CEIP umweltbundesamt

Methodologies applied to the CEIP GNFR gap-filling 2017

Part III: Main pollutants and Particulate Matter (NO_x, NMVOCs, SO_x, NH_3, CO, $PM_{2.5}$, PM_{10}, PM_{coarse})

Technical report CEIP 03-3/2017

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1. Introduction

The EMEP Centre on Emission Inventories and Projections (CEIP) operates the UNECE/EMEP emission database (WebDab) which contains information on air pollutant emissions and projections from the Parties to the LRTAP Convention (UNECE 1979). Among these data sets, also emissions used in EMEP models (gap-filled emissions) and gridded emissions in Google maps are available from the CEIP website (www.ceip.at, CEIP 2017).

Data used by CEIP were reported by the Parties to the LRTAP Convention as sectoral emissions (NFR14) and National Total emissions according to the UNECE guidelines for reporting emissions and projections data under the Convention on long-range transboundary air pollution, Annex I (UNECE 2014). For the use by CEIP, the sector data were aggregated to 13 GNFR sectors. In several cases, no data were submitted by the countries, or the reporting is not complete. Before these emission data can be used by modelers, missing information has to be filled in. To gap-fill those missing data, CEIP typically applies different gap-filling methods. After the gap-filling, sector emissions are used for spatial emission mapping, i.e. the EMEP grid.

This documentation describes the gap-filling methods that have been used for the 2015 GNFR inventory (as reported in 2017) for NO_x, NMVOCs, SO_x, NH_3, CO, $PM_{2.5}$, PM_{10}, PM_{coarse}. It illustrates reasons of replacements of reported data, discusses problems of the procedure and gives an overview on the data availability and gap-filling of each country or area.

2. Summary of the process

The first step was to collect the official submissions by the Parties to the LRTAP Convention. All submissions received before 28th March 2017 were used as a basis for the gap-filled data set. Parties reported their emission inventories to the LRTAP Convention as sectoral emissions (NFR14) and National Total emissions according to the UNECE guidelines for reporting emissions and projections data under the LRTAP Convention, Annex I (UNECE 2014).

The second step was to aggregate the sector data to 13 GNFR sectors. The third step was to check reported data for plausibility by comparing with reported data of other countries, expert data and their ratio to population data, GDP and area in comparison with other countries. If plausibility was not given, reported data were replaced (see section 4).

The next step was to gap-fill the inventory. Gap-filling was applied if (1) no data were submitted by the Parties, (2) the reporting was not complete, (3) there was a notable discrepancy for several sectors and the National Totals between the reported data and expert data or (4) if there was no reporting obligation for a certain area. After gap-filling, sector emissions are used for spatial emission mapping, i.e. the EMEP grid.

3. Gap-filling methods

2.1. Gap-filling of National Total data

The share of reported data and an overview of the gap-filling methods are shown in Figure 3.2.

If no submission is made, different estimates were made such as extrapolation of previous reported data, also by using population or GDP data ([1]) of the respective country. Further, expert estimates were used, as well as inter-, extrapolation or copy of expert estimates. Data for PM_{coarse} were not reported but in all cases calculated as the difference between PM_{10} and $PM_{2.5}$.

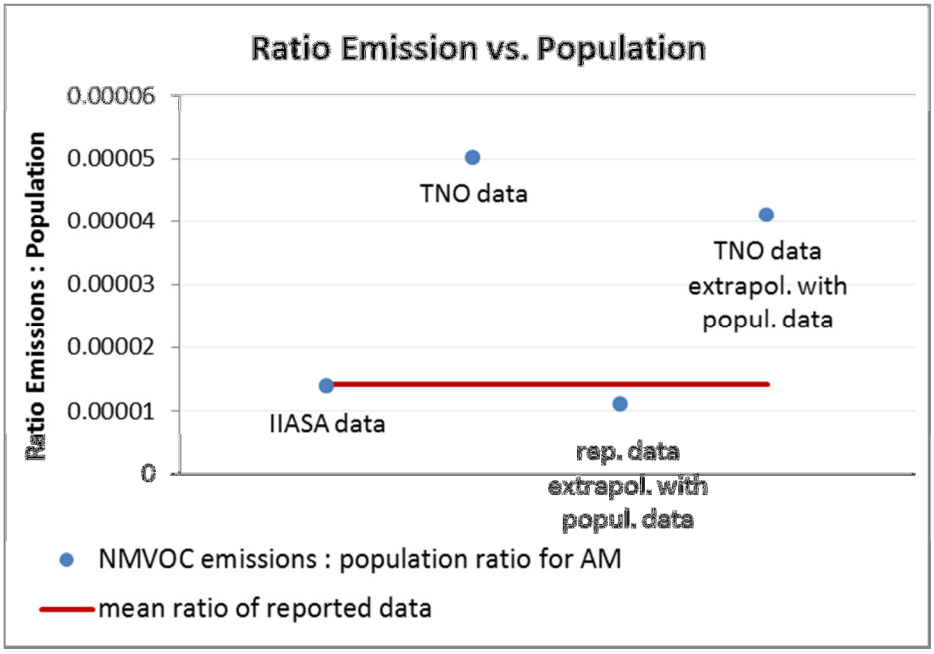
Data from the GAINS model (Greenhouse Gas and Air Pollution Interactions and Synergies) were provided by the International Institute for Applied Systems Analysis (IIASA 2014). Two data sets (on NFR level) were provided by IIASA. One was generated in spring 2014 and covers the period from 1990 to 2010 (i.e. 1990, 1995, 2000, 2005 and 2010) and the other data set was generated in October 2014 and covers the period 2005 to 2030 (i.e. 2005, 2010, 2015, 2020, 2025 and 2030). The data was converted to GNFR level by CEIP. Not for all Parties the second data set was available. If both data sets were available for the overlapping years (2005 and 2010) the data set from October 2014 was used. If not, data from the first data set were extrapolated using the trend between 2005 and 2010. In cases where extrapolation led to negative values either 2010 data was used as a surrogate for 2015 or the last plausible extrapolated year was used as surrogate for 2015.

