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TIMISOARA

TIMISOARA 2 (CENTRAL) AIR QUALITY MONITORING REPORT

TO:

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Results of the Air Quality Monitoring Campaign in Central area of Timisoara

Location: Timisoara / Central / Faculty of Mechanical Engineering quarters / Multidisciplinary Laboratory for Thermal Machines and Unconventional Energies

Coordinates of the AQM station:

44°1444395 N, 21°133818 E, altitude 89 m

Start on: 14 November 2011, 10:00

End on: 19 November 2011, 22:00

Experts: Francisc Popescu, Nicolae Lontis, Dorin Lelea, Gavrilă Trif-Tordai, Virgil Stoica

Overview of the monitoring site:



Timisoara, also called "the city of roses", "the city of flowers", "the gardens paradise" or "the little Vienna" thanks to its beautiful gardens and to its splendid promenade on the Bega river shore as well as its architecture built in the style of the ancient Austrian-Hungarian Empire of the second half of the XVIIIth century and of the first half of the XIXth century, is one of the greatest Romanian industrial centers.

The development concept of Timisoara is based on the main competitive potentials of the area namely: its geopolitical position, the existence of a relatively developed material basis in comparison with other regions from Romania, in all the activity fields, well trained human resources from a professional point of view, having an elevated moral profile and a high cultural level, these being characteristics that generate a real spiritual opening to new, an interethnic and interdenominational harmony, that "spirit of Timisoara" creating an exemplary social cohesion. The analysis of the region pointed out the fact that, at present, Timisoara - the real capital of Banat which, according to the traditional saying, "is always on top" - represents a polarizing center in all the activity fields, this city's power of attraction going beyond its area of direct influence. At the same time, being the largest western city in Romania, situated close to the borders with



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Yugoslavia and Hungary, it can be characterized as a multifunctional contact center - "Romania's open door to Europe". The development concept has in view the reinforcement of the above mentioned fundamental characteristics and the implementation on these grounds of Timisoara Region as a competitive multifunctional center in Romania, polarizing in the West Region and the Euroregion Danube-Cris-Tisa, integrated in the national and European economy, capable of providing a favourable environment for economic life and activities. The achieving of this goal is possible only in a global context - economic, social, cultural - of substantial development in all respects - temporal, qualitative and ecologic.

Cited from <http://www.enterface.ro/tradbridge/English/miscellaneous.htm>

The charm of this city, settled on the northern bank of the Bega River, lies in its distinct architectural character and vibrant cultural life. Frequently referred to as "Little Vienna," Timisoara is home to year-round musical and theatrical performances, art galleries, museums and a buzzing nightlife. A progressive, cosmopolitan place, Timisoara was the first city in Europe and second in the world after New York, to use electricity to illuminate its public streets.



Some of the city's most interesting sites

are its elegant baroque buildings, spread around town and particularly along the main square, Piata Victoriei, which stretches from Opera Square (*Piata Operei*) to Loga Boulevard.

The focal point is the towering Romanian Orthodox Metropolitan Cathedral (*Catedrala Ortodoxa Mitropolitana*) at the south side of the square. Built between 1936 and 1946, its green and red roof tiles are arranged in a mosaic design. In front of the Cathedral is a memorial to those who lost their lives during the 1989 Revolution which overthrew Communist rule. The Memorial Museum of the 1989 Revolution (*Muzeul Revolutiei*) offers a full insight into the revolution in Timisoara



Across the town centre is the picturesque Habsburg-era Piata Unirii, so-named for the imposing sight of the Romano-Catholic and Serbian Orthodox Cathedrals facing each other. Historic pastel-hued buildings line the



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square. During the 18th century, this was the city's commercial centre and the venue for numerous military processions and religious ceremonies.

The baroque Serbian Orthodox Cathedral (*Biserica Orthodoxa Sarba*), built in 1745-48, and the mint green and white Serbian Bishop's Residence (*Vicariatul Ortodox Sarb*) with its extravagant decorations are located on the west side of the square. The Cathedral can be visited daily between 7am and 6pm.

