Air

CSI 001 Emissions of acidifying substances

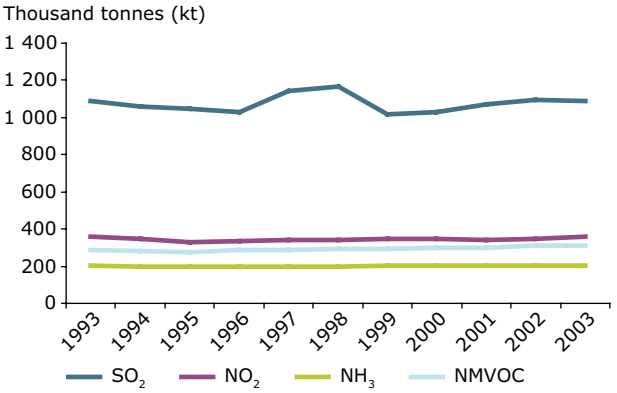
Indicator definition:
Emissions of acidifying pollutants tracks trends in anthropogenic emissions of acidifying substances such as nitrogen oxides, ammonia, and sulphur dioxide, each weighted by their acidifying potential. Projections of emissions of acidifying pollutants present results of the RAINS and EMEP models for nitrogen oxides, sulphur dioxide and ammonia.

Key policy question:
What progress is being made and what are the prospects in reducing the emission of acidifying pollutants in the Western Balkans?

Past and present trends

Key message:
Comparing emissions of acidifying pollutants from 1993 to 2003 *, most ended the time period at levels to those at the start, with minor variations in between. SO_2 and NO_2 show similar levels in 1993 and 2003, and while NH_3 emissions register a reduction of 2 % over the 10-year timeframe, and NMVOC emissions show an increase of 8.4 %.

Emissions of acidifying substances in the Western Balkans, 1993–2003



Assessment:
SO_2 emissions remained stable in the Western Balkan region as a whole from 1993 to 2003, but significantly different trends were registered in the countries. While Croatia managed to reduce emissions by 41 % (from 114 kt to 67 kt) emissions in the former Yugoslav Republic of Macedonia increased by 42 % (from 105 kt to 150 kt), though the country registered their first decrease in SO_2 emissions in 2003, breaking that trend. Bosnia and Herzegovina and Serbia and Montenegro together accounted for ca 75 % of total SO_2 emissions with roughly equally equal shares in 2003.
Similar to SO_2, NO_2 emissions remained at a stable level from 1993 to 2003, also with different trends within individual countries. Albania, Croatia and the former Yugoslav Republic of Macedonia registered increased emissions (by 21 %, 17 % and 47 % respectively), while Bosnia and Herzegovina and Serbia and Montenegro saw reductions in their emissions of 14 % and 11 %.
NH_3 showed an overall reduction of 2 % in Western Balkan between 1993 and 2003. Albania is the only country which registered an increase in NH_3 emissions (+ 10 %) while the other Western Balkan states where able to reduce or at least stabilise their NH_3 emissions. In 2003 Serbia was responsible for 39% of NH_3 emissions in the region, followed by Croatia with 25 %.
Emissions of NMVOC increased in all Western Balkan states other than Bosnia and Herzegovina (– 4.5 %) amounting to a total 8.4 % increase between 1993 and 2003. The most significant increases were registered in Croatia with 27.5 % (from 69 kt to 88 kt) and in Albania with 17.2 % (from 29 kt to 32 kt). Serbia has been able to hold emissions stable, but was nevertheless responsible for 41 % of total Western Balkan NMVOC emissions in 2003.

Source: Inventory Review 2005, Emission Data reported to LRTAP Convention and NEC Directive ISSN 0804-2446.

Temporal coverage: 1993–2003.