Additionally, CRF data reported under the EU Greenhouse Gas Monitoring Mechanism (EU 2013) were available for the gap-filling, as well as expert estimates from the Dutch institute TNO (Kuenen et al. 2014) for the years 2003-2009. For a few sea/lake areas expert estimates for the year 2006 from the Meteorological Synthesizing Centre - West were available (MSC-W 2006).

In several cases, not only one estimate is given for a country, and the question rose which estimate fits most. Therefore ratios for each pollutant between emissions and population data, GDP and area size were calculated by using only reported and plausible data. Then, the distance of the different estimates to this ratio is used to determine the best method for those countries or areas, where data were missing. An example to determine the best method for NMVOC estimates of Armenia is shown in Figure 3.1. In this case, IIASA data highlighted as the best method, i.e. is the closest result to the calculated ratio.

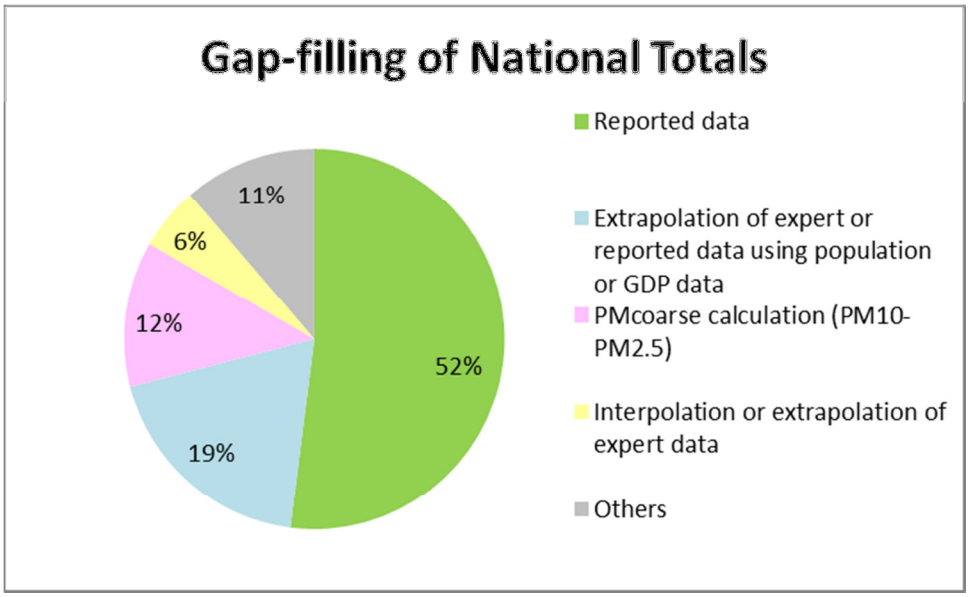
([1]) Population data from database: Health Nutrition and Population Statistics: Population estimates and projections (Last Updated: 10/05/2016). Indicator: Population, total. Total population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship. The values shown are midyear estimates.
GDP data from database: World Development Indicators (Last Updated: 04/27/2017). Indicator: GDP, PPP (constant 2011 international $).

