ENVIRONMENTAL RESEARCH

The main objective of the **Research Department** of the **Romanian Auto Register (RAR)** is to review and assess the environmental impacts associated with the road traffic and other infrastructure related emission sources.

Main field of scientific studies

- Experimental and theoretical studies on road traffic impacts on environmental and human factors: Emission Measurements, Emission Inventories, Air Quality, Global Climate Change (Greenhouse Gases), Noise & Vibrations;

- Analysis of the performance of the statistical and deterministic air pollution models and their application for the urban and roadway air pollution problems;

- Emission inventories using: **COPERT III, COPERT 4, TANKS 4.0**;

- Air pollution modelling using mainly: **AEOLIUS, CALINE4, CAL3QHC, CAR INTERNATIONAL, CPB-3, DMRB, GRAM, HIWAY-2, IPTPLU, OMG, OML-Multi, PAL-DS, RAM, ROADWAY, SCIPUFF, SCREEN-3, SLSM, TSCREEN, WinOSPM**.

Background

- **Research studies**:
  (representative selection)

Datculescu, O. (1994) Experiments and prediction models for determination of road traffic influence on urban environment chemical pollution. Contract 62/1994, INAR S.A. Brasov - RAR, Phase 2, Bucharest Polytechnic University Branch Office, Bucharest.

Datculescu, O. (1995a) Methodology and computer programs for road traffic polluting emission inventory. Contract 62/1994, INAR S.A. Brasov - RAR, Phase 3, Bucharest Polytechnic University Branch Office, Bucharest.

Datculescu, O. (1995b) Experiments and computing applications for urban road traffic polluting emission inventory. Contract 62/1994, INAR S.A. Brasov - RAR, Phase 4, Polytechnic University Branch Office, Bucharest.

Datculescu, O. (1996) Computer programs for emission inventory. Experiments and conclusions. Contract 261/1996, Phase 1.1, RAR, Bucharest.

Datculescu, O. and Iacob, A. (1996) Study regarding road traffic greenhouse gas emissions. Contract 261/1996, Phase 1.2, RAR, Bucharest.

Datculescu, O. and Iacob, A. (1997) Analysis regarding road traffic greenhouse gas emission mitigation measures. Contract 261/1996, Phase 2, RAR, Bucharest.

Datculescu, O. (1997) Road traffic greenhouse gas emission assessment for short, medium and long term in Romania. Contract 261/1996, Phase 3, RAR, Bucharest.

Datculescu, O. (1998) Modelling the road traffic impact on air quality in urban environment. Contract 710/1998, Phase 1, RAR, Bucharest.

Datculescu, O. (1999) Computer programs for estimating urban road traffic main air pollutant concentrations. Contract 710/1998, Phase 2, RAR, Bucharest.

Datculescu, O. (2000) Experiments related to the assessment of road traffic impact on urban air quality, for the validation of the numerical simulation models. Contract 710/1998, Phase 5, RAR, Bucharest.

Datculescu, O. (2002) Preparation of traffic data for the Operational Street Pollution Model (OSPM). Project 52930: Assistance to Romania on Transposition and Implementation of the EU Ambient Air Quality Directives, Romanian Ministry of Waters and Environmental Protection (MWEP) and Danish Environmental Protection Agency (DEPA), Danish Co-operation for Environment in Eastern Europe (DANCEE J.Nr. M 124/033-0072), Report IDAQ-88, Bucharest.

Parcalabescu, M., Buzgan, A., Predescu, M. and Grigore, D. (1999) In traffic measurements concerning road vehicles induced pollution. Contract 710/1998, Phase 3, RAR, Bucharest.

Parcalabescu, M., Grigore, D. and Buzgan, A. (2000) Urban road traffic immission measurements. Contract 710/1998, Phase 4, RAR, Bucharest.

Parcalabescu, M., Grigore, D. and Brand, C. (2000) Pilot study on urban air quality. Contract 710/1998, Phase 6, RAR, Bucharest.

Parcalabescu, M., Grigore, D. and Brand, C. (2001) Structuring the air pollution data base, as a result of immission measurements on urban road traffic. Contract 710/1998, Phase 7, RAR, Bucharest.

Parcalabescu, M., Grigore, D., Datculescu, O. and Brand, C. (2002-2006) Air Quality Monitoring. Annual Reports 2001-2005, RAR, Bucharest.