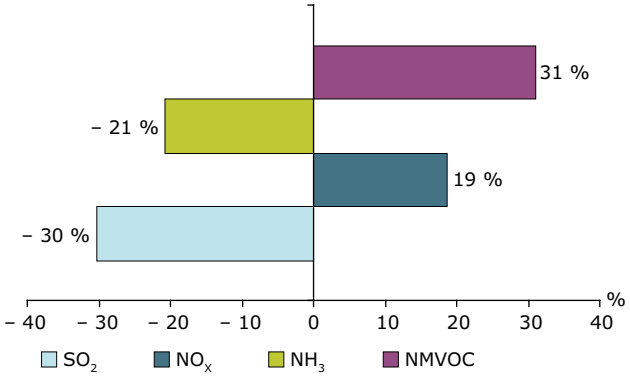
Spatial coverage: Albania, Bosnia and Herzegovina, Croatia, the former Yugoslav Republic of Macedonia, Serbia and Montenegro.

* It should be noted that for some of the Western Balkan countries (Croatia, the former Yugoslav Republic of Macedonia, Serbia) updated national data sets until 2007 are available at Eionet as part of the reporting obligations for the LRTAP Convention. However, construction of an update for the regional indicator was not possible due to lack of updated data for some of the pollutants and lack of updates for the other countries in the region.

Outlook trends

Key message:
Outlook trends under the baseline scenario in Western Balkans indicate that while SO_2 emissions are projected to decline by 30 % between 2000 and 2020 and NH_3 emissions could fall by 21 %; NO_2 and NMVOC emissions are forecast to grow by 19 % and 31 % respectively *.

Projected change in emissions of acidifying substances in the Western Balkans, 2000–2020



Assessment:
Bosnia and Herzegovina, despite a projected reduction of 9% between 2000 and 2020, will likely stay the biggest emitter of SO_2, accounting for 53 % (380 kt) of all SO_2 emissions in the region in 2020. Serbia and Montenegro projects the biggest reduction in emissions with 57 % down to 167 kt. Croatia is projected to increase SO_2 emissions between 2000 and 2020 (by 12 %), at the same time the emission ceiling target set for 2010 under the Gothenburg Protocol (70 kt) is not expected to be exceeded **.
All Western Balkan countries are projected to increase their NO_2 emissions between 2000 and 2020. Increases vary from state to state with so little as a 5 % in Bosnia and Herzegovina and as much as 35 % in Croatia and 43 % in the former Yugoslav Republic of Macedonia.
As opposed to NO_2, between 2000 and 2020 NH_3 emissions are projected to decline in all countries with reductions ranging from 6 % in the former Yugoslav Republic of Macedonia to 37 % in Croatia.
NMVOC will likely present significant growth in emissions in all Western Balkan countries from 2000 to 2020, growing with 31 % overall. Emission growth rates for the individual countries are projected to be between 21 % and 33 % with the exception of the former Yugoslav Republic of Macedonia where a growth of 124 % is forecast.

Source: Inventory Review 2005, Emission Data reported to LRTAP Convention and NEC Directive, ISSN 0804-2446 **.

Temporal coverage: 2000–2020.

Spatial coverage: Albania, Bosnia and Herzegovina, Croatia, the former Yugoslav Republic of Macedonia, Serbia and Montenegro.

* New projections will be available in December 2009 from IIASA's model GAINS-Europe as part of the work dedicated to the revision of the Gothenburg Protocol.
** Available national projections from Croatia are different from these projections and suggest a decrease of SO_2 emission in 2010 and 2020 (Eionet data flow, Status October 2009).

CSI 002 Ozone precursors

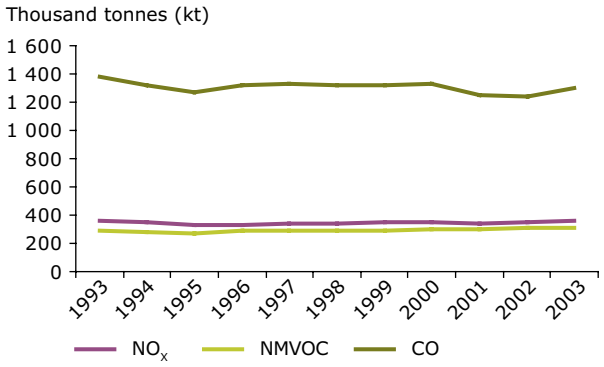
Indicator definition:
Generally, the indicator 'emissions of ozone precursors' tracks trends in anthropogenic emissions of ozone precursors such as nitrogen oxides, carbon monoxide, methane and non methane volatile organic compounds, each weighted by their tropospheric ozone-forming potential. Projections of emissions of ozone precursors present results of the RAINS and EMEP models for only three ozone precursors: nitrogen oxides (NO_x), carbon monoxide (CO) and non-methane volatile organic compounds (NMVOCs) *.

