Convention on Long-range Transboundary Air Pollution
emep Co - operative programme for monitoring and evaluation of the long-range transmissions of air pollutants in Europe

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Status of Reporting, Review and Gridding

Third joint session of the Steering Body to EMEP and the Working Group on Effects

11-15 September 2017, Geneva

Katarina Mareckova, Robert Wankmüller, Marion Pinteris, Melanie Tista, Sabine Schindlbacher, Bernhard Ullrich

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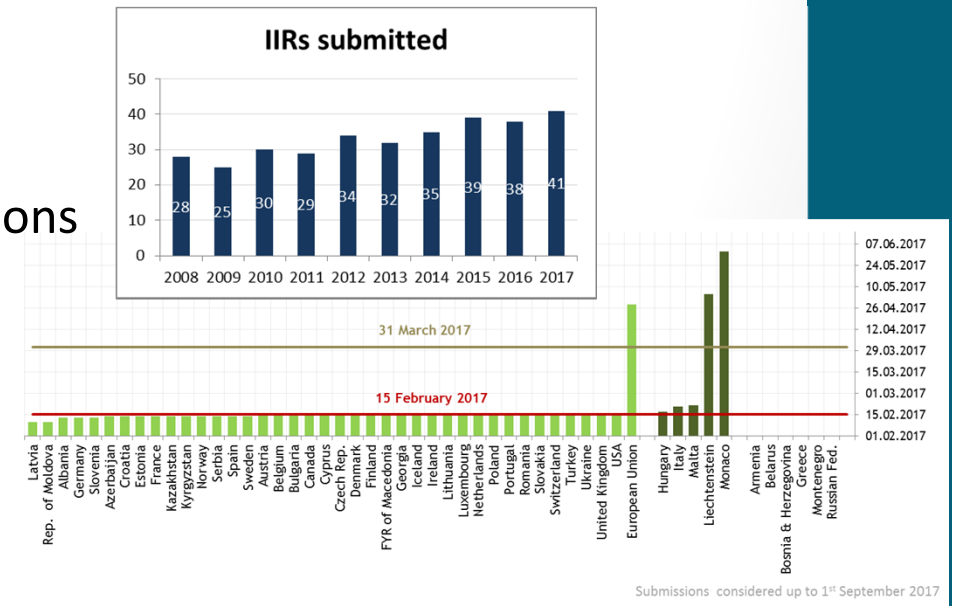
Status of reporting - emissions

- **Persisting problems**
  - Timeliness , completeness
  - Consistency across years, recalculations
  - Transparency (IIRs)
  - **Format of activity data, EFs**

See more in Status report

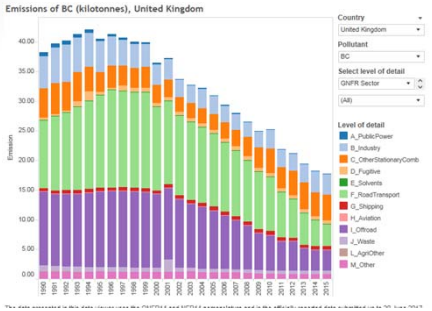


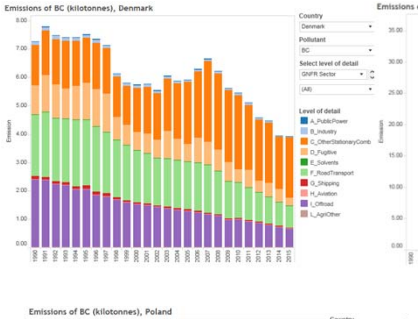
CEIP 19.09.2017

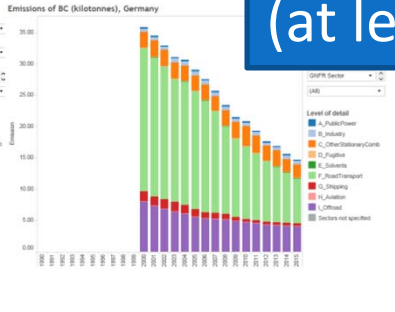
BC reporting 2017

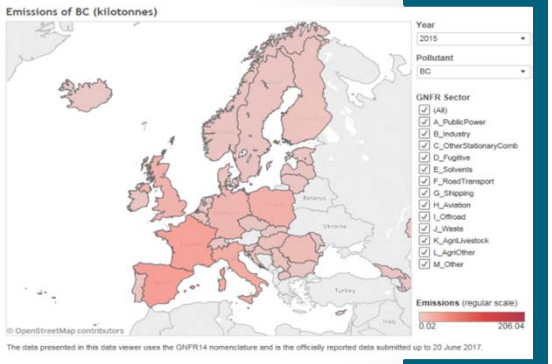
38 Parties (75%) reported BC

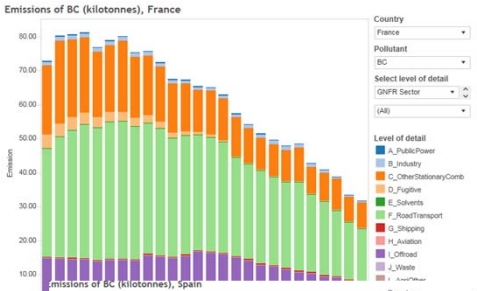
34 Parties full time series (at least 2000 onwards)