The Roman Catholic Cathedral (*Catedrala Episcopala Romano-Catolica*) on the east side of the square was built between 1736 and 1754 to the design of Fisher von Erlach and represents a fine example of Viennese baroque style. The main altar painting was completed by Michael Angelo Unterberger, director of the Fine Arts Academy in Vienna.

Cited from <http://www.romaniatourism.com/timisoara.html>

The Timisoara 2 (Central) Air Quality Monitoring Campaign took place on the Multidisciplinary Laboratory for Thermal Machines and Unconventional Energies, Faculty of Mechanical Engineering at "Politehnica" University of Timisoara. (<http://energieregen.mec.upt.ro/>)

"Politehnica" University of Timisoara is one of the biggest and most well-known technical universities from Central and Eastern Europe. It was founded in 1920, short time after the union in one state of all the Romanian territories -supervened in the context of the political redefinitions in Europe, following at the end of the First World War-, in order to respond to the need of engineers felt by the Romanian society at that time, within the economical re-launching it assumed. During its almost 90 years of existence, "Politehnica" University of Timisoara produced over 100 000 engineers, very appreciated both in Romania and abroad, for their competence and seriousness.

At present, "Politehnica" University of Timisoara has 10 faculties and 4 independent departments. 15 000 students, 850 teaching staff and 900 administrative and auxiliary staff study, respectively, work within their framework.

The studies in "Politehnica" University of Timisoara are organized in "Bologna" paradigm and comprise all the three cycles: Bachelor, Master, Doctorate.



Beyond its good name in education, "Politehnica" University of Timisoara has also the recognition of a first class actor on Romanian scientific research scene, with remarkable results both on the national and international level.

One of the main priorities for the "Politehnica" University of Timisoara was the international affirmation and collaboration. At the present, the university has cooperation agreements with more than 100 universities from all over Europe, but also from USA, Canada and Japan.

The UPT motto lies on the words of King Ferdinand I who on 1923 at the first opening of the University said *"It's not the walls that make a school, but the spirit living inside"*.

Cited from <http://www.upt.ro/english/index.php>



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Figure 1. View of the measurement site

Equipment used in the Timisoara 2 monitoring campaign

In table 1 the measurement techniques involved, equipments and the measurement uncertainty is presented.

Table.1. Equipments used and relevant informations.

Pollutant	Methods	Standard	Equipment	Measurement uncertainty
CO	NDIR	EN 14626:2005	Environnement CO12M	4 %
NO (NO ₂ , NO _x)	Chemiluminescence	EN 14211:2005	Environnement AC31M	2.06 %
O ₃	UV photometry	EN 14625:2005	Environnement O341M	6.98 %
CH ₄ , NMHC, THC	FID (flame ionization detection)	EN 12619:2002 EN 13526:2002	Horiba APHA 370	0.9 %
SO ₂	UV fluorescence	EN 14212:2005	Environnement AF21M	1.76 %
PM ₁₀	Gravimetric / Light scattering	EN12341	TSI Dusttrack	5 %
Wind speed and direction, air pressure, temperature and humidity	Professional mobile wetter station	-	KRONEIS	-



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The equipments are part of the air quality fix mobile laboratory and procedures used are in full compliance with ISO/CEN 17025:2005 standard for quality assurance in analytic laboratories. The laboratory is the property of “Politehnica” University of Timisoara and more details and information’s (including certifications) can be found on www.mediu.ro Linde and DKD (Deutsche Kalibrierdienst) calibrations gases (NO, SO₂, CO, CH₄ in N₂) were used. All the equipments and procedures used were presented in extensor in the previous reports.

Monitoring results.

In table 1 the resulted values for daily mean values for all pollutants are presented.

