

## PREPARATION OF CLEAN AIR ACTION PLANS IN TURKEY: A CASE STUDY FROM THE PROVINCE OF ESKISEHIR

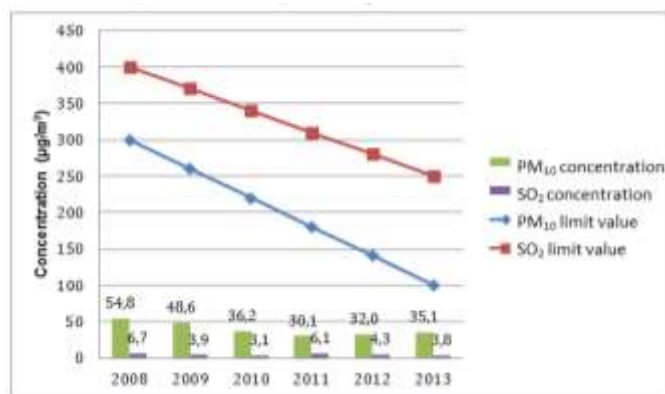
**ALTUG H.<sup>1</sup>, ÇELİK H.<sup>2</sup>, GENÇLER ABES G.<sup>2</sup>, TURAN BIYIK S.<sup>2</sup> and DÖGEROĞLU T.<sup>1</sup>**

<sup>1</sup> Department of Environmental Engineering, Faculty of Engineering, Anadolu University, İki Eylül Campus, 26555, Eskişehir, Turkey, <sup>2</sup> Eskişehir Provincial Directorate for Environment and Urbanization, Eskişehir, Turkey  
E-mail: hcinar@anadolu.edu.tr

Clean air action plans (CAAP), which include strategies that aim to reduce the emissions and health risks from the most significant polluting sources for a defined area, are important tools for air quality improvement. In general, these plans are to be prepared for areas in which detrimental effects on the environment due to air pollution exist or are expected to. Preparation of clean air action plans to achieve acceptable air quality levels is a widely used technique especially in developed countries, such as North American and European countries. For Turkey, preparation of detailed clean air action plans is a relatively new issue. As a candidate country for the EU membership, Turkey is expected to improve air quality nationwide in order to meet EU air quality standards and Turkish legislation should be brought in line with EU air quality management practices. For this reason, a by-law, The Regulation on Ambient Air Quality Assessment and Management (RAAQAM) (1), was established in 2008 in relation to the Directive 2008/50/EC (2) to improve air quality by transposing EU acquis into Turkish law. RAAQAM provides for the necessary instruments such as clean air action planning in order to improve air quality.

Eskişehir is a rapidly developing intermediate size province of Turkey with a population of approximately 800.000 inhabitants. First clean air action plan of Eskişehir city (3), which was one of the first examples in Turkey, was prepared for the years 2010-2014 within an international research project by the leadership of the Anadolu University Air Quality Research Group (AQRG) (4). In 2014, Eskişehir CAAP was updated for the years 2014-2019 by the leadership of the Provincial Directorate for Environment and Urbanization with extending the planning area to the province level and making the plan official with the sign of concerned public authorities (5). Both clean air action plans were prepared with a joint work of a council consisting of different stakeholders (industry, NGOs etc.) and the main institutions taking role in the preparation of the plan were the Anadolu University, the Provincial Directorate for Environment and Urbanization and the Eskişehir Metropolitan Municipality. Clean air action plans were mainly consisting of two parts namely "air quality evaluation" and "strategy development"