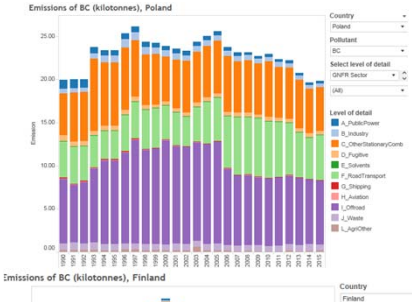


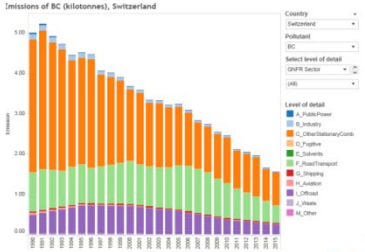


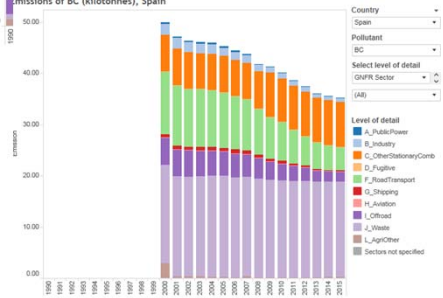


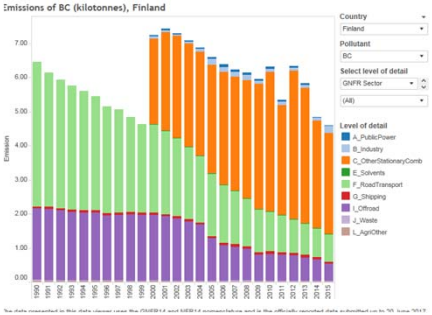


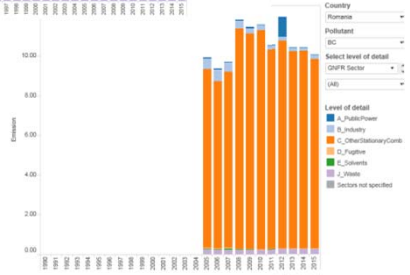


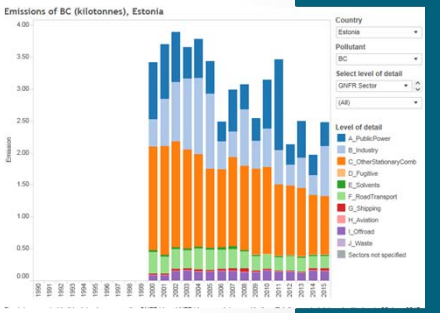


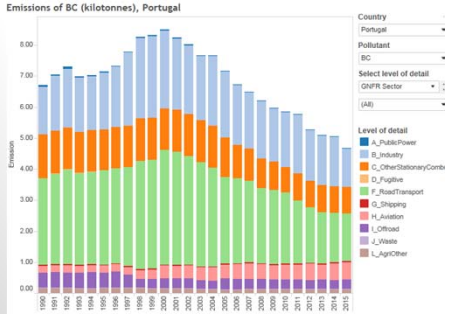