Table 1. Daily mean values for relevant pollutant concentration in ambient air

Day	O ₃ μg/m ³	SO ₂ μg/m ³	NO μg/m ³	NO ₂ μg/m ³	NO _x μg/m ³	CH ₄ mg/m ³	NMHC mg/m ³	THC mg/m ³	CO mg/m ³	CO ₂ ppm	PM10 DRX μg/m ³	PM10 LVS μg/m ³
14/11/11	15.50	23.70	25.10	33.12	58.22	5.00	1.02	6.02	1.30	373.83	68.51	69.44
15/11/11	16.37	19.58	20.79	23.74	44.53	4.94	0.89	5.83	1.19	373.68	46.04	45.62
16/11/11	15.57	21.09	22.68	26.68	49.36	4.91	0.73	5.64	1.02	371.48	50.55	49.68
17/11/11	14.33	21.59	21.14	24.10	45.25	4.96	0.84	5.79	1.10	372.63	43.57	45.81
18/11/11	16.16	19.26	22.69	33.67	56.37	5.01	0.84	5.85	1.15	373.95	58.53	57.92
19/11/11	12.19	20.02	18.30	23.90	42.21	4.88	0.72	5.60	1.23	372.88	38.85	40.22

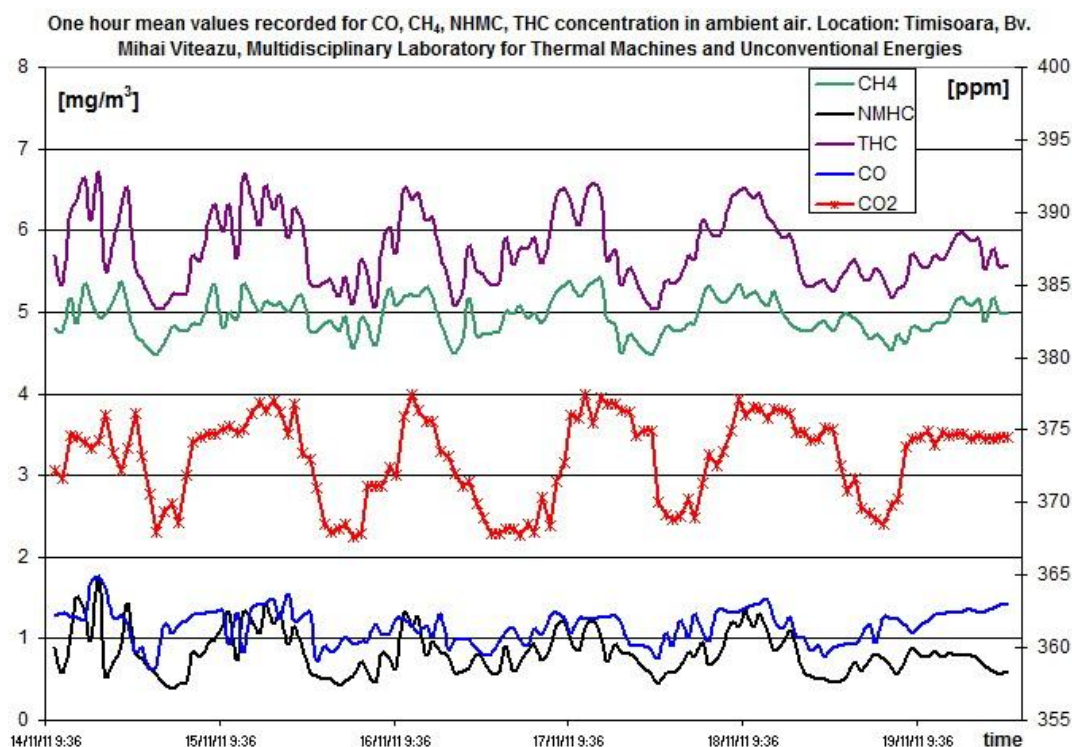


Figure 2. Hourly mean values recorded for CO₂, CH₄, NMHC, THC and CO in Timisoara east industrial area

