Non-Technical Summary of the Kosovo Emissions Inventory

Overview

As part of the Millennium Foundation of Kosovo (MFK) project: '***Supply of project management, air quality information management, behavior change and communication services'*** an 'Emissions Inventory' has been developed for Kosovo.

An Emissions Inventory provides an estimation of the location and amount of pollutants being released into the air from different sources. It is one of the major tools used in air quality management because it provides an understanding of what relative contributions from activities and sources are, thereby allowing the development of effective actions to reduce emissions and improve ambient air quality.

The Kosovo Emissions Inventory focuses on the following pollutants, all of which can negatively affect human health: particulate matter: PM_{10}, $PM_{2.5}$, nitrogen oxides (NOx), sulfur dioxide (SO_2), carbon monoxide (CO), total non-methane volatile organic compounds (NMVOC), arsenic (As), cadmium (Cd), mercury (Hg) and lead (Pb). It is the first detailed Inventory of this kind for Kosovo.

The Emissions Inventory itself is comprised of a series of spreadsheets in Microsoft Excel which contain the data on the pollutant sources. These are accompanied by a report which describes how the data was collated and the key findings[1].

It is important to distinguish between "emissions" of air pollutants and "ambient concentrations" of air pollutants. See Figure 1 below. 'Emissions' represent the amount of pollution emitted from individual sources such as chimneys (at industrial installations, houses, restaurants, offices etc.) or activities like transport or mining. They are usually presented as a mass of pollutant over a time period eg megagrames per year (Mg/year). That is the focus of the Emissions Inventory.

Ambient concentrations represent the amount of a pollutant in the air at an outdoor location where someone is likely to be exposed to it. The level of pollutant at a given location is affected by emission sources (mainly those nearby but also sometimes those a long way away) after they have undergone some level of 'dispersion' in the atmosphere. Ambient concentrations are usually presented as a mass per volume of air eg micrograms per cubic meter ($\mu g/m^3$). This is not what the Emissions Inventory represents. But, the Emissions Inventory is a vital source of input data to a dispersion model which can then in turn be used to calculate ambient concentrations.

[1] "*Supply of project management, air quality information management, behavior change and communication services. TASK D1: Update of the Emission inventory: Detailed methodology for the inventory of emissions of substances in Kosovo and the scope of the electronic database"* (version 2). Prepared by ATMOTERM; MFK; December 2020;

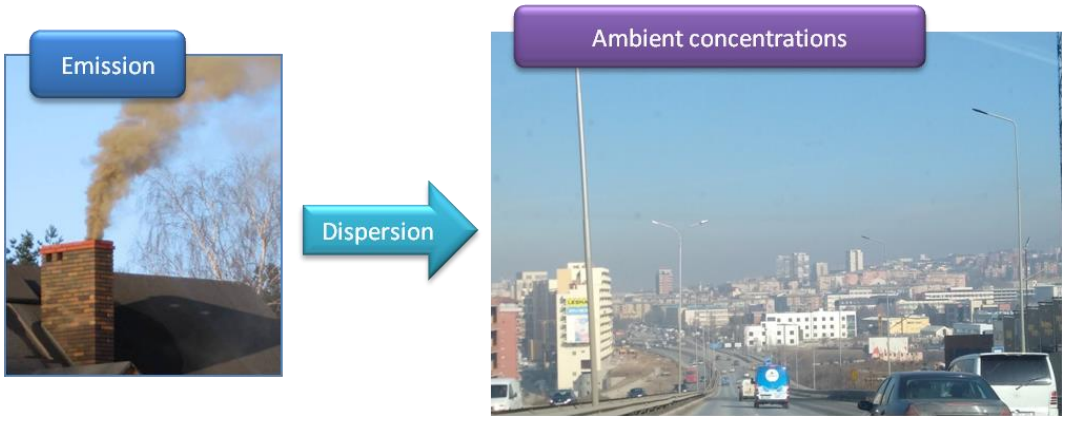


Figure 1 Emission versus ambient concentrations

Method and Data Sources

The creation of the emission inventory was based on a methodology set out by the European Environment Agency[2] and was supported by existing data in Kosovo.

This included data from other inventories created by the Kosovo Environmental Protection Agency (KEPA), Japan International Cooperation Agency (JICA) for specific areas of Kosovo and for other purposes.

At a national level data were collected from institutions such as the Kosovo Statistical Agency, Kosovo Cadastral Agency and Ministry of Infrastructure. At a local level data were collected from City Municipalities. In some cases, specific data were taken from other studies such as those undertaken by the European Union (EU).

