

# Kvalitet vazduha

## Air Quality

Prije rata, Sarajevo je spadalo među najzagađenije gradove u Evropi. Zbog brojne industrije smještene u Bosni i Hercegovini, ta republika je bila najzagađeniji dio bivše Jugoslavije. Kvalitet vazduha se poboljšao za vrijeme rata zbog potpunog uništenja industrije. Međutim, tačni podaci o kvalitetu vazduha u BiH nisu dostupni (REC, 2000).

Before the war, Sarajevo was among the most polluted cities in Europe. Because of many industries located in Bosnia and Herzegovina, this republic was one of the most polluted parts of ex-Yugoslavia. Air quality improved during the war, due to the complete breakdown of industry. However, exact data on air quality in BiH is not available (REC, 2000).

### Glavni trendovi u BiH

U češće Bosne i Hercegovine u ukupnom zagađenju vazduha u bivšoj Jugoslaviji iznosilo je 32%.

Organizovani svakodnevni monitoring kvaliteta vazduha postoji u Sarajevu i podaci su odnedavno dostupni na Internetu.

Prema predratnim izvještajima Državnog zavoda za zdravstvo u Sarajevu, Sarajevo je u 1980-im spadalo među najzagađenije gradove u Evropi (REC, 2000).

### Main BiH Trends

The contribution of Bosnia and Herzegovina to the total air pollution of former Yugoslavia was 32%.

There is organized daily monitoring of air quality in Sarajevo, and the data is available on the Internet.

According to the pre-war surveys by the Public Health Institute in Sarajevo, Sarajevo was among the most polluted cities in Europe in the 1980s (REC, 2000).

## Kvalitet vazduha

Pritisak na kvalitet vazduha izazivaju sektori industrije, energije, transporta i domaćinstava. Sektor transporta je odgovoran za emisije CO, NO<sub>x</sub>, VOC, olova i izvjesne količine SO<sub>x</sub> (čiji je glavni izvor korištenje energije). Domaćinstva doprinose emisijama CO, NO<sub>x</sub>, VOC, kao i čestica, uglavnom putem sagorijevanja goriva. Industrija doprinosi emisijama SO<sub>x</sub>, VOC i NO<sub>x</sub>. Poljoprivreda je glavni izvor metana, amonijaka i azotnih oksida.

Zagađenje vazduha dovodi do formiranja zimskog smoga (SO<sub>2</sub>, čestice i CO), kao i ljetnjeg smoga (NO<sub>x</sub> i VOC). Iako je količina zimskog smoga u većini urbanih oblasti smanjena, količina ljetnjeg smoga se povećava. Formiranje troposferskog ozona je globalni problem, zbog toga što uključuje komplicirane fotohemijske reakcije kojima treba dugo vremena da se dogode, tako da mogu da se dogode i veoma daleko od stvarnog izvora zagađenja.

Emisije zagađivača u vazduh takođe dovode do eutrofikacije i kiselih padavina. Problem acidifikacije (kiselih kiša) je povezan sa visokim koncentracijama SO<sub>x</sub> i NO<sub>x</sub> koji se emituju sagorijevanjem fosilnih goriva pri proizvodnji energije, transportu i poljoprivrednim aktivnostima. Kisele padavine prouzrokovale su značajne štete površinskim vodama i šumama u mnogim dijelovima svijeta. Eutrofikacija je veoma ozbiljan problem izazvan, između ostalog, i emisijom NO<sub>x</sub>.

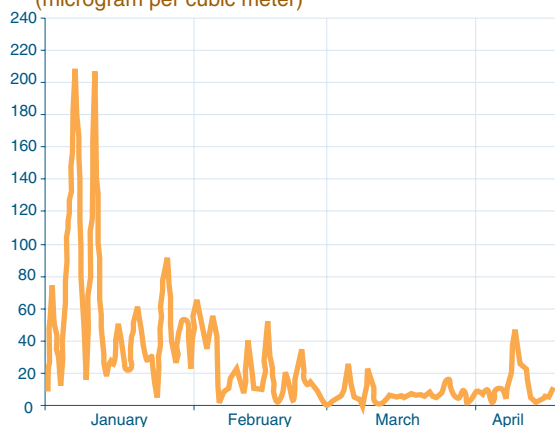
## Političke opcije

Integrirane političke opcije su prilično ograničene i najčešće fokusirane na odvojene sektore i dijelove