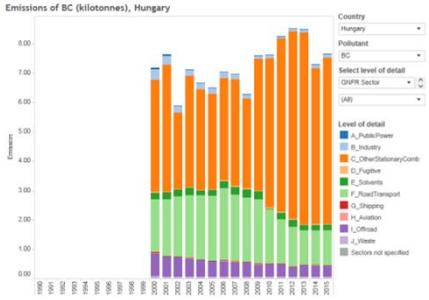


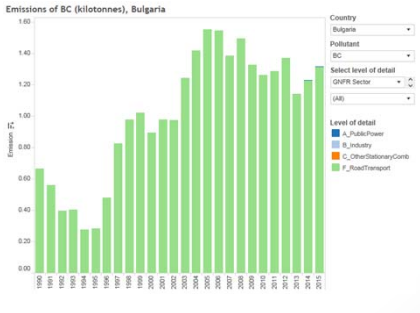


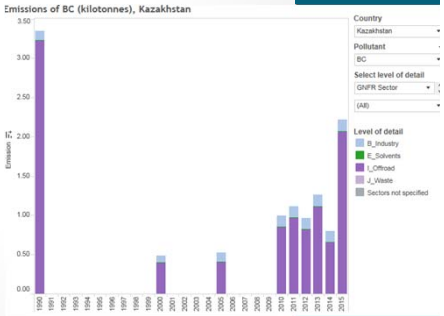




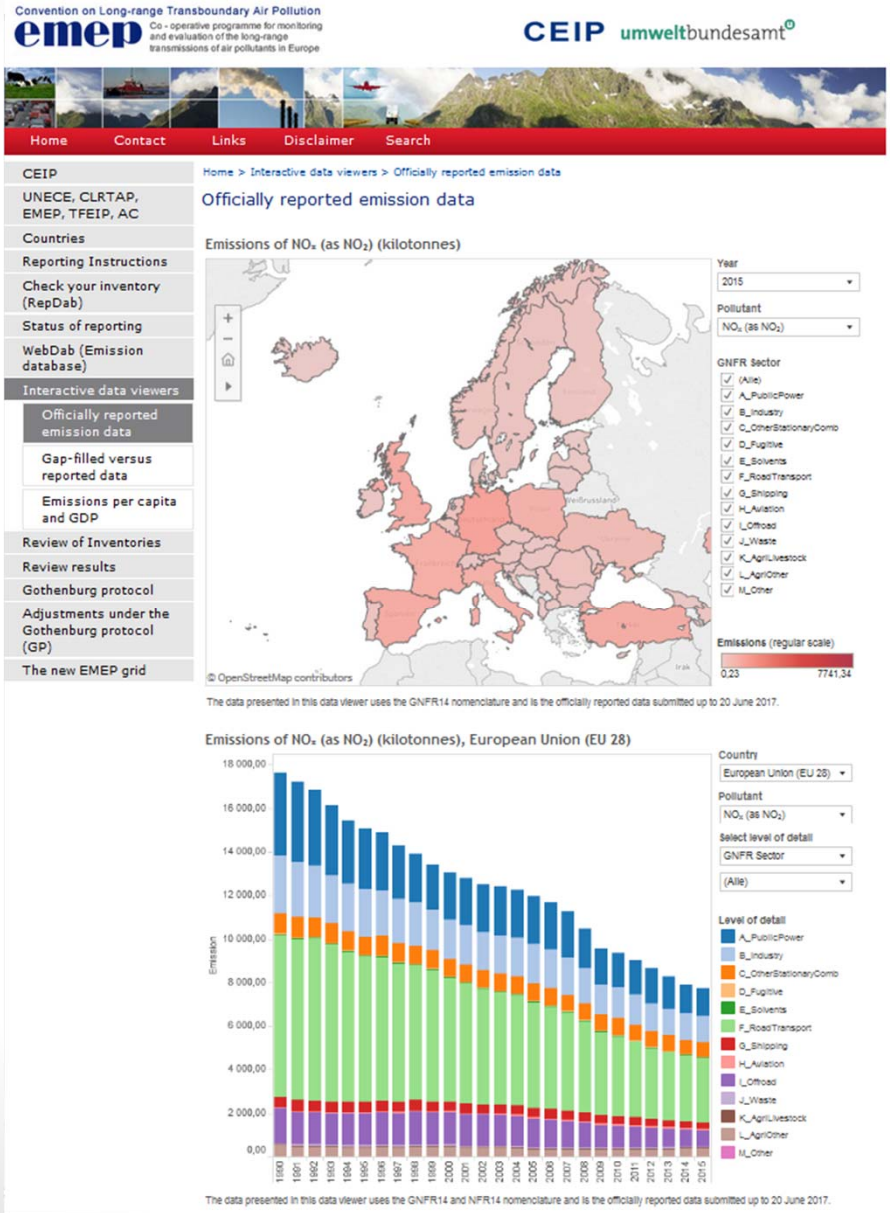








Officially reported emission data



CEIP Website, interactive data viewers

http://www.ceip.at/data_viewers/official_tableau/

Selection:

- Country
- Pollutant
- Year
- GNFR Sector
- NFR Sector

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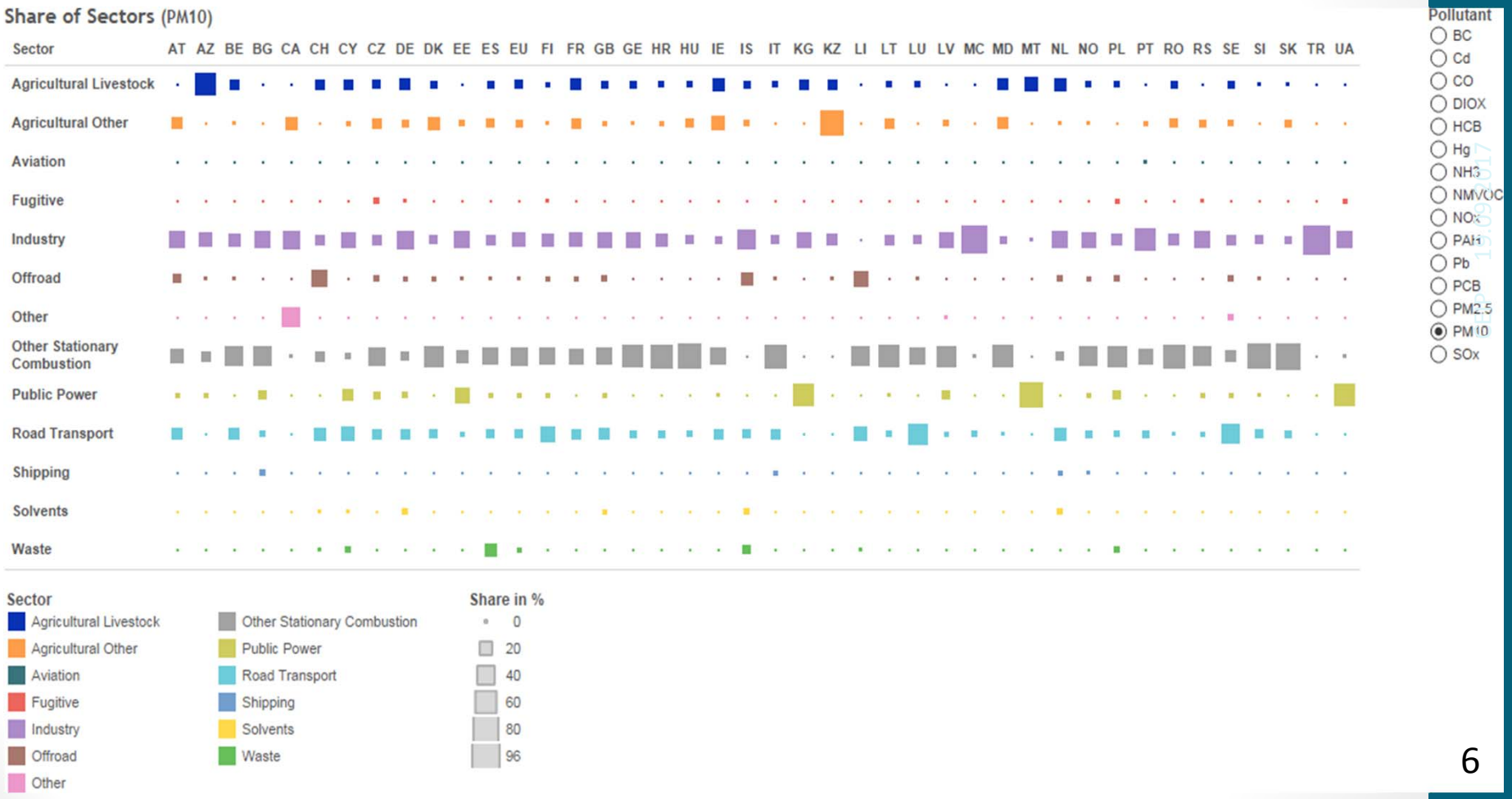
Initial review (S1 and S2) of inventories reported under CLRTAP 2017, plan 2018

- Initial checks cover: timeliness, completeness, consistency (years, Parties, reporting obligations), indicators
- **2017**: All submitted inventories have been reviewed (S1 & S2)
- Findings provided in March/April in country reports http://www.ceip.at/review_results/review_results_2017/
- Summary in *EEA&CEIP joint Inventory review report,* Technical report 2/2107, Annexes in form of interactive data viewers
- **Assessment of IIRs** - transparency and completeness – IIR Awards 2017
- **CLRTAP inventories are not always considered priority by Parties** – limited feedback to the questions of CEIP
- **2018: Follow the same principles,** Further improve initial checks, publication of findings in interactive format

Share of GNFR sectors, 2015, PM10 example



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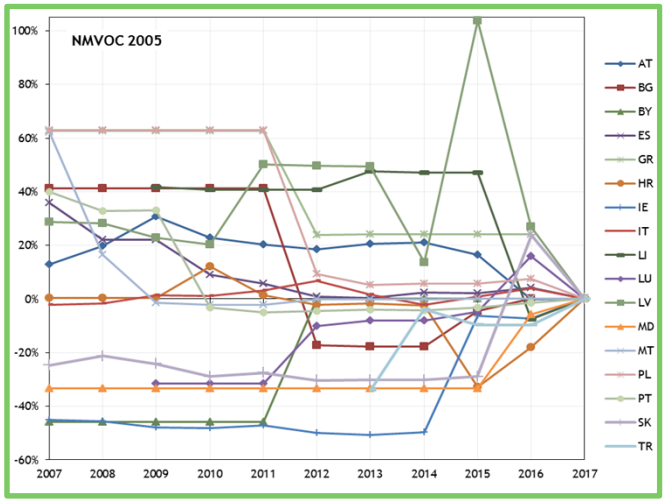
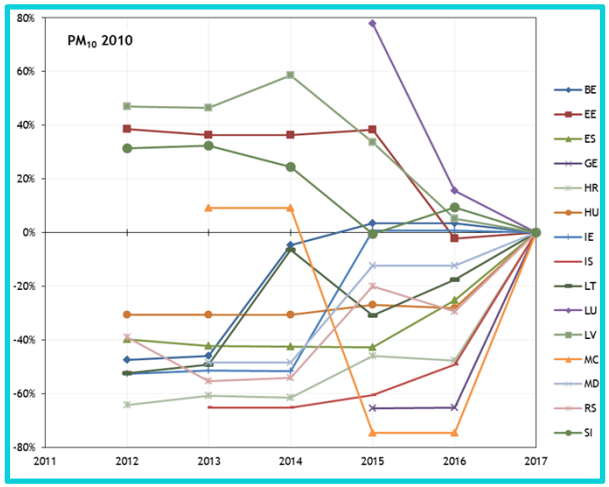
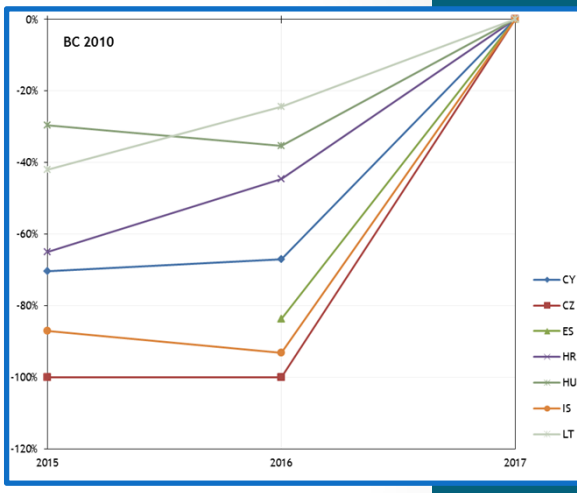
Recalculations in 2017 example (time series consistency)







