EXECUTIVE SUMMARY

ES.1 Reporting obligations under UNECE/LRTAP and Directive (EU) 2016/2284 (NEC Directive)

Austria's Informative Inventory Report (IIR) and the complete set of NFR tables (the latter are submitted in digital format only) represent Austria's official submission under the United Nations Economic Commission for Europe (UNECE) Convention on Long-rage Transboundary Air Pollution (LRTAP) and under Directive (EU) 2016/2284 (NEC Directive). The Umweltbundesamt in its role as single national entity regarding emission inventories compiles Austria's annual delivery, and the Austrian Ministry of Agriculture, Forestry, Environment and Water Management submits it officially to the Executive Secretary of UNECE as well as to the European Commission.

As a party to the UNECE/LRTAP Convention and under the NEC Directive, Austria is required to annually report data on emissions of air pollutants covered in the Convention and its Protocols:

- main pollutants: nitrogen oxides (NO_x), non-methane volatile organic compounds (NMVOC), sulphur oxides (SO_x), ammonia (NH_3) and carbon monoxide (CO);
- particulate matter (PM): primary PM (fine particulate matter ($PM_{2.5}$) and coarse particulate matter (PM_{10})[1];
- priority heavy metals (HMs): lead (Pb), cadmium (Cd) and mercury (Hg);
- persistent organic pollutants (POPs): polychlorinated dibenzodioxins/dibenzofurans (PCDD/Fs), polycyclic aromatic hydrocarbons (PAHs), hexachlorobenzene (HCB) and polychlorinated biphenyls (PCBs).

In order to fulfil these reporting requirements, Austria compiles an Air Emission Inventory ("Österreichische Luftschadstoff-Inventur – OLI"), which is updated annually. The IIR contains information on Austria's inventories of air pollutants for all years from 1990 to 2015 for the main pollutants, for POPs and HMs and for the years 1990, 1995 and from 2000 onwards for PM.

From submission 2015 onwards, Austria reports all pollutants in the NFR14 reporting format from 1990 to the latest inventory year. Emissions of the years before 1990 were last updated and published in submission 2014.[2]

In addition, the report includes both detailed descriptions of methods, data sources and uncertainties and information on quality assurance and quality control (QA/QC) activities as well as analyses of emission trends.

The emission data presented in this report were compiled according to the revised 2014 Reporting Guidelines (ECE/EB.AIR.125) that were approved by the Executive Body for the UNECE/LRTAP Convention at its 36th session.

The Austrian inventory is complete with regard to reported gases, reported years and reported emissions from all sources, and also complete in terms of geographic coverage.

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[1] According to the CLRTAP Reporting GL the reporting of Total suspended particules (TSPs) is not mandatory, but reported by Austria.

[2] Austria´s submission 2014 under the Convention on Long-range Transboundary Air Pollution covering the years 1980–2012: http://www.ceip.at/ms/ceip_home1/ceip_home/status_reporting/2014_submissions/

ES.2 Differences with other reporting obligations

NEC Directive (EU) 2016/2284 sets out national emission reduction commitments for the pollutants SO_2, NO_x, VOC, NH_3 and $PM_{2.5}$. Austria uses the national emission totals calculated on the basis of *fuel used* (thus excluding emissions from fuel exports in the vehicle tank) for compliance assessment under the NEC Directive.

The annual greenhouse gas reporting under the UNFCCC and the Kyoto Protocoll also requires the reporting of indirect GHGs (NO_x, CO, NMVOC) and SO_2 emissions based on *fuel sold*. In contrast to UNFCCC requirements, emissions from aviation under the NEC Directive and the LRTAP Convention include domestic LTO and cruise. Furthermore, international navigation of inland waterways is covered under NEC and CLRTAP.

ES.3 Overview of emission trends

Main Pollutants

In 1990, national total SO_2 emissions amounted to 75 kt. Since then emissions have decreased quite steadily. In the year 2015, emissions were reduced by 80% compared to 1990 and amounted to 15 kt, which was mainly due to lower emissions from residential heating, combustion in industries and in energy industries. The sharp decrease from 2008 onwards is due to a further reduction of the sulfur content of gasoil to 10ppm. From 2014 to 2015 emissions slightly increased by 0.8% mainly due to higher emissions from NFR sectors *1.A.2 Manufacturing Industries* and *1.A.4 Other Sectors*. Emissions from manufacturing industries rose due to an increased coal and residual fuel use. Emissions from the residential sector increased due to the increased heating demand (more coal and biomass used) as a result of the colder winter.