The data in the Emissions Inventory specifically represents the year 2018. This year was chosen because it was considered that the data available to create the inventory was most accurate and reliable for 2018.

The following emission sources, referred to as 'sectors', are included in the Inventory:

1. Small combustion – heating (also cooking) in domestic, public and business services.
2. Transport: roads and aviation.
3. Industry: power plants and large industrial installations.
4. Agriculture.
5. Landfill (Waste).
6. Mines and quarries .
7. Natural sources: forests.

Results and Conclusions

A summary of the emissions in Kosovo in 2018 for each sector is presented in Figure 2 and table 1.

[2] *EEA Report No 13/2019; EMEP/EEA air pollutant emission inventory guidebook 2019 — European Environment Agency (europa.eu)*

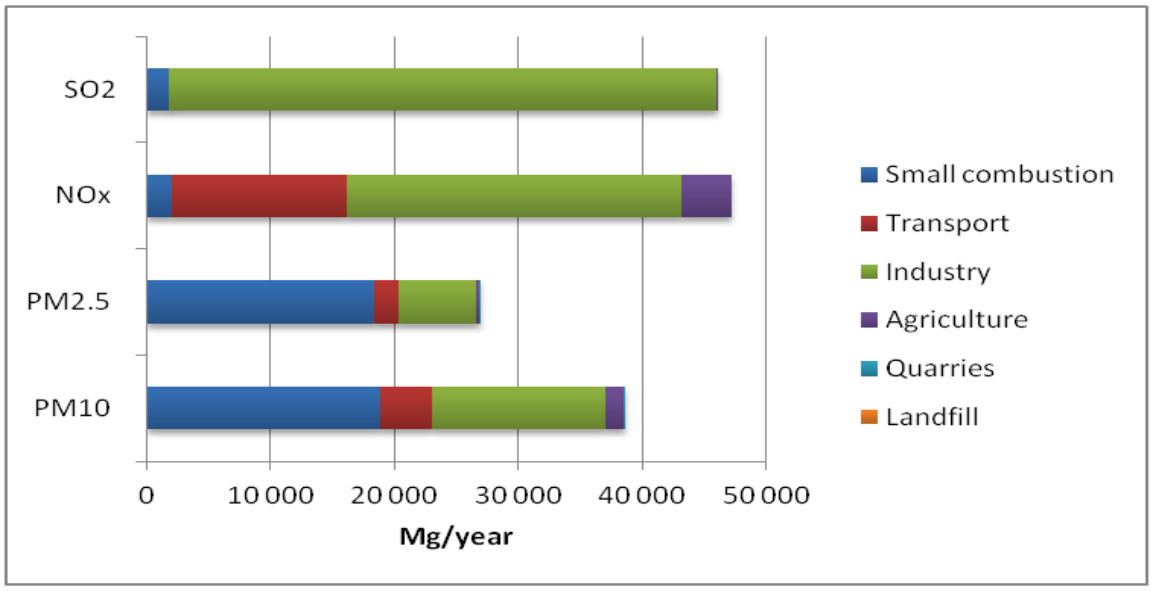


Figure 2 Emissions for Kosovo in 2018 for the main pollutants by sector[Mg/year]

Table 1 Emission or Kosovo in 2018 for the main pollutants by sector

Pollutant	Small combustion	Transport	Industry	Agriculture	Quarries	Landfill	Total
	[Mg/year]	[Mg/year]	[Mg/year]	[Mg/year]	[Mg/year]	[Mg/year]	[Mg/year]
PM_{10}	18 883	4 174	14 003	1 443	112	0	38 616
$PM_{2.5}$	18 397	1 860	6 372	204	11	0	26 846
NOx	1 976	14 169	26 971	4028	0	0	47 145
SO_2	1 745	9,5	44 201	2,8	0	0	45 958

The emission of other pollutants, such as heavy metals, is about 630 kg / year, and the emission of volatile non-methane compounds (NMVOCs) - about 28 Mg / year.

Figure 3 presents the relative share of emissions for each of the sectors and Figure 4 shows the locations of emissions of PM_{10} and NOx.