Key policy question:
What progress is being made and what are the prospects for reducing the emission of ozone precursors in the Western Balkans?

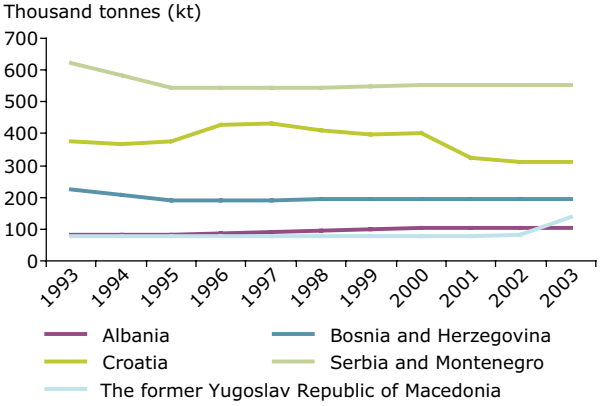
Past and present trends

Key message:
Emissions of ozone precursors in Western Balkans from 1993 to 2003 **, have stayed relatively stable over this time period with an initial decline from 1993 to 1995 followed by increases until 2003. Emissions over the ten-year period increased by less then 1 % for NO_x and about 8.4 % for NMVOC while CO emissions decreased by 6 %.

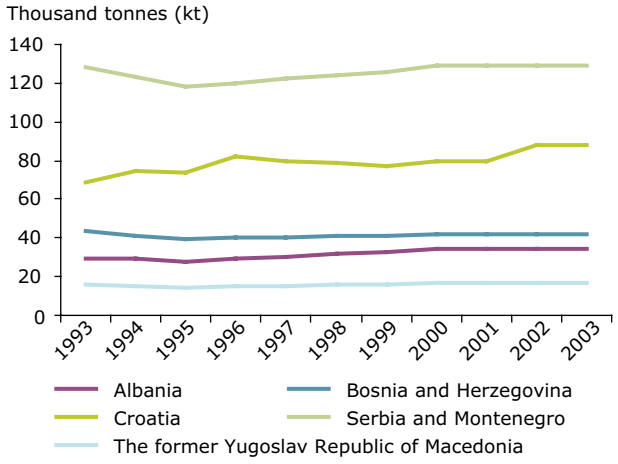
Ozone precursors in the Western Balkans, 1993–2003



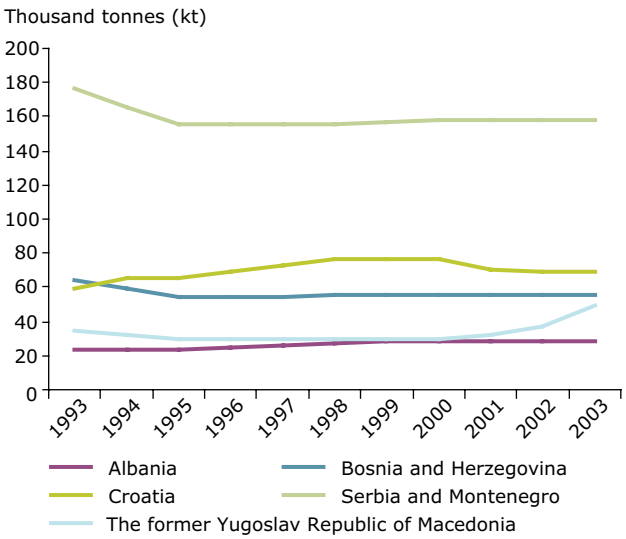
CO emissions in the Western Balkans, 1993–2003