Figure 3.1 Example for different NMVOC estimates for Armenia (AM)



The most common imputation method was the extrapolation of expert or reported data using population or GDP data (see Figure 3.2). Further, a common imputation method was the interpolation or extrapolation of expert data.

Figure 3.2 Overview of reported data and imputation methods for National Total data

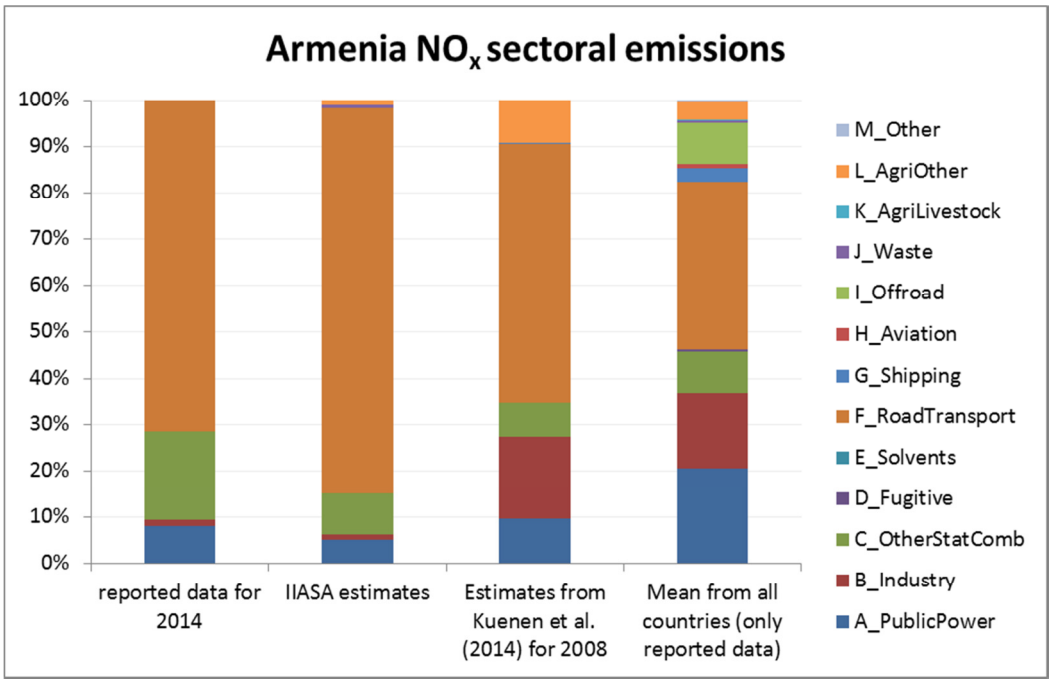


2.2. Gap-filling of sectoral data

The share of reported data and an overview of the gap-filling methods are shown in Figure 3.4.

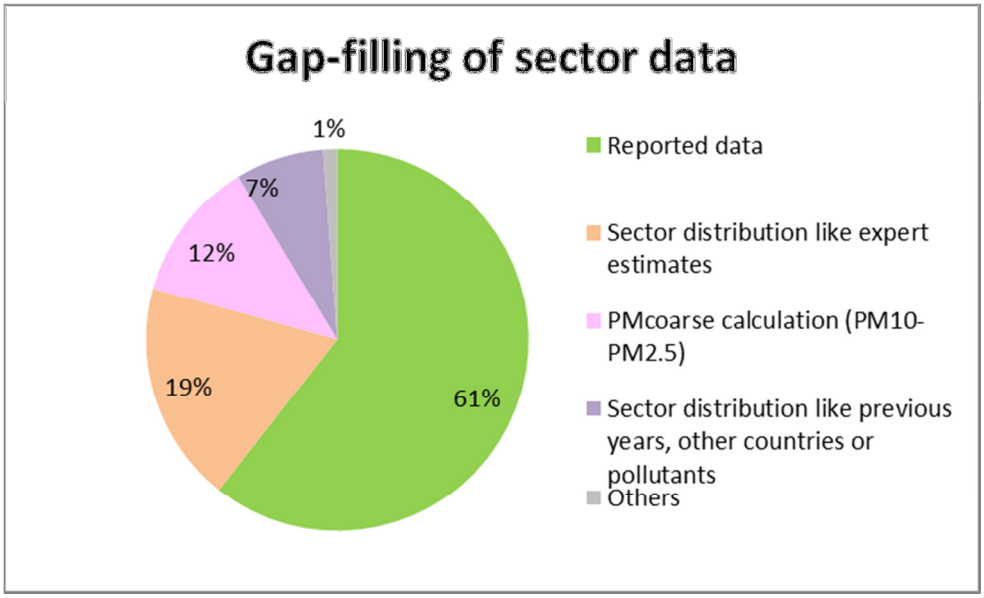
Estimates on the sectoral distribution of the emissions are available from IIASA (2014), Kuenen at al. (2014) and in some cases from previous reported submissions. For comparison, the mean sectoral distribution from all countries that submitted plausible data for the year 2015 were used. The sectoral distribution which fits most to this mean distribution was used to split the National Total into GNFR sectors. An example to determine the best distribution of NO_x emissions from Armenia is shown in Figure 3.3. In this case, the estimate from Kuenen et al. (2014) highlighted as the best distribution, i.e. is the closest result to the mean distribution shown on the very right.