Using data gathered by different techniques (ambient air quality monitoring, emission inventories and modeling studies etc.), evaluation of the current and future situation of urban air quality in Eskişehir was performed. Figure 1 gives an example of evaluation of air quality by comparing measured annual average pollutant levels with annually decreasing air quality limit values according to the RAAQAM. Currently, PM<sub>10</sub> and SO<sub>2</sub> in one sampling location are continuously measured in Eskişehir within the national monitoring program since 2008. Data can be obtained from the official website with the desired time intervals ranging from hourly to yearly (6). In addition to national monitoring data, good quality measurement data with high spatial and time resolution are available from different research studies held by the Anadolu University AQRG, studies can be found elsewhere (4, 7, 8). An emission inventory for the year 2013 was prepared for combustion related anthropogenic sources using the EMEP/CORINAIR emission factors (9). According to the emission inventory results, industrial fuel consumption and processes were the most important sources of PM<sub>10</sub> emissions and road traffic was important for VOC and NO<sub>x</sub> emissions. Also, residential heating was playing an important role in the formation of CO and SO<sub>2</sub> as coal is still used for heating purposes by around 40% of the population.



**Figure 1:** Annual levels of PM<sub>10</sub> and SO<sub>2</sub> from the national monitoring network in comparison with annually decreasing limit values in RAAQAM 2008

After the situation assessment stage, air quality improvement strategies for Eskişehir were developed within a group work of stakeholders from different organizations. As traffic was found out to be the most critical polluting source in the city, emission reduction strategies focused on traffic management for preventing future problems. Also, measures for heating at residences and energy-efficient production for industrial facilities were taken into account.

As a conclusion, clean air action plans are being applied and getting more widespread in Turkey used as a useful tool for air quality management. On the other side, in order to achieve air quality improvement the following key-problems are need to be addressed: strengthening the institutional capacities of national and local authorities in the field of air quality, enhancing the level of knowledge on the relationship between air pollution and it's negative health impacts; increasing public awareness on the health impact of air pollution and increase platforms for exchanging information between stakeholders (like citizens, industries, worker-organisations, traffic, green-groups, science, authorities etc.).

**Keywords:** Clean Air Action Plan; air quality management; air quality improvement; air quality legislation in Turkey; Eskişehir.

## REFERENCES

1. The Regulation on Ambient Air Quality Assessment and Management (RAAQAM) (2008), in Turkish, Ministry of Environment and Forestry, Official Gazette No: 26898, Official Gazette Date: June 6<sup>th</sup> 2008. URL: <http://www.resmigazete.gov.tr/eskiler/2008/06/20080606-6.htm>
2. Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe (2008), URL: <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32008L0050&from=EN>
3. Eskişehir Clean Air Action Plan (2011-2014) (in Turkish), Prepared within the project "Together Towards Clean Air in Eskişehir and İskenderun", Funded by Matra Programme of the Netherlands, Project No: 9S0635.0, 06/2007 - 06/2010 URL: <http://www.temizhava.anadolu.edu.tr/Eskişehir-ili-Temiz-Hava-Plani.pdf>
4. Anadolu University Air Quality Research Group Eskişehir Turkey URL: <http://aqrg.org>
5. Eskişehir Clean Air Action Plan (2014-2019) (in Turkish), Prepared by the Eskişehir Provincial Directorate for Environment and Urbanization URL: <https://www.csb.gov.tr/db/eskişehir/webicerik/webicerik1221.pdf>
6. Turkish National Ambient Air Monitoring Network databank URL: <http://www.havaizleme.gov.tr/>
7. Ö. Özden, T. Döğeroğlu, S. Kara (2008), "Assessment of ambient air quality in Eskişehir, Turkey", Environment International, Volume 34, Issue 5, 678–687.
8. Gaga E.O., Döğeroğlu T., Özden Ö., Ari A., Yay O.D., Altuğ H., Akyol N., Örnektekin S., Van Doorn W. (2012), "Evaluation of Air Quality by Passive and Active Sampling in an Urban City in Turkey: Current Status and Spatial Analysis of Air Pollution Exposure", Environ. Sci. Pollut. R. 19 (8), 3579 - 3596.
9. EMEP-CORINAIR Emission Inventory Guidebook (2013) URL: <http://www.eea.europa.eu/publications/emep-eea-guidebook-2013>