NMVOC emissions in the Western Balkans, 1993–2003



NO_2 emissions in the Western Balkans, 1993–2003



Assessment:
NO_2 emissions remained at a stable level from 1993 to 2003, with different trends in the Western Balkan countries. Albania, Croatia and the former Yugoslav Republic of Macedonia registered increased emissions (by 21 %, 17 % and 47 % respectively), while Bosnia and Herzegovina and Serbia and Montenegro saw reductions by 14 % and 11 %.
Emissions of NMVOC increased in all Western Balkan states other than Bosnia and Herzegovina (– 4.5 %) amounting to a total of plus 8.4 % between 1993 and 2003. The most significant increases were registered in Croatia with 27.5 % (from 69 kt to 88 kt) and in Albania with 17.2 % (from 29 kt to 32 kt). Serbia has seen stable emissions levels, but was nevertheless responsible for 41 % of total Western Balkan NMVOC emissions in 2003. While CO emissions in the Western Balkan states overall declined by 6 %, development differs considerably from country o country. Bosnia and Herzegovina, Serbia and Montenegro and Croatia registered a decline of emissions between 11 % and 17 % whereas Albania and the former Yugoslav Republic of Macedonia show increases of 21 % and 81 % respectively.

Source: Inventory Review 2005, Emission Data reported to LRTAP Convention and NEC Directive, ISSN 0804-2446.

Temporal coverage: 1993–2003.

Spatial coverage: Albania, Bosnia and Herzegovina, Croatia, the former Yugoslav Republic of Macedonia, Serbia and Montenegro.

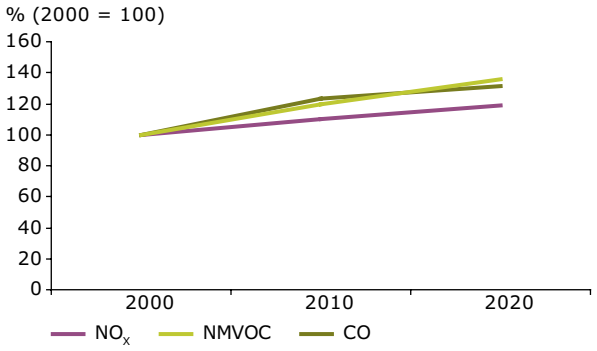
* This indicator is based on the results of RAINS and EMEP models presented in the Inventory Review 2005, Emission Data reported to LRTAP Convention and NEC Directive ISSN 0804-2446. GAINS model (a successor of RAINS model) include also projections for all ozone precursors: nitrogen oxides, carbon monoxide, methane and non methane volatile organic compounds.

** It should be noted that for some of the Western Balkan countries (Croatia, the former Yugoslav Republic of Macedonia, Serbia) updated national data sets until 2007 are available at Eionet as part of the reporting obligations for the LRTAP convention. However, construction of an update for the regional indicator was not possible due to lack of updated data for some of the pollutants and lack of updates for the other countries in the region.

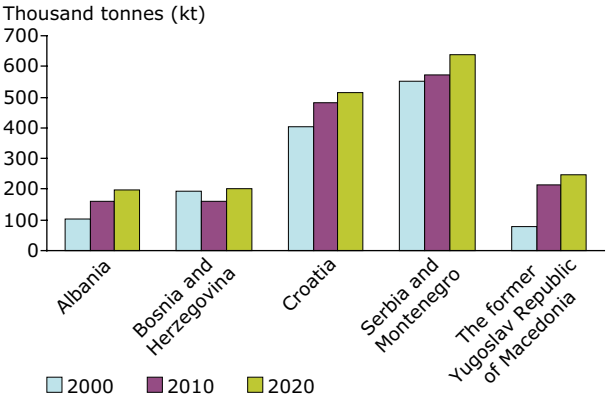
Outlook trends

Key message:
Although some slight reduction of emissions of ozone precursors was registered in the Western Balkans since 1990, the baseline scenario projections suggest that from 2000 to 2020 NO_2, CO and NMVOC emissions are expected to grow by 19 %, 36 % and 31 % respectively with not a single country in the region expected to see a reduction in either of these emissions *.