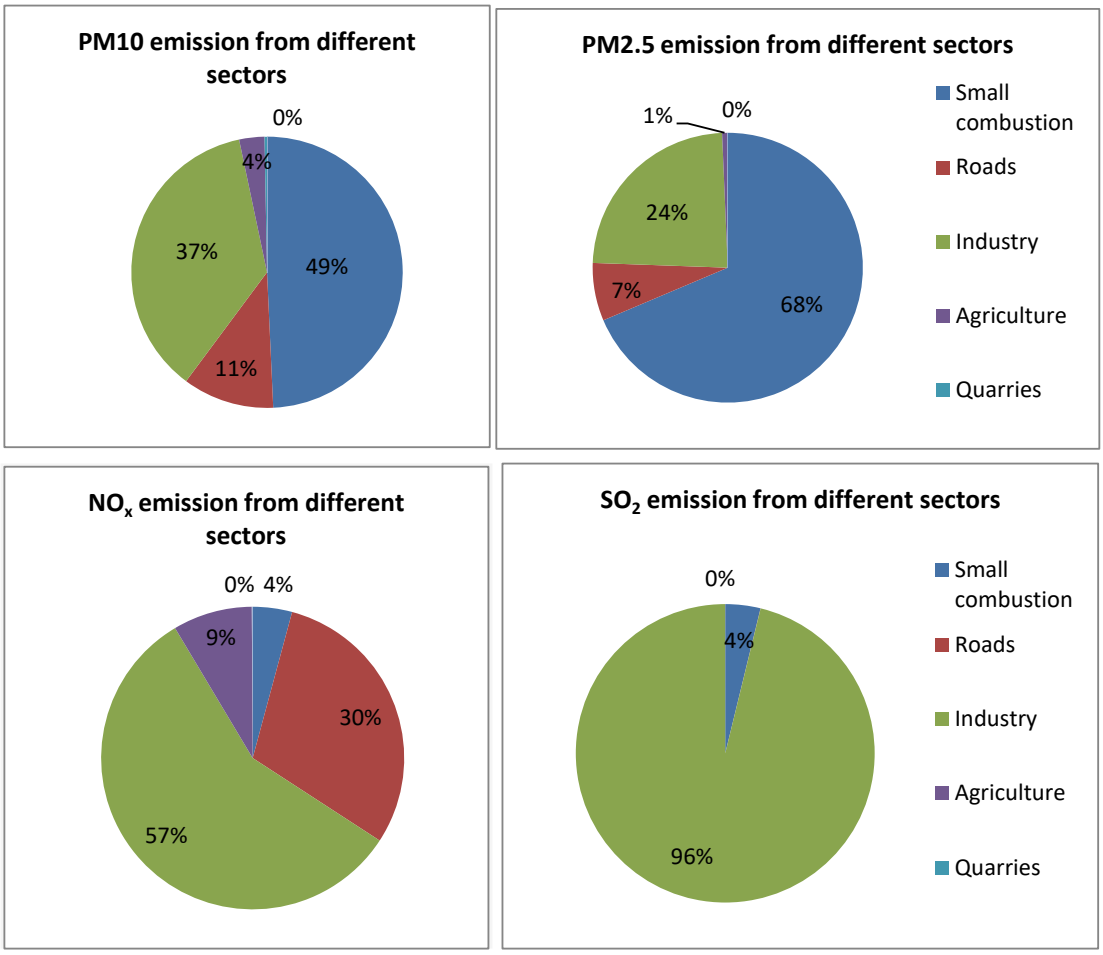