In 1990, national total NO_x emissions amounted to 221 kt. After an all-time high of emissions between 2003 and 2005 emissions are decreasing continuously, which is mainly due to lower emissions from heavy duty vehicles influenced by declined fuel sales, fleet renewal and well-functioning NO_x exhaust after treatment systems. In 2015, NO_x emissions amounted to 149 kt and were about 32% lower than in 1990. From 2014 to 2015 emissions decreased by 2.6%, again mainly due to decreasing emissions of road transportation, in particular from heavy duty vehicles. In 2015 49% of the total nitrogen oxides emissions originate from road transport (including fuel exports). Austria is a landlocked country and fuel prices vary significantly between neighbouring countries. So Austria has experienced a considerable amount of 'fuel export' in the last few years and the share of NO_x emissions caused by fuel sold in Austria but used abroad is notable. Emissions for 2015 based on fuel used amount to 132 kt and are about 17 kt lower than based on fuel sold; the decrease between 1990 and 2015 is also slightly stronger.

In 1990, national total NMVOC emissions amounted to 281 kt. Emissions have decreased steadily since then and in the year 2015 emissions had been reduced by 60% to 113 kt compared to 1990. From 2014 to 2015 emissions increased by 2.4%. This was mainly due to higher fuel demand for residential heating as a consequence of the low winter temperatures in 2015 (higher biomasse consumption).

In 1990, national total NH_3 emissions amounted to 66.1 kt; emissions have been quite stable over the period from 1990 to 2015. In 2015, emissions were 1.1% above 1990 levels and amounted to 66.9 kt. Compared to the previous year, emissions in 2015 remained nearly at the same level (+0.4%). NH_3 in Austria is almost exclusively emitted in the agricultural sector; emissions from agricultural soils, mainly resulting from organic and inorganic fertilization, have the highest contribution to national total NH_3 emissions.

In 1990, national total CO emissions amounted to 1 287 kt. Emissions considerably decreased from 1990 to 2015. In 2015, emissions were 56% below 1990 levels and amounted to 567 kt. This reduction was mainly due to decreasing emissions from road transport (catalytic converters). The emissions increased between 2014 and 2015 by 5.3%, mainly due to higher emissions from iron and steel plants and an increased use of biomass in residential heatings.

Particulate Matter

Particulate matter emissions in Austria mainly arise from industrial processes, road transport, agriculture and small heating installations.

Particulate matter (PM) emissions show a decreasing trend over the period 1990 to 2015: TSP emissions decreased by 11%, PM_{10} emissions were about 22% below the level of 1990, and $PM_{2.5}$ emissions dropped by about 34%. Between 2014 and 2015 PM emissions increased by 1.0% (TSP), 1.3% (PM_{10}) and 2.1% ($PM_{2.5}$) mainly because of higher biomass consumption of the residential sector due to lower winter temperatures in 2015, which has been partly compensated by decreasing emissions from road transport. Apart from industry and road transport, private households and the agricultural sector (soil cultivation and harvesting) are the main contributors to PM emissions. Where for TSP the most important sources are transport and industrial processes, small heating installations have the highest share in $PM_{2.5}$ emissions.

Heavy Metals

Emissions of all three priority heavy metals (Cd, Pb and Hg) have decreased since 1990.

The overall Cd emissions reduction of 25% from 1990 to 2015 is mainly due to a decline in the industrial processes and energy sector, which is due to lower use of heavy fuel oil and lower emissions from iron and steel production. The increase of 2.0% between 2014 and 2015 mainly results from higher biomass consumption of households.

The overall reduction of Hg of about 55% for the period 1990 to 2015 was due to decreasing emissions from cement industries and the industrial processes sector as well as due to reduced use of coal for residential heating. Several bans in different industrial sub-sectors and in the agriculture sector are behind these developments in Austria.

The overall reduction trend of Pb emissions was minus 93% for the period 1990 to 2015, which is mainly a result of the ban of lead in gasoline. However, abatement techniques and product substitutions also contributed to the emission reduction.

Persistent Organic Pollutants (POPs)

Emissions of all POPs decreased remarkably from 1990 to 2015 (HCB, PAH and PCDD/F by about 60 to 80%), where the highest achievement was made until 1995. The significant increase of HCB emissions in the years 2012, 2013 and 2014 was due to unintentional releases of HCB by an Austrian cement plant.

In 2015 the emissions from HCB and PCB decreased compared to the previous year. The short term trend of HCB is influenced by the accidental release, as already mentioned, which is the reason for the decrease of 74% between 2014 and 2015. The slight decrease (-1.8%) of PCB between 2014 and 2015 is dependent on production activities in secondary lead production.

PAH and PCDD/F increased by 11% and by 7.4% respectively between 2014 and 2015.