# Kvalitet vazduha

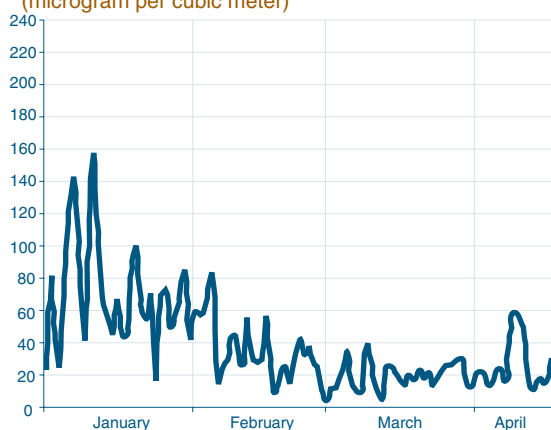
## Air Quality

Prosječna dnevna koncentracija NO u Sarajevu u 2002 (mikrogrami po kubnom metru)  
Average Daily Concentration of NO in Sarajevo in 2002 (microgram per cubic meter)



Izvor-Source: Federal Meteorological Institute.

Prosječna dnevna koncentracija NO2 u Sarajevu u 2002 (mikrogrami po kubnom metru)  
Average Daily Concentration of NO2 in Sarajevo in 2002 (microgram per cubic meter)



Izvor-Source: Federal Meteorological Institute.

Prosječna dnevna koncentracija SO2 u Sarajevu u 2002 (mikrogrami po kubnom metru)  
Average Daily Concentration of SO2 in Sarajevo in 2002 (microgram per cubic meter)



Izvor-Source: Federal Meteorological Institute.

okoliša. Trebalo bi da se naprave integralni planovi za upravljanje vazduhom, koji bi kombinovali regulativu za emisije iz svih izvora i ekonomske instrumente, koji bi podstakli razvoj čistih tehnologija, vozila i goriva (OECD, 2001).

Određivanje cijena i taksi moglo bi podstaći zamjenu goriva i uštede u energiji. Fiskalna politika trebalo bi da stimulise upotrebu goriva sa manjim sadržajem sumpora i tehnološka poboljšanja koja vode redukcijama emisije čestica i NOx iz dizel motora, kao i tehnologija koje vode smanjenju potrošnje goriva (OECD, 2001).

### Kvalitet vazduha u BIH

Većina materija koje zagađuju vazduh potiče od industrijskih aktivnosti, ali značajan dio i od transporta. Industrija je bila naznačajniji zagađivač: željezara Zenica, termoelektreane u Kaknju, Tuzli, Ugljeviku i Gacku; cementare u Kaknju i Tuzli; drvnoprerađivačka industrija u Maglaju; tvornica acetilena, hlora i hlorne kiseline u Jajcu; fabrika deterdženata i đubriva u Tuzli; te mnoge druge. Većina industrije je prestala sa radom u toku rata i još uvijek nije rekonstruisana na predratni nivo. Zahvaljujući tome, zagađenje vazduha je mnogo manje nego prije rata. Najznačajniji zagađivač vazduha u zatvorenim prostorima je duvanski dim (75-80% populacije iznad 18 godina su pušači).

Podaci o kvalitetu vazduha u BIH uglavnom nisu dostupni (REC, 2000). Organizovani monitoring kvaliteta vazduha postoji u Sarajevu i podaci o dnevnom zagađenju su odnedavno dostupni preko Interneta na EIONETU. Podsticaji za čistiju proizvodnju i kontrolu zagađenja su veoma rijetki (REC, 2000).

### Air Quality

The pressures on air quality come from industry, energy, transport, agriculture, and households. The transport sector is responsible for emissions of CO, NOx, VOC, lead, and some SOx (the main source of this last being energy consumption). Households contribute with emissions of CO, NOx, VOC, and particulate matters, mainly through fuel combustion. Industry contributes to emissions of SOx, VOC, and NOx. Agriculture is the main source of methane, ammonia, and nitrous oxide.

Air pollution leads to formation of winter

# Kvalitet vazduha

## Air Quality

### Globalni trendovi i projekcije

**Z**načajno smanjenje emisije sumpornih oksida, olova i ugljen monoksida nastavit će se u OECD. Emisije čestica, međutim, bit će u porastu.

**S**ektor transporta odgovoran je za emisije 85% CO, 52% NO<sub>x</sub>, 44% VOC i 50% olova, ali samo za 4% SO<sub>x</sub>, čiji je najveći izvor energija (23%).