Difference of **NMVOC (for the year 2005), PM_{10} (for 2010**) and **BC (for 2010)** national total emissions as reported for the period 2007–2017 and 2012-2017, respectively (in %; only countries with **recalculations of more than ± 30%)**

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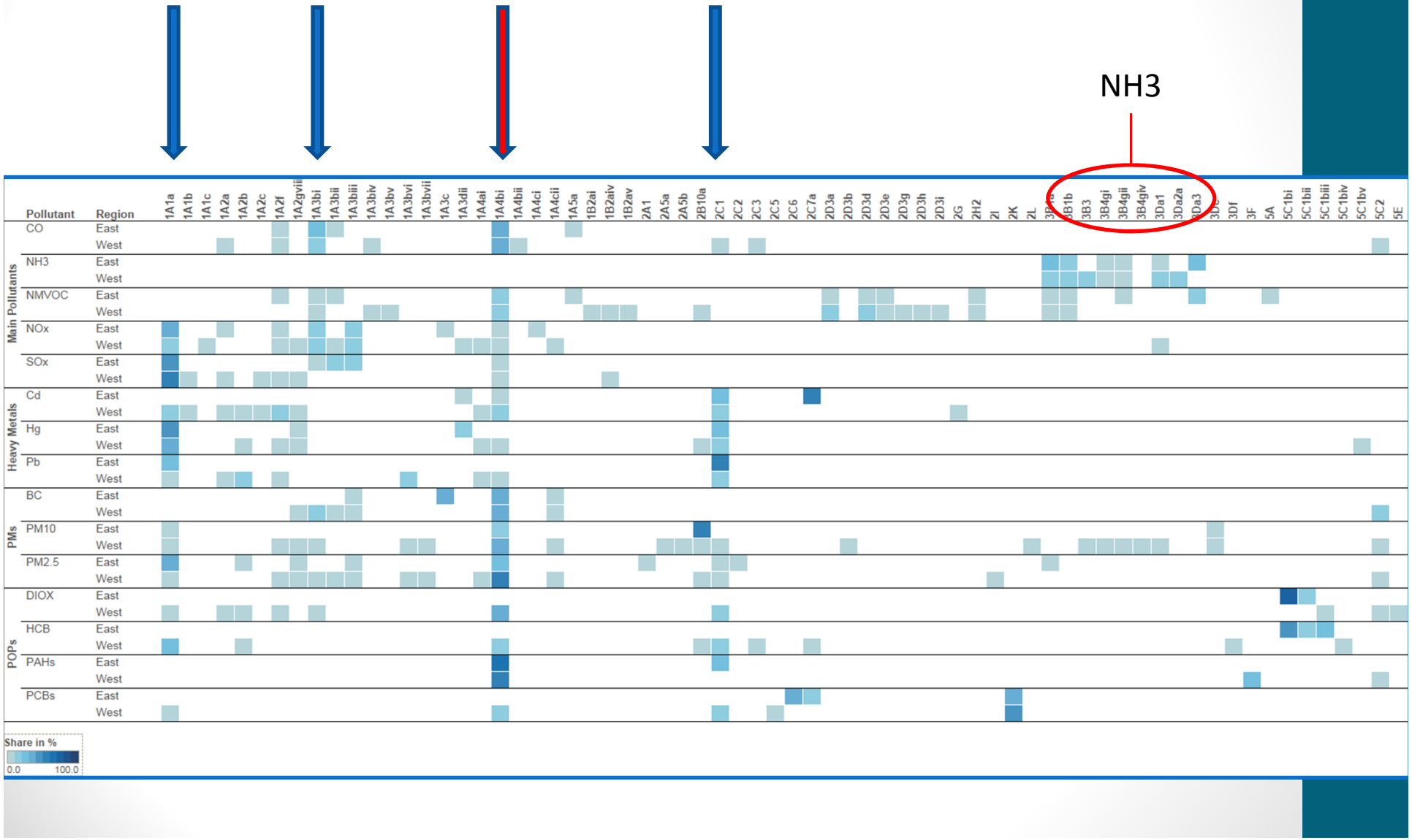
KCA 2017