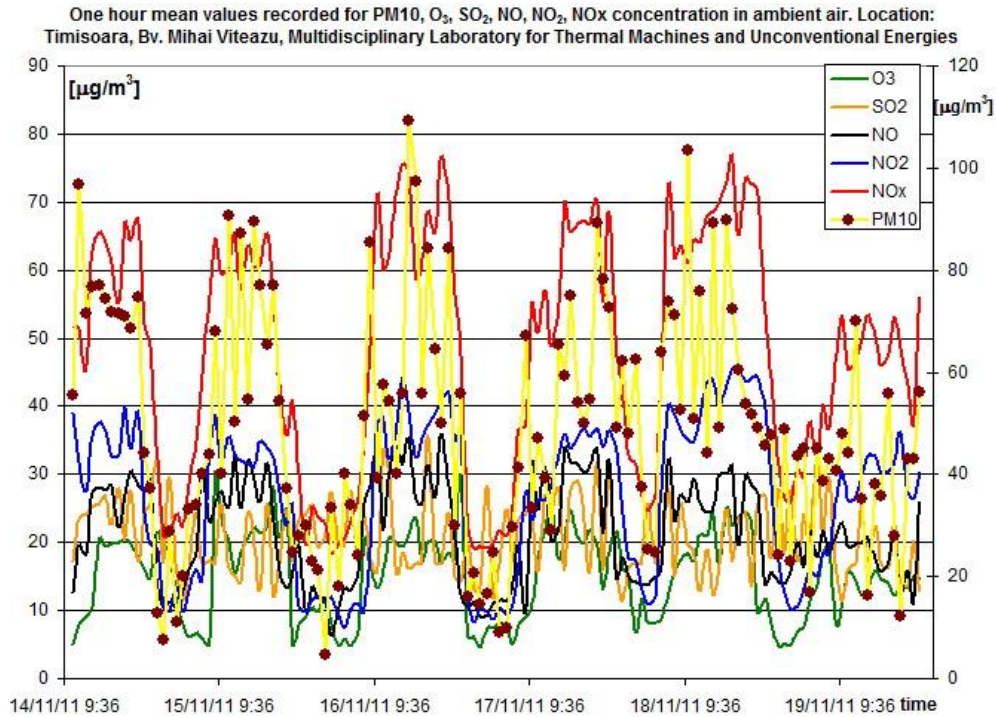


Figure 3. Hourly mean values recorded for PM10, O₃, SO₂, NO, NO₂ and NO_x in Timisoara east industrial area

