval, busses, transport of the physically handicapped, emergency vehicles, old timers and service vehicles are excluded from the ban on entering the pilot environmental zone.
- The program for permanent implementation of the environmental zone is being carried out in the pilot zone as well as an extended area with traffic-related measures for reducing exhaust and other traffic-related emissions.

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Operational Program Slovenia-Austria 2007-2013 Interreg Project

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2nd Information Folder

PMinter

Interregional interaction of measures for the reduction of domestic fuel and traffic with fine dust pollution in the Slovenia-Austria border region.

www.pminter.eu

Fine Dust Emissions

Completion of series of field measurements

6 households were selected with wood-burning furnaces that are typical of the respective region to substantiate the emission data for the project regions and emission measurements were carried out locally. For complete characterisation of the furnaces, the fuels, ashes as well as gas and particulate emissions were measured and analysed. The results support the simulation models for predicting fine dust pollution in the project regions.

Chimney sweep training

A large amount of fine dust emissions from wood-burning furnaces can be avoided through new combustion technologies and the right heating habits. To exploit this potential, it is necessary in particular to inform owners of wood stoves, with support from the chimney sweeps required for a lasting change. The training program is expected to help chimney sweeps in the project regions to be competent advisors in issues dealing with environmental protection and energy efficiency.

Fine dust measuring kit in field use

During the course of the training program, suitable fine dust measuring equipment was presented to chimney sweeps and made available to them for one heating season. Approximately 15 chimney sweep businesses shared 10 measuring devices, acquired experience with the unit, and in turn supplied fine dust measurement results for small biomass heating plants. The emissions of firewood, pellet and woodchip boilers as well as wood-burning stoves and tiled stoves were measured during regular customer operation. The collected emission data provides information on the status of the furnaces in the project region, improves the database for simulation models, and provides approaches for future measures to reduce fine dust pollution from wood combustion.

All these measures were carried out inside the participating project regions (Klagenfurt-South Carinthia, South Styria, and Maribor-North Slovenia).

Selected examples of a great variety of activities by TU Graz in the PMinter project

The IPPT Institute (Institute for Process and Particle Technology) and IVT Institute (Institute for Combustion Engines and Thermodynamics) are involved in this project with a focus on fine dust resulting from biomass combustion (IPPT measurements) as well as resulting from a great variety of sources and transformations, mainly with the use of complex models for determination of emissions and immissions (IVT).

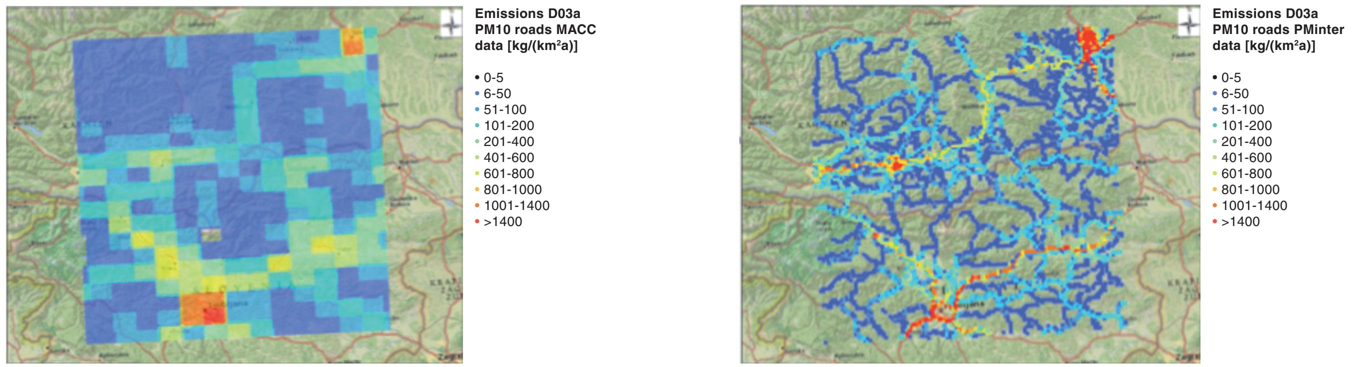
Air quality simulations with the model systems WRF & GRAMM/GRAL for fine dust (PM10)

Work was conducted in PMinter on a "holistic" model approach for observing the fine dust problem in the program region and in the three core regions, i.e. Klagenfurt (K), Maribor (MB) and Leibnitz (LB).

The focus was on recalculating the emissions of precursor gasses responsible for the fine dust problem, e.g. nitrogen oxides (traffic) or ammonia (agriculture) as well as the diverse particle emissions in a high spatial resolution (1 km x 1 km) in the program region. Work also focussed on regenerating existing emission data with a 1 km x 1 km resolution in order to be able to resolve the complex structure of high pollutant emissions in valleys and low emissions at higher elevations in the program region. This is because the existing emission datasets are only available up to a resolution of 7 km x 7 km (see Fig. 1).

Subsequently, the spreading of these gasses and particles as well as the complex physical/chemical conversion processes were calculated with highly modern simulation models. One particular area of focus was the calculation of secondary particulate mass formed from precursor gasses from different sources, for example ammonium nitrate (ammonia results ultimately from agriculture and nitrate mainly from traffic). The special feature regarding the air quality simulations carried out in PMinter is the combination of taking meteorological pollutant transport and conversion at a European level into consideration down to the three core regions (size up to 20 km x 30 km). Here, the local meteorological conditions and terrain at high resolution (200 m x 200 m) were taken into consideration in the core regions. Local emissions were spatially assigned with an accuracy of just a few metres and the propagation was calculated with an extremely fine spatial resolution of 10 m x 10 m.