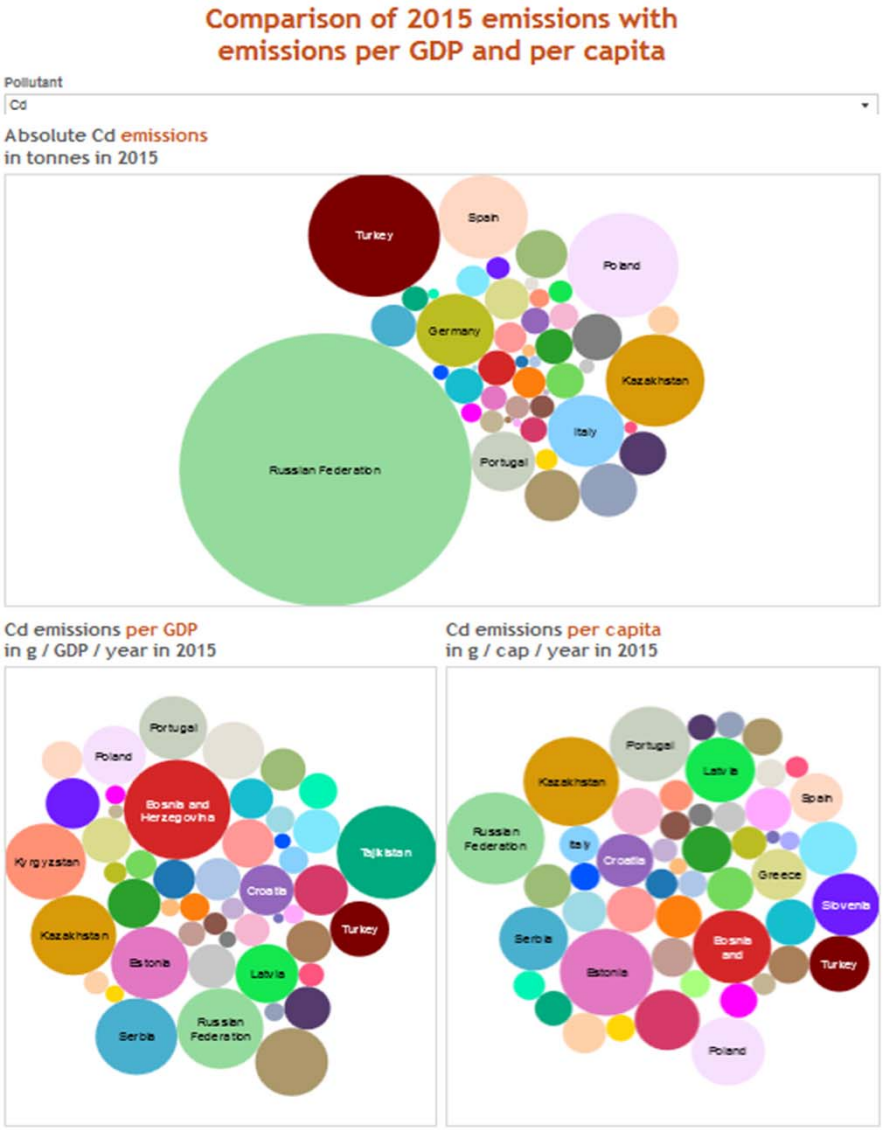
in EMEP East and EMEP West



KCA 2017 cont

- *1A4bi Residential – Stationary plants* is the most important source of the pollutants assessed for this report: like in previous years, *1A4bi* is a key source of all pollutants except NH_3 and ranks among the top three key categories for most pollutants.
- *1A1a Public Electricity and Heat Production* is among the key categories for nine assessed pollutants (except NMVOC, NH_3, BC, CO and PAH). It is the most important key source of SO_x Hg and HCB in the countries of the 'EMEP West' area and for NO_x, SO_X, $PM_{2.5}$ and Hg in the 'EMEP East' area.
- *1A2f Stationary combustion in manufacturing industries and construction: Non-metallic minerals* is key category for ten out of the fourteen assessed pollutants (all except NH_3, BC, PAH and HCB).
- *1A3bi Road Transportation – Passenger cars* is a key source of NO_X, NMVOC, $PM_{2.5}$, PM_{10}, BC, CO and DIOX emissions.
- Sectors 3B1a (Manure management – Dairy cattle), 3B1b (Manure management – Non-dairy cattle) and 3Da1 (Inorganic N-fertilizers) are dominating NH_3 emission sources in both areas.
- The energy sector *(mainly 1A4bi – Residential stationary)* is the dominating source of PM_{10} emissions in the 'EMEP West' area, whereas the industry sector (*particularly 2B10a – Chemical industries – other*) is the main source of PM_{10} emissions in the 'EMEP East' area.
- In the 'EMEP West' area 53% of the $PM_{2.5}$ emissions come from *1A4bi – Residential stationary*, while the most important key category for this pollutant in the 'EMEP East' area is *1A1a Public Electricity and Heat Production* with a share of 38%.