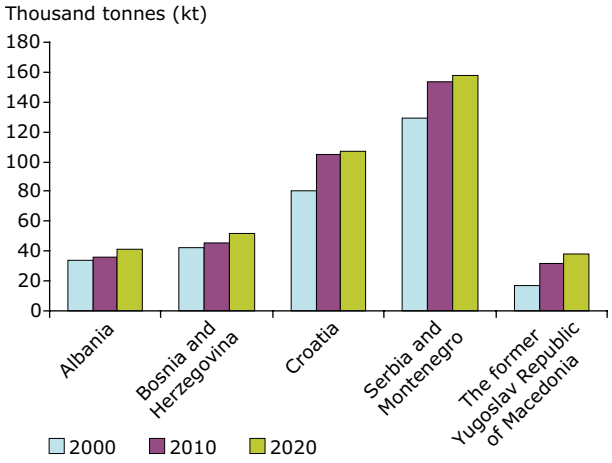
Total projected ozone precursors in the Western Balkans until 2020



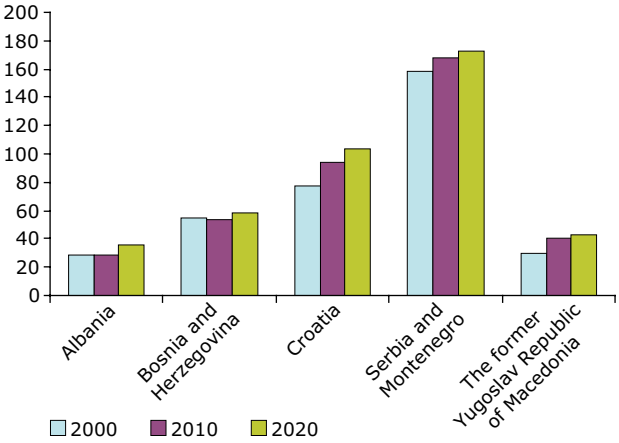
Projected CO emissions in the Western Balkans until 2020



Projected NMVOC emissions in the Western Balkans until 2020



Projected NO_2 emissions in the Western Balkans until 2020



Assessment:
All Western Balkan countries are projected to increase their NO_2 emissions between 2000 and 2020. Increases vary, from as little as 5 % in Bosnia and Herzegovina to as much as 35 % in Croatia and 43 % in the former Yugoslav Republic of Macedonia.
NMVOC emissions will likely see a significant growth in all Western Balkan countries, rising by 31 % overall. Emission growth rates for the individual countries are projected to be between 21 % and 33 % with the exception of the former Yugoslav Republic of Macedonia where a growth of 124 % is forecast.
Although a significant reduction of emissions from 1990 to 2000 is registered in all the Western Balkans countries CO emissions are expected to grow between 5 % (Bosnia and Herzegovina) and over 200 % (the former Yugoslav Republic of Macedonia) from 2000 to 2020. The biggest emitters in the region currently are Serbia and Croatia which are likely to stay that way in 2020 as well.

Source: Inventory Review 2005, Emission Data reported to LRTAP Convention and NEC Directive, ISSN 0804-2446.

Temporal coverage: 2000–2020.

Spatial coverage: Albania, Bosnia and Herzegovina, Croatia, the former Yugoslav Republic of Macedonia, Serbia and Montenegro.

* New set of projections will be available in December 2009 from IIASA's model GAINS-Europe as part of the work dedicated to the revision of the Gothenburg Protocol.