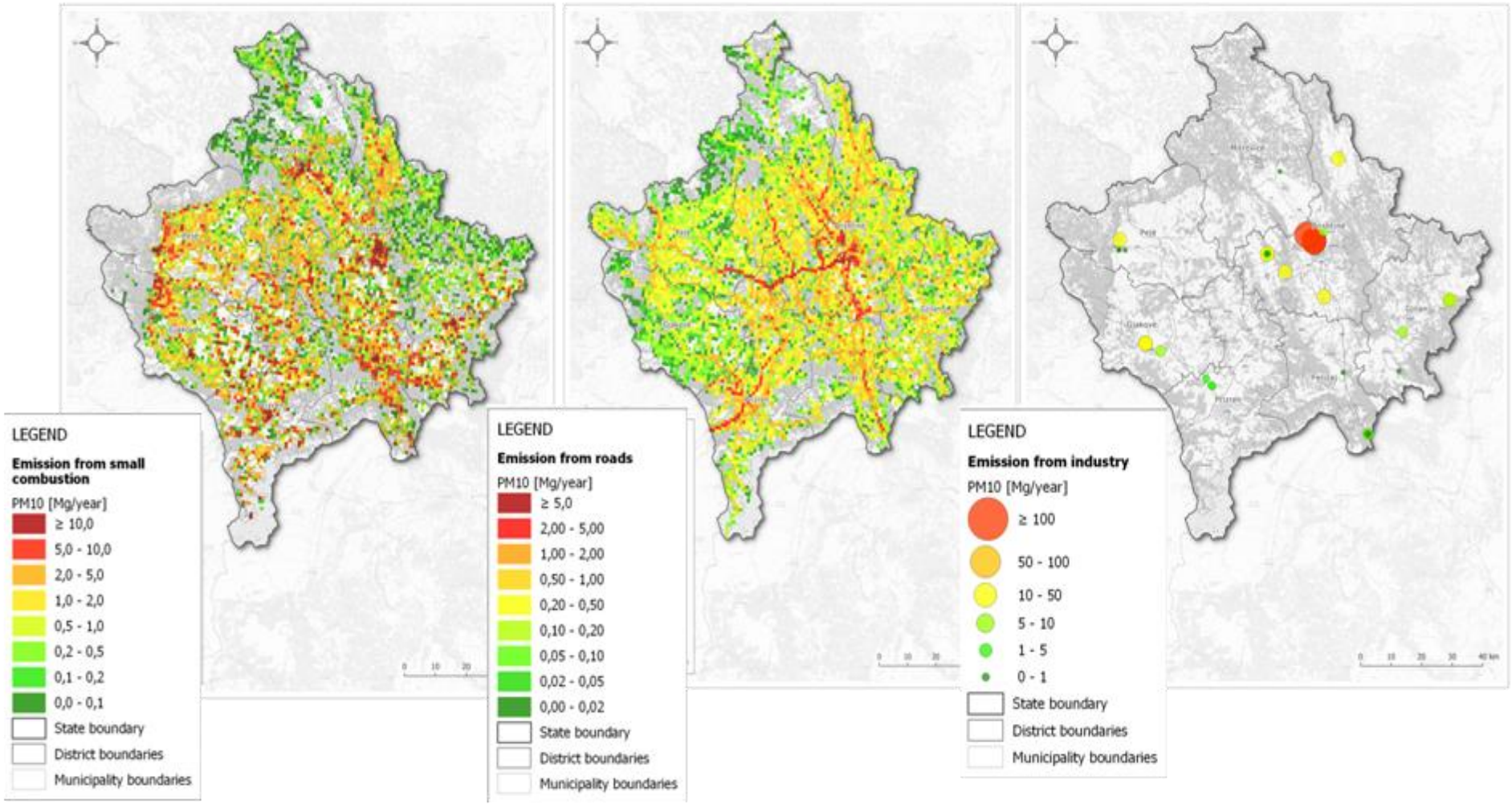