Figure 3.3 Example for sectoral distributions of NO_x emissions from different expert estimates for Armenia



The most common imputation method to gap-fill sector data was the sector distribution like expert estimates (see Figure 3.3). Further, the sector distribution like previous years, other countries or pollutants (i.e. the distribution of PM_{10} was used for $PM_{2.5}$). Other gap-filling methods were applied only in individual cases.

Figure 3.4 Overview of reported data and imputation methods for sectoral data



4. Reasons for replacement of reported data

For two countries, data submitted in 2017 were replaced: NO_x, SO_x, and CO emissions from Kyrgyzstan and $PM_{2.5}$ and PM_{10} emissions from Kazakhstan. Further for some countries, reported emissions for PM_{10} had to be corrected as these data were lower than the respective $PM_{2.5}$ emissions. This was the case for Azerbaijan (National Total), Bulgaria (National Total), Kyrgyzstan (National Total), Lithuania (National Total and G_Shipping), Luxembourg (National Total, L_AgriOther), the FYR of Macedonia (National Total) and the Ukraine (National Total, L_AgriOther).

Kyrgyzstan reported NO_x, SO_x, and CO emissions for 2015 that were much lower than emissions reported in some previous years or that are quite different to expert estimates. Thus, these data are not very plausible and the reported sectoral and National Total data have been replaced by IIASA data (see section 1.6.26).

Kazakhstan reported PM_{10} and $PM_{2.5}$ only for a few sectors, and the National Total differed strongly to expert estimates. Thus sectoral and National total data for PM_{10} and $PM_{2.5}$ have been replaced by IIASA estimates and sector distribution (see section 1.6.27).

5. Improvements of the gap-filling procedure

Most countries (36 of 51 countries) submitted data that seem to be complete and plausible. Problems occur where no data at all are available, or when submitted data are not plausible.

When no data are available, different imputation methods were applied. This year, an improvement of the gap-filling procedure was the development of a method to detect the best estimate for missing emissions of a country (in case there are several estimates). This was done by using plausible reported data of other countries in comparison with population data, GDP and area size. Calculations are further developed by including population or GDP data (see section 2.1).

6. Data availability and gap-filling method per country

6.1. Albania (AL)

Data availability and estimation of National Total data

Albania provided National Total data of the year 2015 for all pollutants except $PM_{2.5}$. The most recent reported data for $PM_{2.5}$ includes only the year 2009. No sectoral data were available for the year 2015.

The best method (see section 2.1 for an explanation) to calculate 2015 National Total $PM_{2.5}$ data was the extrapolation of 2003 to 2009 reported data.

Estimation of sectoral data

The best method (see section 0 for an explanation) to calculate sectoral data for NO_x, NMVOCs, SO_x, NH_3, $PM_{2.5}$ and PM_{10} were the use of the sector distribution provided by IIASA (2014) and inter- or extrapolated for the year 2015. For CO, the sector distribution provided by Kuenen et al. (2014) for the year 2009 was used to fill the missing sectoral data.

6.2. Armenia (AM)

Data availability and estimation of National Total data

The most recent reported data includes only the year 2014. The best method (see section 2.1 for an explanation) to calculate 2015 CO and NH_3 National Total data was the extrapolation of TNO data (Kuenen et al. 2014). National Totals of NMVOCs, NO_x, $PM_{2.5}$ and PM_{10} were gap-filled using estimates from GAINS from spring 2014 (IIASA 2014). SO_x National Totals were calculated by extrapolation of reported 2014 data using population data of Armenia.

Estimation of sectoral data

The best method (see section 0 for an explanation) to calculate sectoral data for CO and NH_3 was the use of the sector distribution provided by IIASA and extrapolated for the year 2015. For NMVOCs, NO_x and SO_x, the sector distribution provided by Kuenen et al. (2014) for the year 2008 was used to fill the missing sectoral data. For $PM_{2.5}$ and PM_{10}, the same distribution as for reported data in 2016 was used (for the year 2014).