Comparison of 2015 total emissions with emissions per GDP and per capita



CEIP Website, interactive data viewers

Selection:

- Pollutant

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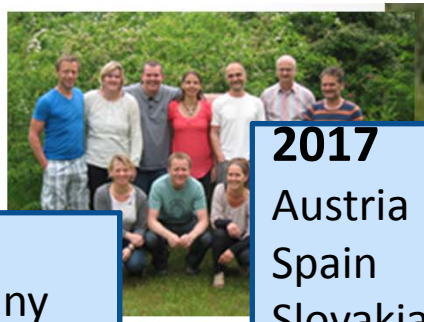
Awards 2010- 2017



2015
Denmark
Portugal
Canada
Luxembourg
Italy
Turkey
Switzerland

2016
Germany
Sweden
Latvia
Iceland
Macedonia
Lithuania
Croatia

2017
Austria
Spain
Slovakia
Moldova
Azerbaijan
Hungary
Latvia

2014
Norway
France
Latvia
Belgium
Denmark
Slovenia
UK

2013
Finland
Croatia
Estonia
Sweden
Poland
Spain
Turkey

2012
United Kingdom
Germany
The Netherlands
FYR Macedonia
Ireland

Denmark

2011
Finland
Estonia
Austria
Croatia
Switzerland

2010
France
Germany
The Netherlands
Croatia
Cyprus

In-depth review (S3) process

- **History: 2 cycles**
  - 2008 - 2013 , 44 countries reviewed
  - 2014 – 2017 (2018); 45 countries reviewed, 4 outstanding

- System is resource demanding for EMEP and requires regular **support of Parties**
  - management (set-up of review teams, communication with Parties,…)
  - Website ,DB, tools (data for reviewers)
  - Country reports (proofreading, editing,…)
  - ERTs (about 20-22 reviewers a year needed)
  - Reporting requirements /formats (UNECE Guidelines) does not really support review process (e.g. AD, EFS not in standardised formats)

- **CLRTAP inventories are not always considered priority by Parties** – limited resources for national inventory teams to follow up recommendations of ERTs

http://www.ceip.at/review_process/stage3_review_ae/

In-depth review (S3) 2013-2017

notes	2017	2016	2015	2014	2013
OK	Albania	Estonia	Azerbaijan	Belgium	Bulgaria
no data no IIR in 2017 but promised	Armenia	Georgia	Belarus	Croatia	France
OK	Austria	Iceland	Czech Rep.	Cyprus	Italy
no IIR, only 2015	Kyrgyzstan *	Luxembourg	Ireland	Denmark	Latvia
no IIR since 2013	Malta*	FYR of Macedonia	Rep. of Moldova	Greece	Lithuania
no IIR	EU	Russian Fed	Netherlands	Germany	Norway
no IIR but promised	Kazakhstan*	Serbia	Slovakia	Hungary	Poland
no IIR but promised	Liechtenstein*	Switzerland	Slovenia	Spain	Portugal
promised by end of	Monaco	Turkey	Ukraine		Romania
2013		UK			Sweden

Pending (planed for 2018/19):

- Armenia, Montenegro, Bosna & Herzegovina **no data**
- Finland – recalculating inventory

Since 2014 is **Adjustment review** conducted along with S3 review

http://www.ceip.at/review_process/stage3_review_ae/

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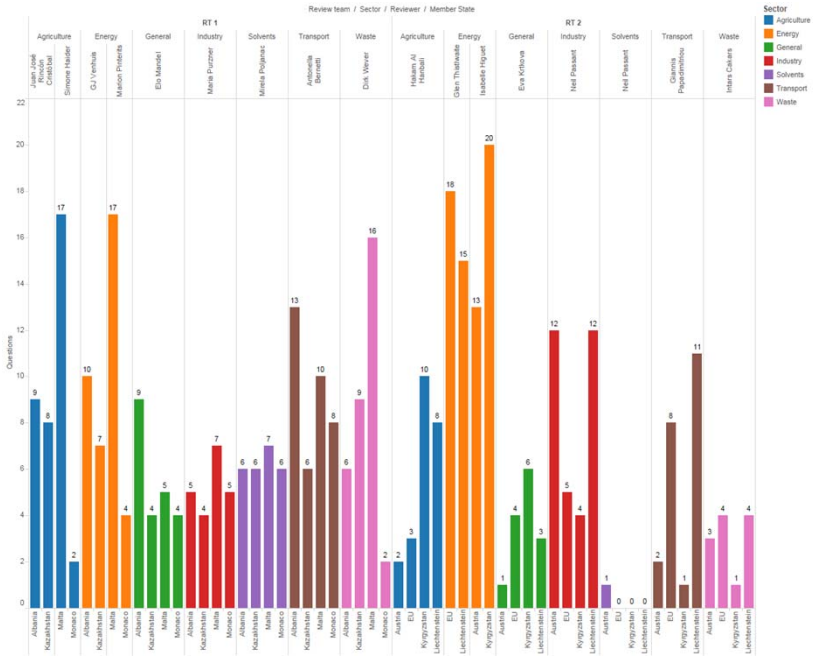
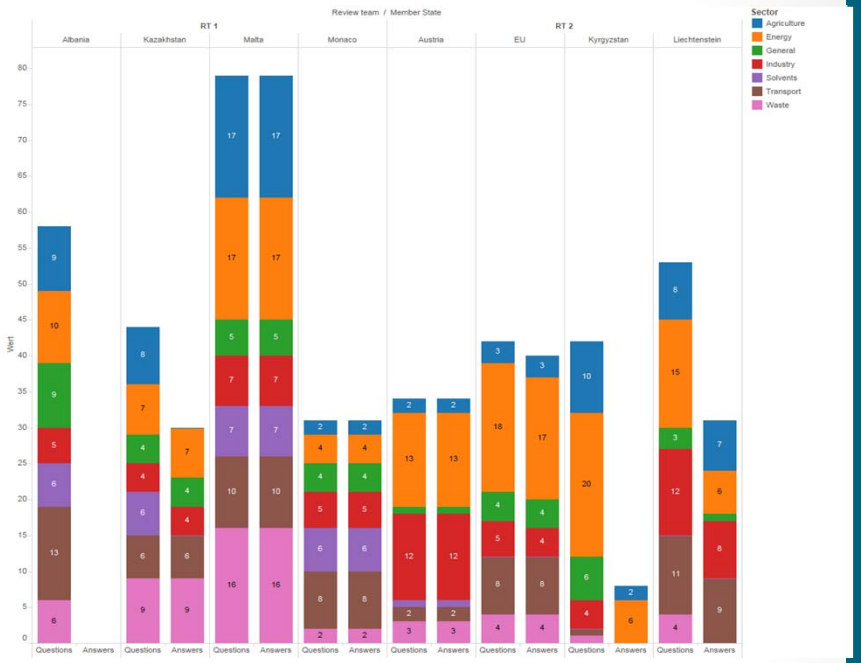
R3 2017 Progress