The most important source for PAH, PCDD/F and HCB emissions in Austria is residential heating. In the 80s industry and waste incineration were still important sources regarding POP emissions. Due to legal regulations concerning air quality emissions from industry and waste incineration decreased remarkably from 1990 to 1993. PCB emissions are almost exclusively emitted in NFR sector *2 Industrial Processes and Product Use* (Metal Production).

ES.4 Key categories

To determine key categories, a trend and a level assessment have been carried out, which resulted in 43 identified key categories. It shows that the residential sector has been identified as the most important key category: all air pollutants except NH_3 are found key in either the trend or the level assessment. In the following table the top 5 ranked key categories are listed.

Table 1: Most relevant key categories in Austria for air emissions 2015.

Name of key category	No of occurrences as key category
1.A.4.b.1 – Residential: stationary	23 times (SO_2, NO_x, NMVOC, CO, Cd, Pb, Hg, PAH, DIOX, HCB, PCB, TSP, PM_{10}, $PM_{2.5}$)
2.C.1 – Iron and Steel Production	15 times (Cd, Pb, Hg, PAH, DIOX, HCB, PCB, TSP, PM_{10}, $PM_{2.5}$)
1.A.3.b.1 R.T., Passenger cars	12 times (NO_x, NMVOC, CO, Pb, TSP, PM_{10}, $PM_{2.5}$)
1.A.2.g.8 Other Stationary Combustion in Manufacturing Industries and Construction	14 times (SO_2, NO_x, Cd, Pb, DIOX, TSP, PM_{10}, $PM_{2.5}$)
1.A.2.a Iron and Steel	4 times (SO_2, CO)

ES.5 Main differences in the inventory since the last submission

As a result of the continuous improvement process of Austria's Annual Air Emission Inventory, emissions for some sources have been recalculated, e.g. on the basis of updated activity data or revised methodologies. Thus emission data for the whole time series submitted this year differ from the data reported previously.

In NFR sector *1 Energy*, changes are mainly due to revisions of the energy balance following a revision of the gross natural gas consumption affecting the 'own use' of the energy sector as well as the 'final energy consumption'. Minor revisions have been made for liquid fuels. For other fuels' the major revision took place for the year 2014 where a shift of 'industrial waste' to municipal solid waste' has been reported by energy statistics. Furthermore, emissions declarations 2007–2014 from large combustion plants have been updated and corrected.

In NFR sector *1.A.3 Transport*, emissions have been slightly revised due to the usage of the most recent version of the emission calculation model "NEMO". Domestic consumption on the road has been slightly revised upwards for 2012–2014. In the model this results in a reduction in energy consumption of fuel export. Further recalculations are due to revisions of the energy balance (LPG and biogas fuel quantities, use of diesel).

In NFR sector *2 Industrial Processes and Product Use*, recalculations have been carried out mainly due to updated activity data of NFR source categories *2.A Mineral Products* (Mining, construction/demolition and handling of products), *2.B Chemical Industry* (Handling of products and other chemical industry) and *2.C Metal Production* (Aluminium and Lead production).

For NFR sector *3 Agriculture*, revisions were on the one hand due to methodological improvements like the update of NH_3 and NO_x emission factors according to the EMEP/EEA Emission Inventory Guidebook 2016 in the sectors manure management and agricultural soils. On the other hand, recalculations have been carried out due to updated activity data (livestock data for horses, compost and land use data).

In NFR sector *5 Waste*, recalculations have been carried out because Austria has adapted its DOC of residual waste for the historical years 1950–1989. This has affected the amount of landfill gas generated and thus also the emission values for NMVOC and NH_3. Further, amounts of deposited construction waste and tar paper for the year 2010 have been corrected slightly. NMVOC emissions from *5.D Wastewater Treatment and Discharge* were estimated and reported for the first time in this years' submission.

For more detailed information see Chapter 7 – Recalculations and Improvements.

ES.6 Improvement Process

The Austrian Air Emission Inventory is subject to a continuous improvement programme resulting in annual recalculations (see Chapter ES.5 above). Furthermore, the regularly conducted CLRTAP stage 3 reviews trigger improvements. The last in-depth review of the Austrian Inventory took place in 2010 (UNITED NATIONS 2010). The findings were commented in Table 280. The next stage 3 review will take place in 2017. In addition to the CLRTAP review, from 2017 onwards the national emission inventory data will be also checked by the European Commission as set out in Article 10 of Directive 2016/2284. The inventories will be checked to verify the transparency, accuracy, consistency, comparability and completeness of information submitted and to identify possible inconsistencies with the requirements set out under international law, in particular under the LRTAP Convention.

Recalculations and improvements are summarized in Chapter 7 – Recalculations and Improvements and described in detail in the sector-specific chapters of this report.