6.3. Austria (AT)

The data of Austria reported in 2017 seemed to be complete and plausible. Therefore no gap-filling was performed.

6.4. Azerbaijan (AZ)

The data of Azerbaijan reported in 2017 seemed to be complete and plausible. Therefore no gap-filling was performed.

6.5. Bosnia and Herzegovina (BA)

Data availability and estimation of National Total data

No reported data were available. The best method (see section 2.1 for an explanation) to calculate 2015 NH_3, NMVOC, NO_x, $PM_{2.5}$ and PM_{10} National Total data were estimates from GAINS from

October 2014 (IIASA 2014). National Totals of CO and SO_x were gap-filled using extrapolation of TNO data (Kuenen et al. 2014).

Estimation of sectoral data

The best method (see section 0 for an explanation) to calculate sectoral data for NH_3, NMVOC, NO_x, $PM_{2.5}$ and PM_{10} was the use of the sector distribution provided by IIASA and interpolated for the year 2015. For CO and SO_x, the sector distribution provided by Kuenen et al. (2014) for the year 2009 was used to fill the missing sectoral data.

6.6. Belgium (BE)

The data of Belgium reported in 2017 seemed to be complete and plausible. Therefore no gap-filling was performed.

6.7. Bulgaria (BG)

The data of Bulgaria reported in 2017 seemed to be complete and plausible. Therefore no gap-filling was performed.

6.8. Belarus (BY)

Data availability and estimation of National Total data

The most recent reported data includes only the year 2014. The best method (see section 2.1 for an explanation) to calculate 2015 National Total data was the extrapolation of reported 2014 data using population data of Belarus.

Estimation of sectoral data

The best method (see section 0 for an explanation) to calculate sectoral data was the use of the same distribution as for reported data in 2016 (for the year 2014).

6.9. Switzerland (CH)

The data of Switzerland reported in 2017 seemed to be complete and plausible. Therefore no gap-filling was performed.

6.10. Cyprus (CY)

The data of Cyprus reported in 2017 seemed to be complete and plausible. Therefore no gap-filling was performed.

6.11. The Czech Republic (CZ)

The data of the Czech Republic reported in 2017 seemed to be complete and plausible. Therefore no gap-filling was performed.

6.12. Germany (DE)

The data of Germany reported in 2017 seemed to be complete and plausible. Therefore no gap-filling was performed.

6.13. Denmark (DK)

The data of Denmark reported in 2017 seemed to be complete and plausible. Therefore no gap-filling was performed.

6.14. Estonia (EE)

The data of Estonia reported in 2017 seemed to be complete and plausible. Therefore no gap-filling was performed.

6.15. Spain (ES)

The data of Spain reported in 2017 seemed to be complete and plausible. Therefore no gap-filling was performed. However, as Spain did report data only National Total data for the EMEP region, the sectoral data had to be calculated using the same distribution as for the whole Spanish territory.

6.16. Finland (FI)

The data of Finland reported in 2017 seemed to be complete and plausible. Therefore no gap-filling was performed.

6.17. France (FR)

The data of France reported in 2017 seemed to be complete and plausible. Therefore no gap-filling was performed.

6.18. The United Kingdom (GB)

The data of the United Kingdom reported in 2017 seemed to be complete and plausible. Therefore no gap-filling was performed.

6.19. Georgia (GE)

The data of Georgia reported in 2017 seemed to be complete and plausible. Therefore no gap-filling was performed.

6.20. Greece (GR)

Data availability and estimation of National Total data

The most recent reported data includes only the year 2014. The best method (see section 2.1 for an explanation) to calculate 2015 NMVOC, $PM_{2.5}$, PM_{10} and SO_x National Total data was the extrapolation of TNO data (Kuenen et al. 2014). National Totals of CO and NO_x were estimates from GAINS from spring 2014 (IIASA 2014). NH_3 National Totals were calculated by extrapolation of reported 2014 data using population data of Greece.

Estimation of sectoral data

The best method (see section 0 for an explanation) to calculate sectoral data was the use of the sector distribution provided by IIASA and interpolated for the year 2015.

6.21. Croatia (HR)

The data of Croatia reported in 2017 seemed to be complete and plausible. Therefore no gap-filling was performed.

6.22. Hungary (HU)

The data of Hungary reported in 2017 seemed to be complete and plausible. Therefore no gap-filling was performed.

6.23. Ireland (IE)

The data of Ireland reported in 2017 seemed to be complete and plausible. Therefore no gap-filling was performed.

6.24. Iceland (IS)

The data of Iceland reported in 2017 seemed to be complete and plausible. Therefore no gap-filling was performed.

6.25. Italy (IT)

The data of Italy reported in 2017 seemed to be complete and plausible. Therefore no gap-filling was performed.