Figure 1: Fine dust emissions for traffic in kg/(km²a); excerpt from the European-wide MACC dataset with a 7 km grid size (left) and the fine dust emissions with a 1 km grid size (right) calculated in the PMinter project.



Another area of focus was the regeneration or alternatively recalculation of the emission data for domestic fuel and the calculation of spatial propagation. The winter average value calculated for Maribor for the year 2010 is shown as an example in Figure 2. The fine dust pollution resulting from the combustion of solid fuels is shown spatially in Figure 3 (fine dust concentrations in µg/m³). What is striking is that considerable pollution of up to 10 µg/m³ in the centre results above all from the combustion of solid fuels (mainly wood). The simulated contributions from specified air pollution sources can be seen as an example in pie charts in Figures 4-6 for the locations of the air quality measuring stations at Maribor Centre, Klagenfurt and Leibnitz. Ultimately, this information is required and used for the preparation of more targeted and hence more efficient air pollution protection plans (measures) at the local level (K, MB and LB) and on a regional basis.

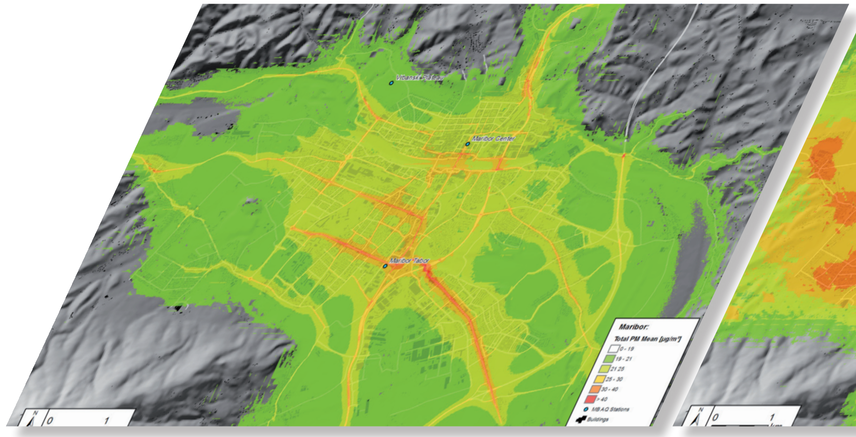


Figure 2: Calculated winter (DJF 2010) period average value in µg/m³ for fine dust (PM10) in Maribor. The circles mark the locations of the air quality measuring stations.

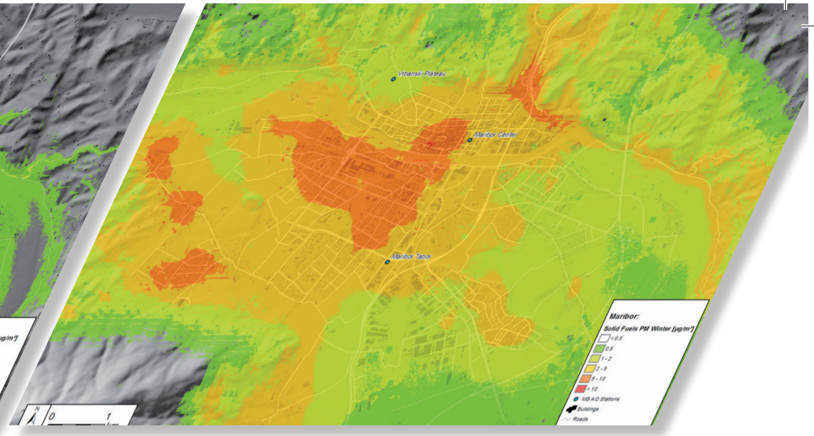


Figure 3: Calculated winter (DJF 2010) period average value in µg/m³ for the proportion of fine dust (PM10) resulting mainly from wood combustion as well as other solid fuels such as coal, pellets etc. in Maribor. The circles mark the locations of the air quality measuring stations.

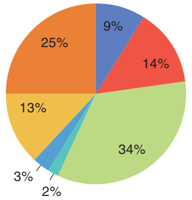


Figure 4: Calculated proportional PM10 values (from sim. 49 µg/m³) and proportions of different sources and PM components, monthly average for January 2010 for **Klagenfurt Völkermarkter Straße.** "OC/EC trans" represents the transported carbon component from combustion engines, industry and domestic fuel. The secondary component is essentially determined by traffic and agriculture (approximately equal parts), but also from district heating plants and industry.

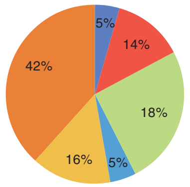


Figure 5: Calculated PM10 values (from sim. 39 µg/m³) and proportions of different sources and PM components, monthly average for January 2010 for **Maribor Centre.**

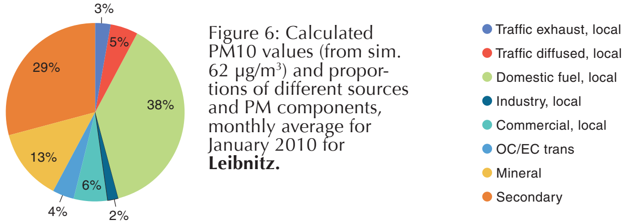


Figure 6: Calculated PM10 values (from sim. 62 µg/m³) and proportions of different sources and PM components, monthly average for January 2010 for **Leibnitz.**