**K**oncentracije ozona u troposferi udvostručile su se u Evropi od 1950. Najveći razlog za to je porast koncentracije VOC i NO<sub>x</sub>, koji potiču iz sektora transporta i industrije.

**L**imiti za nivo ozona, postavljeni od strane WHO, uveliko se premašuju (u 95% mjesta u SAD i Japanu, i 90% mjesta u Evropi gdje se vrši monitoring). Preko 33 miliona ljudi u evropskim gradskim područjima izloženo je visokom nivou ozona tokom više od 25 dana godišnje.

**T**renutno, između 20 i 40% osjetljivih ekosistema u Evropi prima više kiselih oborina nego što je dozvoljeno, ali se očekuje da će se to smanjiti na 10% do 2010.

**E**utrofikacija je veoma ozbiljan problem, koji nastaje usljed emisija NO<sub>x</sub>. Skoro 80% područja u CEE i 40% u Zapadnoj Evropi je ugroženo. Očekuje se da će se te vrijednosti smanjiti na 60%, odnosno 20% do 2010. (OECD, 2001).

### Global Trends and Projections

**S**ignificant reductions in emission of sulfur oxides, lead, and carbon monoxide in OECD will continue. However, emissions of particulate matter have been increasing.

**T**he transport sector is responsible for 85% of CO, 52% of NO<sub>x</sub>, 44% of VOC, and 50% of lead emissions, but only for 4% of SO<sub>x</sub>, a major source of which is the energy (23%).

**C**oncentrations of tropospheric ozone have doubled in Europe since 1950. The main reason for this is the increase in the concentration of VOC and NO<sub>x</sub> released from transport and industry.

**T**he limits imposed on ozone levels by WHO are being exceeded by a great amount (95% of monitored sites in USA and Japan, and 90% of sites in Europe). More than 33 million people in European urban areas are exposed to high levels of ozone for more than 25 days a year.

**C**urrently, between 20 and 40% of sensitive ecosystems in Europe receive more acid depositions than is tolerable, but it is expected that this will decrease to 10% by 2010.

**E**utrophication is a very serious problem caused by NO<sub>x</sub> emissions. Almost 80% of areas in CEE and 40% in Western Europe are endangered. By 2010, these values are expected to decline to 60% and 20% respectively (OECD, 2001).

smog (SO<sub>2</sub>, PM, and CO) and summer smog (NO<sub>x</sub>, VOC). Although winter smog has decreased in most urban areas, summer smog is increasing. Tropospheric ozone formation is a global problem, since it involves complicated photochemical reactions that take time to occur, and may happen very far from actual sources of pollution.

Air emissions also lead to eutrophication and acidic depositions. Acidification problems are related to high concentrations of SO<sub>x</sub> and NO<sub>x</sub> emitted from fossil fuels combustion for power generation, transport, and agriculture. Acidic depositions have caused much damage to surface waters and forests in many parts of the world. Eutrophication is a very serious problem caused by NO<sub>x</sub> emissions.

### Policy Options

Integrated policies are quite limited; most of them focus on separate environmental media and sectors. Integral air quality management plans should be made, which will combine regulations on emission from all sources, and economic instruments that could encourage the development of clean technologies, vehicles, and fuels (OECD, 2001).

Pricing and tax incentives could encourage fuel substitution and energy savings. Fiscal incentives should stimulate use of fuels with lower sulfur content and technological improvement to reduce emissions of PM and NO<sub>x</sub> from diesel engines, as well as technologies that lead to lower fuel consumption (OECD, 2001).

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### **Air Quality in BIH**

Most air pollutants come from industrial activities, but a significant quantity also from traffic. Industry was the most important polluter: this includes the steel industry in Zenica, thermal power plants in Kakanj, Tuzla, Ugljevik, and Gacko; cement factory in Kakanj and Tuzla; wood processing industry in Doboj and Maglaj; acetylene, chlorine, and chloric acid factory in Jajce; chemical, detergent, and fertilizer industry in Tuzla; and many more. Before the war, there were 122 industrial wastewater plants in BIH (only 40% were operating properly). Currently none of them is working. Most industry collapsed during the war, and has not been restored to the pre-war levels yet. Therefore, pollution is much lower than before the war. The most significant indoor air pollutant is tobacco smoke (75-80% of the population over 18 smokes).

Data on air quality in BIH is missing (REC, 2000). An organized air quality monitoring exists in Sarajevo, and daily data on the main air pollutants is available on the Internet through EIONET. Incentives for cleaner production and pollution control are few (REC, 2000).