6.26. Kyrgyzstan (KG)

Data availability and estimation of National Total data

Kyrgyzstan reported data also for the year 2015. NO_x, SO_x, and CO emissions for 2015 were much lower than emissions reported in some previous years and further are quite different to expert estimates. Thus, these data are not very plausible and the reported National Total data have been replaced. The best method (see section 2.1 for an explanation) to calculate to calculate these data were estimates from GAINS from spring 2014 (IIASA 2014).

Estimation of sectoral data

Also reported sectoral data of NO_x, SO_x, and CO were replaced. The best method (see section 0 for an explanation) to calculate them was the use of the sector distribution provided by IIASA and extrapolated for the year 2015.

6.27. Kazakhstan (KZT): Kazakhstan (KZ) and Rest of Kazakhstan in the extended EMEP domain (KZE)

Data availability and estimation of National Total data

Kazakhstan reported data also for the year 2015. However, $PM_{2.5}$ and PM_{10} emissions were reported only for a few sectors, and the National Total differed strongly to expert estimates. Thus, these data are not very plausible and the reported National Total data have been replaced. The best method (see section 2.1 for an explanation) to calculate to calculate these data were estimates from GAINS from spring 2014 (IIASA 2014).

Estimation of sectoral data

Also reported sectoral data of $PM_{2.5}$ and PM_{10} were replaced. The best method (see section 0 for an explanation) to calculate them was the use of the sector distribution provided by IIASA and extrapolated for the year 2015.

6.28. Liechtenstein (LI)

Data availability and estimation of National Total data

The most recent reported data includes only the year 2014. The best method (see section 2.1 for an explanation) to calculate 2015 National Total data was the extrapolation of reported 2014 data using population data of Liechtenstein.

Estimation of sectoral data

The best method (see section 0 for an explanation) to calculate sectoral data was the use of the same distribution as for reported data in 2016 (for the year 2014).

6.29. Lithuania (LT)

The data of Lithuania reported in 2017 seemed to be complete and plausible. Therefore no gap-filling was performed.

6.30. Luxembourg (LU)

The data of Luxembourg reported in 2017 seemed to be complete and plausible. Therefore no gap-filling was performed.

6.31. Latvia (LV)

The data of Latvia reported in 2017 seemed to be complete and plausible. Therefore no gap-filling was performed.

6.32. Monaco (MC)

Data availability and estimation of National Total data

The most recent reported data includes only the year 2014. The best method (see section 2.1 for an explanation) to calculate 2015 National Total data was the extrapolation of reported 2014 data using population data of Monaco.

Estimation of sectoral data

The best method (see section 0 for an explanation) to calculate sectoral data was the use of the same distribution as for reported data in 2016 (for the year 2014).

6.33. Republic of Moldova (MD)

The data of the Republic of Moldova reported in 2017 seemed to be complete and plausible. Therefore no gap-filling was performed.

6.34. Montenegro (ME)

Data availability and estimation of National Total data

The most recent reported data includes only the year 2011. The best method (see section 2.1 for an explanation) to calculate 2015 National Total data was the extrapolation of reported 2011 data using population data of Montenegro.

Estimation of sectoral data

The best method (see section 0 for an explanation) to calculate sectoral data was the use of the same distribution as for reported data in 2013 (for the year 2011).

6.35. The Former Yugoslav Republic of Macedonia (MK)

The data of the Former Yugoslav Republic of Macedonia reported in 2017 seemed to be complete and plausible. Therefore no gap-filling was performed.

6.36. Malta (MT)

The data of Malta reported in 2017 seemed to be complete and plausible. Therefore no gap-filling was performed.

6.37. The Netherlands (NL)

The data of the Netherlands reported in 2017 seemed to be complete and plausible. Therefore no gap-filling was performed.

6.38. Norway (NO)

The data of Norway reported in 2017 seemed to be complete and plausible. Therefore no gap-filling was performed.

6.39. Poland (PL)

The data of Poland reported in 2017 seemed to be complete and plausible. Therefore no gap-filling was performed.

6.40. Portugal (PT)

The data of Portugal reported in 2017 seemed to be complete and plausible. Therefore no gap-filling was performed. However, as Portugal reported sectoral data for the EMEP region that differ to the reported National Total (the National Total included the entire Portuguese territory), the National Total was adjusted to the sectors (sum of sectors).

6.41. Romania (RO)

The data of Romania reported in 2017 seemed to be complete and plausible. Therefore no gap-filling was performed.

6.42. Serbia (RS)

The data of Serbia reported in 2017 seemed to be complete and plausible. Therefore no gap-filling was performed.