CSI 003 Emissions of primary particles

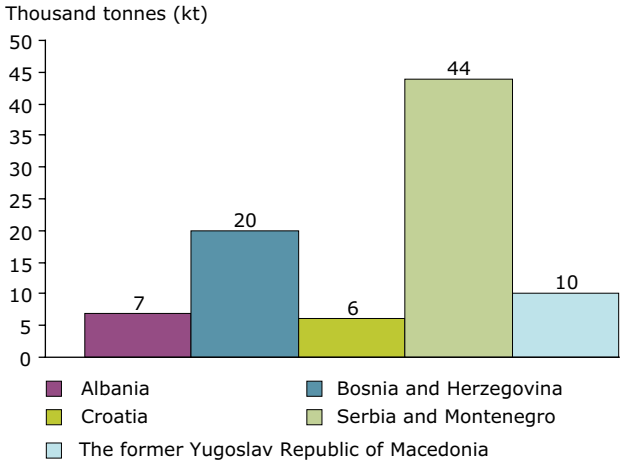
Indicator definition:
This indicator tracks trends in emissions of primary particulate matter PM_{10} and $PM_{2.5}$. 'PM_{10}' means particulate matter which passes through a size-selective inlet with a 50 % efficiency cut-off at 10 mm aerodynamic diameter;
'$PM_{2.5}$' means particulate matter which passes through a size-selective inlet with a 50 % efficiency cut-off at 2.5 mm aerodynamic diameter.
Projections of emissions of primary particulates present results of the RAINS and EMEP models for both PM_{10} and $PM_{2.5}$ *.

Key policy question:
What progress is being made and what are the prospects for reducing particulate matter in the Western Balkans?

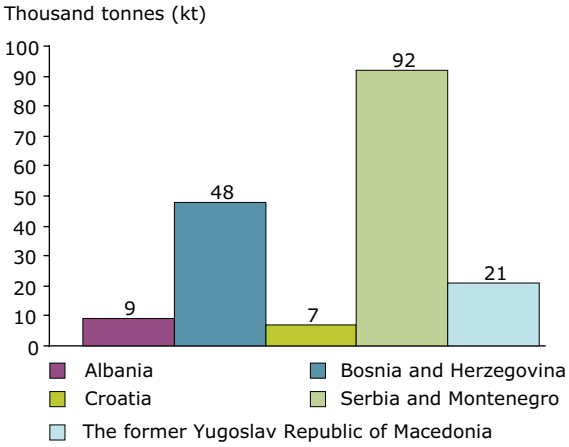
Past and present trends

Key message:
The limited past trends data available shows no change in emissions between 2000 and 2003 **.

Annual emissions of $PM_{2.5}$ in the Western Balkans, 2000–2003



Annual emissions of PM_{10} in the Western Balkans, 2000–2003



Assessment:
The data available for the years from 2000 to 2003 are identical, indicating no or only minor variations of emissions during this time period.

Source: Inventory Review 2005, Emission Data reported to LRTAP Convention and NEC Directive ISSN 0804-2446.

Temporal coverage: 1993–2003.

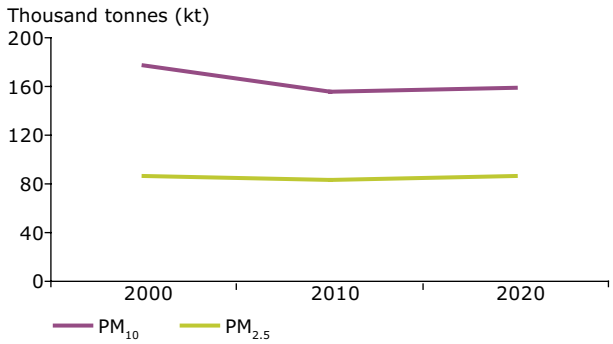
Spatial coverage: Albania, Bosnia and Herzegovina, Croatia, the former Yugoslav Republic of Macedonia, Serbia and Montenegro.

* In contrast to EEA CSI 003, this indicator only include PM and does not include secondary particulate matter precusors (NO_x, NH_3 and SO_2).
** It should be noted that for some of the Western Balkan countries (HR) updated national data sets for PM_{10} and $PM_{2.5}$ until 2007 are available at Eionet as part of the reporting obligations for the LRTAP convention. However, construction of an update for the regional indicator was not possible due to lack of the updates for the other countries in the region. The available data for Croatia show a decrease of 23.7 % as compared to 1990, and 3 % compared to 2000 for $PM_{2.5}$ and a decrease of 23.9 % compared to 1990 and 2,7 compared to 2006 for PM_{10}.