Figure 3 Share of individual sectors in emissions of the main pollutants


LEGEND
Emission from small combustion
PM10 [Mg/year]
≥ 10,0
5,0 - 10,0
2,0 - 5,0
1,0 - 2,0
0,5 - 1,0
0,2 - 0,5
0,1 - 0,2
0,0 - 0,1
State boundary
District boundaries
Municipality boundaries
LEGEND
Emission from roads
PM10 [Mg/year]
≥ 5,0
2,00 - 5,00
1,00 - 2,00
0,50 - 1,00
0,20 - 0,50
0,10 - 0,20
0,05 - 0,10
0,02 - 0,05
0,00 - 0,02
State boundary
District boundaries
Municipality boundaries
LEGEND
Emission from industry
PM10 [Mg/year]
≥ 100
50 - 100
10 - 50
5 - 10
1 - 5
0 - 1
State boundary
District boundaries
Municipality boundaries

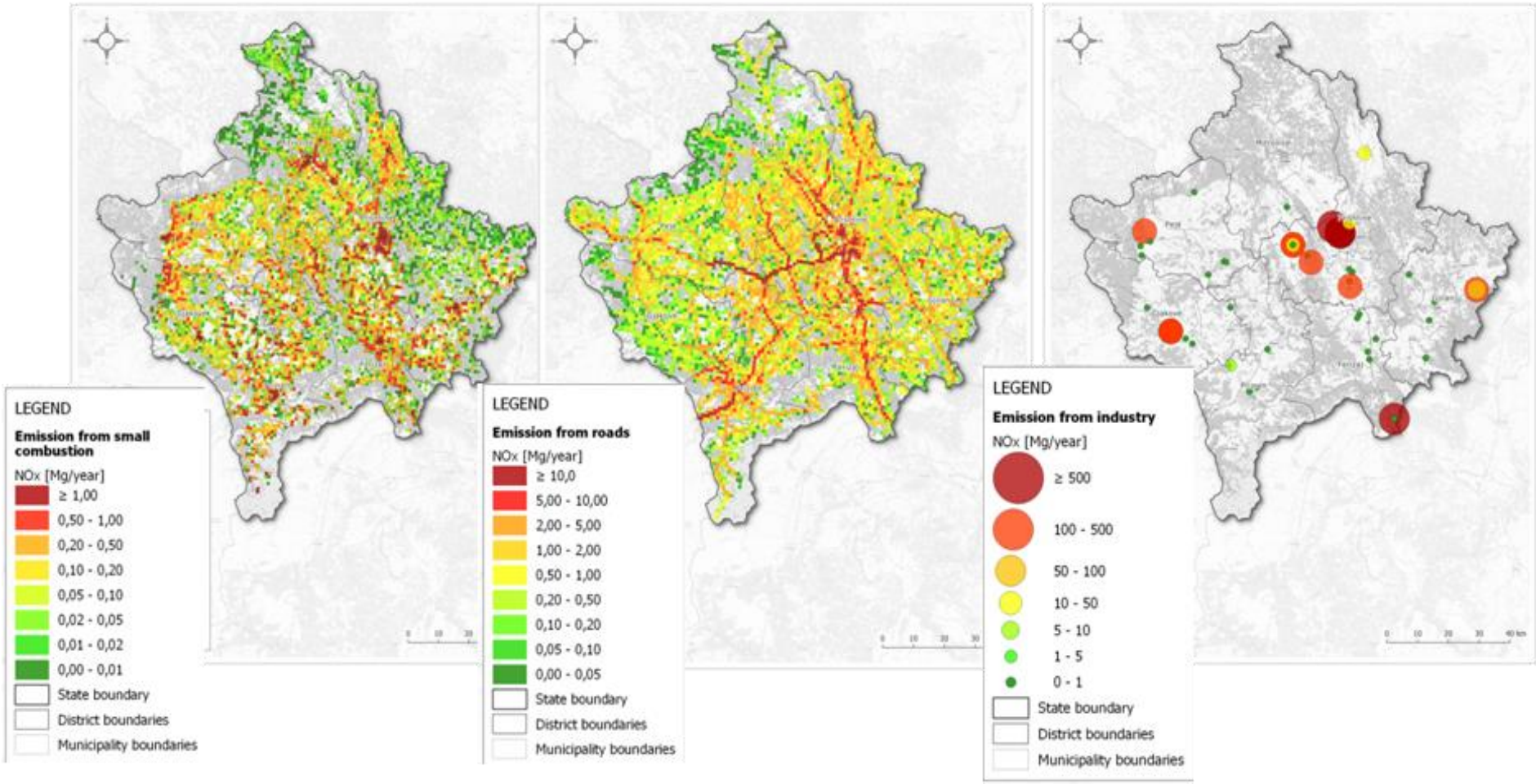


Figure 4 Annual emission of PM_{10} and NOx for the main sources

Key points to note are:

- The largest sources of emissions of PM_{10} and $PM_{2.5}$ are small combustion, mainly domestic heating. Overall, almost 50% of PM_{10} and 68% of $PM_{2.5}$ comes from small combustion. Industry is the second largest with 37% for PM_{10} and 24% for $PM_{2.5.}$ Transport, mainly road traffic, is the third source with 11% and 7% shares in emission respectively. The remaining sectors account for less than 5% of emissions.
- Industry and transport, mainly road traffic, are the largest emissions sources of NO_x. Industry represents 57% and transport 30%.
- Industry is the largest source of SO_2 emissions at 96%.
- Most emissions of PM_{10}, $PM_{2.5}$ and NO_x occur in urban areas and along main roads.
- Small combustion is the main source of heavy metals emission, CO and NMVOC. However, emissions of heavy metals and NMVOC from industry are not included.

All Emissions Inventories are subject to uncertainty. As this is the first Emissions Inventory of its kind for Kosovo there are a number of opportunities to improve its accuracy in future such as through additional data collection. Specific areas for improvement have been identified and it is expected that the Inventory will be updated in future to allow this, and to account for changes in the emission sources.