6.43. Russian Federation in the former official EMEP domain (RU)

Data availability and estimation of National Total data

The most recent reported data includes only the year 2013. The best method (see section 2.1 for an explanation) to calculate 2015 NO_x and SO_x National Total data was the extrapolation of TNO data (Kuenen et al. 2014). National Totals of CO, NMVOCs, $PM_{2.5}$ and PM_{10} were gap-filled using estimates from GAINS from October 2014 (IIASA 2014). NH_3 National Totals were calculated by extrapolation of reported data.

Estimation of sectoral data

The best method (see section 0 for an explanation) to calculate sectoral data for NH_3, NMVOCs and NO_x was the use of the sector distribution provided by IIASA and extrapolated for the year 2015. For CO, $PM_{2.5}$, PM_{10} and SO_x, the sector distribution provided by Kuenen et al. (2014) for the year 2009 was used to fill the missing sectoral data.

6.44. Sweden (SE)

The data of Sweden reported in 2017 seemed to be complete and plausible. Therefore no gap-filling was performed.

6.45. Slovenia (SI)

The data of Slovenia reported in 2017 seemed to be complete and plausible. Therefore no gap-filling was performed.

6.46. Slovakia (SK)

The data of Slovakia reported in 2017 seemed to be complete and plausible. Therefore no gap-filling was performed.

6.47. Tajikistan (TJ)

Data availability and estimation of National Total data

No reported data were available. Emission estimates from MSC-W for the year 2006 are available. The best method (see section 2.1 for an explanation) to calculate 2015 CO, $PM_{2.5}$ and PM_{10} National Total data was the extrapolation of these expert data using population data of Tajikistan, and for the National Totals of NH_3, NMVOCs, NO_x and SO_x the extrapolation of these expert data using GDP data of Tajikistan.

Estimation of sectoral data

The distribution of the sectoral data was the same as developed for and used since the gap-filling in 2013. This distribution is based on the estimates of EDGAR version 4.2 (EC 2013).

6.48. Turkmenistan (TM): Rest of Turkmenistan in the extended EMEP domain (TME) and Turkmenistan in the former official EMEP domain (TMO)

Data availability and estimation of National Total data

No reported data were available. Emission estimates from MSC-W for the year 2006 are available. National Total data were estimated by extrapolation of these expert data using GDP data of Turkmenistan.

Estimation of sectoral data

The distribution of the sectoral data was the same as developed for and used since the gap-filling in 2013. This distribution is based on the estimates of EDGAR version 4.2 (EC 2013).

6.49. Turkey (TR)

Data availability and estimation of National Total data

Turkey reported data for all pollutants except $PM_{2.5}$. The reported data seemed to be complete and plausible. Therefore no gap-filling was performed, except for $PM_{2.5}$. The best method (see section 2.1 for an explanation) to calculate 2015 $PM_{2.5}$ National Total data was the extrapolation of TNO data (Kuenen et al. 2014).

Estimation of sectoral data

For the distribution of $PM_{2.5}$ sectoral data, the same distribution as for reported PM_{10} data was used.

6.50. Ukraine (UA)

The data of the Ukraine reported in 2017 seemed to be complete and plausible. Therefore no gap-filling was performed.

6.51. Uzbekistan (UZ): Rest of Uzbekistan in the extended EMEP domain (UZE) and Uzbekistan in the former official EMEP domain (UZO)

Data availability and estimation of National Total data

No reported data were available. Emission estimates from MSC-W for the year 2006 are available. National Total data were estimated by extrapolation of these expert data using GDP data of Uzbekistan.

Estimation of sectoral data

The distribution of the sectoral data was the same as developed for and used since the gap-filling in 2013. This distribution is based on the estimates of EDGAR version 4.2 (EC 2013).

7. Data availability and gap-filling method for other regions

7.1. Sea regions: Atlantic Ocean (ATL), Baltic Sea (BLS), Caspian Sea (CAS), Mediterranean Sea (MED), North Sea (NOS)

It was planned to use international shipping emissions from the ECLISPE 5 dataset. Due to discrepancies between this dataset and the MACC-III dataset that has been used so far for gap-filling, it was decided to use the same MACC-III dataset, which was calculated for 2011, also for the year 2015.

7.2. Aral Lake: Rest of Aral Lake in the extended EMEP domain (ARE), Aral Lake in the former official EMEP domain (ARO)

Emission estimates from MSC-W for the year 2006 are available. However, due to the serious change within this region, expert estimates were not used any more. Only the estimates for international shipping (i.e. SNAP sector S8) were used and summed up for the National Total.