- **Several papers presented and published** in the Proceedings of some Romanian Scientific Conferences and Sessions such as CONAT – Brasov, CAR – Pitesti, ESFA – Bucharest, INMH – Bucharest, some of the most comprehensive and representative being:

Datculescu, O. (2001) Development and validation of an integrated operational modelling system for road traffic impact on air quality in urban environment. Annual Session of Scientific Papers 2001, Romanian National Institute of Meteorology and Hydrology (INMH), Bucharest, 5-7 June 2001.

Datculescu, O. (2002) Compiling vehicle fleet statistics for use in emission inventories and air quality modelling. EPI Workshop II on Air Quality

Assessment in Romania, Results of the IDAQ Pilot Project, Hotel Palace, Sinaia, 12-14 May 2002.

- **Winner of the research project contest within the Romanian Environmental Forum FORM '99** (6th Edition - 1999) with the paper and presentation titled:
"TRAF – A Road Traffic Air Pollutant Dispersion Model for Street Microscale"
(authored by Eng. Octavian Datculescu)

The same work has received the **Diploma of Excellence in Scientific Research – 2000** from the National Agency for Science, Technology and Innovation of the Romanian Government.

- **Participation of Eng. Octavian Datculescu in the European level Model Intercomparison Podbielskistrasse-Exercise** (1999-2001): intercomparison of methods for the prediction of the air pollutant concentrations in a specific street canyon using usually available input data. The European Research Network TRAPOS joints that initiative to bring the intercomparison on the European level. The results were presented and discussed during the 6th International Conference on Harmonisation within Atmospheric Dispersion Modelling for Regulatory Purposes, in Rouen (France), October 11-14, 1999, and the 7th International Conference on Harmonisation within Atmospheric Dispersion Modelling for Regulatory Purposes, in Belgirate (Italy), May 28-31, 2001.

Detailed additional information can be found in:
http://www.lohmeyer.de/Podbi/
and
http://www.dmu.dk/AtmosphericEnvironment/trapos/podbielski.htm

- **Participation of Eng. Octavian Datculescu as Road Traffic & Vehicle Emission National Expert in the Project "*Assistance to Romania on Transposition and Implementation of the EU Ambient Air Quality Directives*"** (2001-2002).
One main objective of the project was to develop human and technical capacity and capability in Romania to meet the EU requirements for air quality assessment and management. The project was funded by the Danish Co-operation for Environment in Eastern Europe (DANCEE) under the Danish Environmental Protection Agency. The recipient institutions in Romania were the Ministry of Waters and Environmental Protection (MWEP) and the Environmental Protection Inspectorates (EPI) in three selected pilot project areas: Bucharest, Bacau and Piatra-Neamt industrial valley region, and Ploiesti. The international team included the project leadership by COWI, consulting

engineers and planners in Denmark (www.cowi.dk) in a join venture with the Norwegian Institute for Air Research, NILU (www.nilu.no) and in association with the National Environmental Research Institute in Denmark (www.dmu.dk).

The main objectives of the road traffic related technical assistance were to:

1. Provide traffic data for Bucharest to be used to determine the contribution from traffic to urban background concentrations;
2. Prepare simple guidelines for the EPIs to estimate traffic loads in selected street canyons;
3. Prepare diurnal profiles of the temporal variation of traffic (traffic loads, speed and cold starts);
4. Prepare car fleet characteristics required for estimation of emission factors (number of cars in emission classes and age distribution);
5. Predict car fleet characteristics in the future, needed for estimation of emissions using the COPERT methodology for the years 2005 and 2010.

Main environmental interest

Assessment of road traffic air quality impacts in the vicinity of roadway infrastructure, especially in urban areas, in view of an "**International collaboration for development and implementation of an Operational Forecasting System for Air Quality near major roadways in biggest urban agglomerations in Romania**".

Working proposals

Practical use and assessment of operational computer models for road traffic induced pollution on:

- Air Quality:

- vehicle emission inventory
- roadway microscale dispersion in open field
- street canyons

- road tunnels
- rest areas
- parking lots
- underground garages
- urban submesoscale dispersion for street background air quality estimation
- determination of dispersion in the case of calm wind conditions
- improved treatment of NO-NO_2-conversion
- practical handling of EU-directives for air quality
- transfer of meteorological information from remote sites to the area of interest
- wall heating influences
- effects of special inaccuracy of models
- urban air pollution mapping

- Noise Climate:

- noise emissions and immissions
- impact assessment.
- urban noise mapping

Testing the applied engineering models for calculation of diffusion of traffic induced air pollutants within the concept of **European Harmonisation and the EU guidelines on air quality**:

- practical applying of models
- comparing of models
- comparing results to field measurements

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