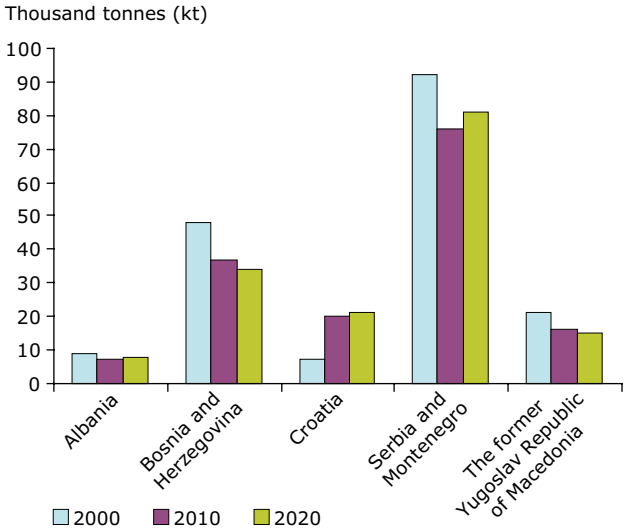
Outlook trends

Key message:
Under the baseline scenario PM_{10} emissions are projected to decrease somewhat over the 2000–2020 period, while $PM_{2.5}$ emissions are expected to stagnate. Both are forecast to decline initially but to increase slightly between 2010 and 2020 *.

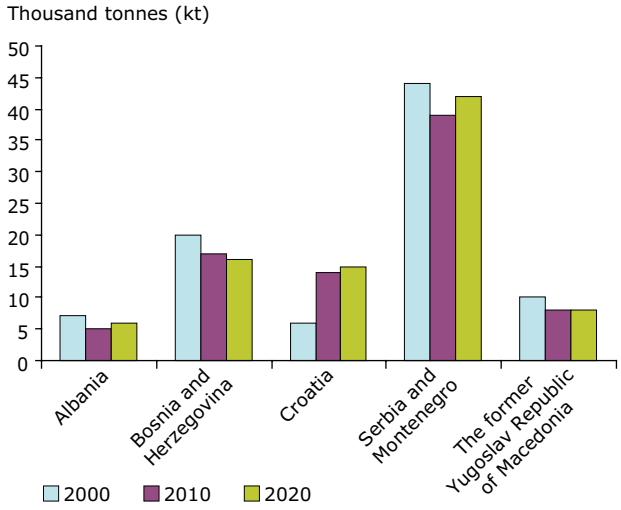
Projected PM_{10} and $PM_{2.5}$ emissions in the Western Balkans until 2020



Projected PM_{10} emissions in the Western Balkans until 2020



Projected $PM_{2.5}$ emissions in the Western Balkans until 2020



Assessment:
Overall PM_{10} emissions in the Western Balkans are projected to decrease by 10% between 2000 and 2020, even though the 2010 to 2020 period could show a slight increase in emissions.

On country level, PM_{10} emissions are projected to decline in most of Western Balkan countries during the 2000 to 2020 period. Emissions in Bosnia and Herzegovina and the former Yugoslav Republic of Macedonia are forecast to decline by around 29 % while Serbia and Montenegro and Albania see their emissions decline with 12 % and 11 % respectively. Croatia, however, is expected to see its PM_{10} output triple.
$PM_{2.5}$ emissions in the Western Balkans are expected to be the same in 2020 as they were in 2000. Forecasts indicate a slight dip between 2000 and 2010 which is then regained until 2020. Declines in emissions are expected in most countries of the region: between 14 % and 20 % in Albania, Bosnia and Herzegovina and the former Yugoslav Republic of Macedonia and a reduction of almost 5 % in Serbia and Montenegro. A significant increase in emissions (150 %) is projected for Croatia. For both PM_{10} and $PM_{2.5}$ Serbia and Montenegro was the biggest total emitter followed by Bosnia and Herzegovina.

Source: Inventory Review 2005, Emission Data reported to LRTAP Convention and NEC Directive ISSN 0804-2446.

Temporal coverage: 2000–2020.

Spatial coverage: Albania, Bosnia and Herzegovina, Croatia, the former Yugoslav Republic of Macedonia, Serbia and Montenegro.

* New set of projections will be available in December 2009 from IIASA's model GAINS-Europe as part of the work dedicated to the revision of the Gothenburg Protocol.