7.3. Russian Federation in the extended EMEP domain (RUE): Rest of Russian Federation in the extended EMEP domain (RFE) and EMEP-external part of Russian Federation (RUX)

Emission estimates from MSC-W for the year 2006 are available. To estimate the emissions of the Russian Federation in the extended EMEP domain, these expert estimates were used and extrapolated using the GDP trend of Russia. For the sectoral distribution, a similar sector distribution as for the Russian Federation (RU) was assumed.

7.4. Remaining Asian Areas in the extended EMEP domain (ASE) and Modified Remaining Asian Areas in the former official EMEP domain (ASM)

Emission estimates from MSC-W for the year 2006 are available. To estimate the emissions of the Remaining Asian Areas in the extended EMEP domain (ASE), these expert estimates were used and extrapolated using the GDP trend of Pakistan. To estimate the emissions of the Modified Remaining Asian Areas in the former official EMEP domain (ASM), these expert estimates were used and extrapolated using the GDP trend of Iran.

The distribution of the sectoral data was the same as developed for and used since the gap-filling in 2013. This distribution is based on the estimates of EDGAR version 4.2 (EC 2013).

7.5. North Africa (NOA)

Emission estimates from MSC-W for the year 2006 are available. To estimate the emissions of North Africa, these expert estimates were used and extrapolated using the GDP trend of Egypt.

The distribution of the sectoral data was the same as developed for and used since the gap-filling in 2013. This distribution is based on the estimates of EDGAR version 4.2 (EC 2013).

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9. EMEP Country Codes

AL	Albania
AM	Armenia
AOE	Arctic Ocean in the extended EMEP domain
ARE	Rest of Aral Lake in the extended EMEP domain
ARO	Aral Lake in the former official EMEP domain
AST	Asian areas in the extended EMEP domain (ASM+ASE+ARO+ARE+CAS)
AT	Austria
ATL	Remaining North-East Atlantic Ocean
ATX	EMEP-external Remaining North-East Atlantic Ocean
AZ	Azerbaijan
BA	Bosnia and Herzegovina
BAS	Baltic Sea
BE	Belgium
BG	Bulgaria
BLS	Black Sea
BY	Belarus
CA	Canada
CAS	Caspian Sea
CH	Switzerland
CY	Cyprus
CZ	Czech Republic
DE	Germany (FGD+FFR)
DK	Denmark
EE	Estonia
ES	Spain
EU	European Union
FFR	Former Federal Republic of Germany (FGD+FFR = DE)
FGD	Former German Democratic Republic (FGD+FFR = DE)
FI	Finland
FR	France
GB	United Kingdom
GE	Georgia
GL	Greenland
GR	Greece
HR	Croatia
HU	Hungary
IE	Ireland
IS	Iceland
IT	Italy
KG	Kyrgyzstan
KZ	Kazakhstan in the former official EMEP domain (KZ+KZE = KZT)
KZE	Rest of Kazakhstan in the extended EMEP domain (KZ+KZE = KZT)
KZT	Kazakhstan (KZ+KZE)
LI	Liechtenstein
LT	Lithuania
LU	Luxembourg
LV	Latvia
MC	Monaco
MD	Republic of Moldova
ME	Montenegro
MED	Mediterranean Sea
MK	FYR of Macedonia
MT	Malta
NL	Netherlands
NO	Norway
NOA	North Africa
NOS	North Sea
PL	Poland
PT	Portugal
RFE	Rest of Russian Federation in the extended EMEP domain (RUX+RFE = RUE)
RO	Romania
RS	Serbia
RU	Russian Federation in the former official EMEP domain (RUO+RUP+RUA+RUR)
RUA	Kaliningrad (RUO+RUP+RUA+RUR = RU)
RUE	Russian Federation in the extended EMEP domain (RFE+RUX)
RUO	Kola & Karelia (RUO+RUP+RUA+RUR = RU)
RUP	St.Petersburg & Novgorod-Pskov (RUO+RUP+RUA+RUR = RU)
RUR	Rest of the Russian Federation (RUO+RUP+RUA+RUR = RU)

RUX	EMEP-external part of Russian Federation (RUX+RFE = RUE)
SE	Sweden
SI	Slovenia
SK	Slovakia
TJ	Tajikistan
TM	Turkmenistan (TMO+TME)
TME	Rest of Turkmenistan in the extended EMEP domain (TMO+TME = TM)
TMO	Turkmenistan in the former official EMEP domain (TMO+TME = TM)
TR	Turkey
UA	Ukraine
US	United States
UZ	Uzbekistan (UZO+UZE)
UZE	Rest of Uzbekistan in the extended EMEP domain (UZO+UZE = UZ)
UZO	Uzbekistan in the former official EMEP domain (UZO+UZE = UZ)