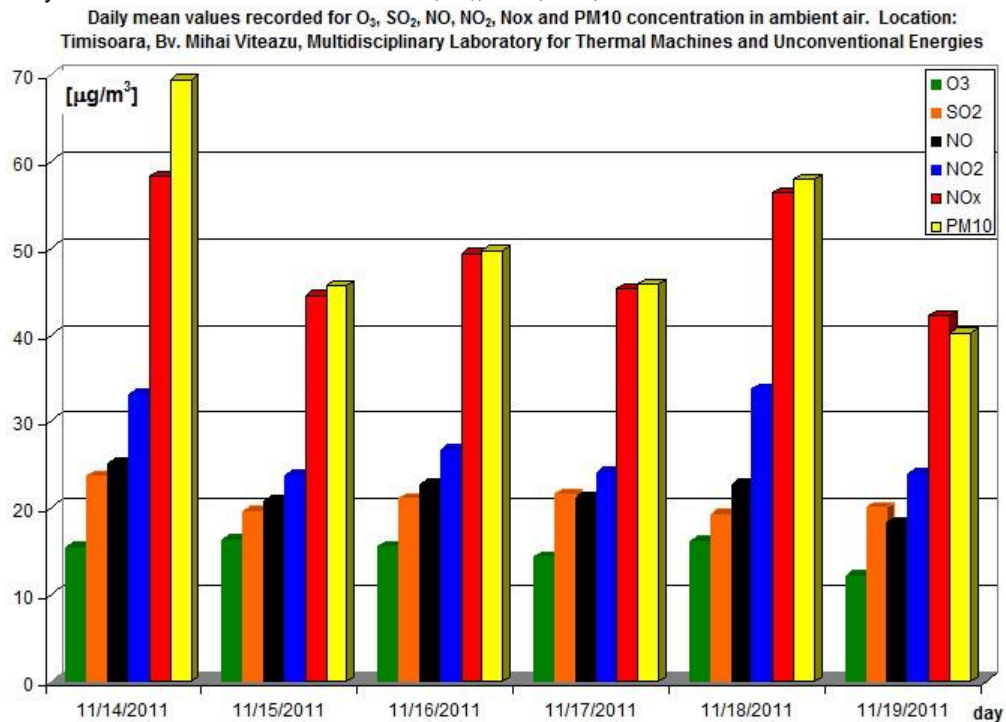


Figure 4. Daily mean values recorded for O₃, SO₂, NO, NO₂ and NO_x in Timisoara east industrial area



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Daily mean values recorded for CO, CH₄, NMHC, THC concentration in ambient air.
Location: Timisoara, Bv. Mihai Viteazu, Multidisciplinary Laboratory for Thermal Machines and Unconventional Energies

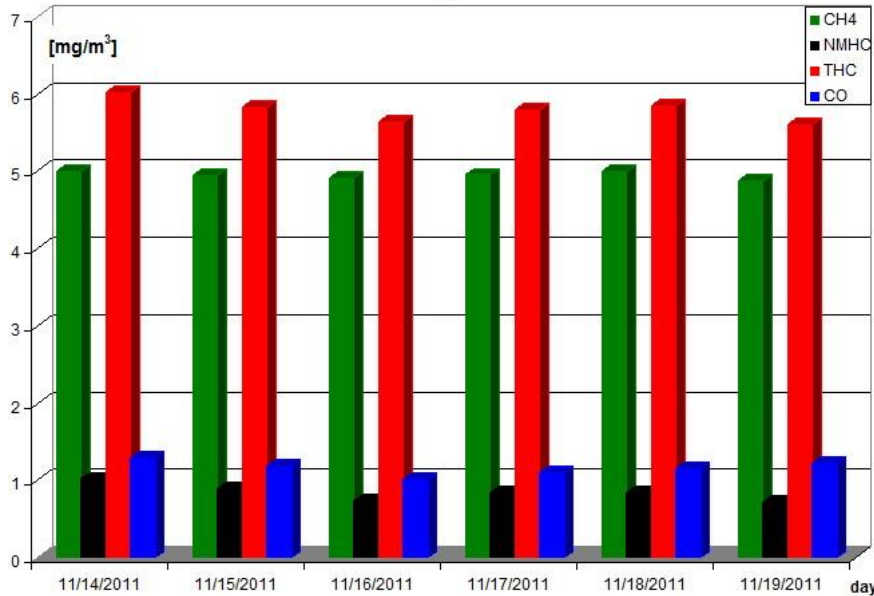


Figure 5. Daily mean values recorded for CH₄, NMHC, THC and CO in Timisoara east industrial area

Conclusions.

For the values recorded at Timisoara Central site we can draw following conclusions:

1. the PM₁₀ concentration are high, above the EU limits in most o the days.
2. all other pollutants measured are under the EU admissible limits

Due to a limited time of the monitoring period and the choice of location by availability criteria the result obtained are to be considered to have educational and informal value only. Road traffic is in general a major source of air pollution in Timisoara and that is visible in the recorded values. For all pollutants (NO_x, CO, PM₁₀, NMHC) we can observe that the high pics are following the daily traffic with high concentrations on morning (8÷10 am), launch (11÷13) and evening (17÷20 pm). Considering the relative isolated location of the monitoring site (about 150 meters from any road) we can conclude that the air pollutants concentrations are much higher on the vicinity of the Timsoara's boulevards.

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