Questions/answers
per sector / reviewer (20-30)



Questions/answers
per Party (max 80)



➢Review of 8 Parties completed

- ➢Up to **80 questions** for a Party, **20 - 40 issues** identified by reviewer
- ➢Revised review guidelines including calculation of TC tested
- ➢Cooperation with review under NECD directive considered useful but does not resulted in reduced workload for ERT and /or CEIP

TC lessons learned (observations of LRs)

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- **New** item in the review process /An **additional** task **not easy to manage** given the **same deadline and time budget** than before
- For some countries (generally not EU MS), **there are many not estimated emissions**, so it would be very time consuming for ERT to estimate emissions for most of all these missing categories in the frame of the TC process + identification of cases above the threshold.
- **The time budget of CLRTAP review is rather limited and it would be difficult to extend voluntary effort for the CLRTAP review.**

TC / PTC	Nb TC (*)	Nb identified PTC (*)
Austria	0	0
EU	0	0
Kyrgyzstan	3	15
Liechtenstein	2	7

(*) : the number is higher if we count the differ

TC next / LR recommendations

- The significance threshold to be discussed during TFEIP meeting
- Instructions to be elaborated and examples needed if this should become a standard part of the review
- **Possible options to examine for next years, if TC process is adopted for the CLRTAP review :**
  - Option 1 : TC process to be managed mainly before S3 - stage 3 review (e.g. during S2: -> **more time / more complete TCs** , but **difficulty of timing and voluntary resources**.
  - Option 2 : TC process to be continued after the S3: -> more time for Party to respond to the PTC and TC, but **difficulty of timing with the holiday period and voluntary resources needed.**
  - Option 3 : Mainly focusing TC process during S3 (as this trial year): -> no **need of further voluntary resources, no change in the timing/deadline**, but **limited TC investigations and no reasonable time for Party to react to TCs**.
  - Option 4 : one of option 1-2-3 combined with a share of TC process with the NECD review : e.g. NECD review focusing on TC for EU MS, CLRTAP focusing on TC for non EU MS.

In depth review 2018 / 2022 next steps / new situation

- NECD review cycle related to inventories 2017-2021
  - 2017 (2018) SOX, NOX, NMVOC, NH3, PM2.5 (**28 EU MS**)
  - 2018, 2019 (2020) review of POPs and HMs (**28 EU MS**)
  - 2020 (2021) CO, PM10, BC (28 EU MS)

- EMEP cycle related to EMEP inventories 2018 – 2022
  - current system **8 – 10 countries a year** but **priorities** for the S3 review and selection of the countries for the review are updated before annual SB meetings , proposed by CEIP in discussion with TFEIP ,…. and approved by EMEP SB
  - option a) all Parties 3 pollutants - more reviewers needed each year
  - option b) 23 countries one group of pollutants (main + CO, POPs, 3HMs + PM + BC) cycle prolonged to 8 years, more reviewers needed

  ……..

In depth review plan 2018 - 2023

- **Continue in in-depth reviews keeping main principles as in cycles before** and aim to limit overlap with review under NECD to the extent possible, **streamlining of the process should be advantage for all**

- The **NEW Review guidelines** including **guidance for technical corrections** (as Annex) to be approved by EMEP SB meeting and used during 2018 review and provide to EB for approval 2019

- In-depth review 2018 – 2020 **focus on non EU MS** 6-8 Parties a year
- *Option: EU MS might be included in the package if requested by IC or review teams*

- **2019 (2020) evaluate experience** from cooperation with EC (NECD review) and in cooperation with experienced reviewers propose **strategy for next 3-5 years**

- There will be a need to harmonize the **time schedule** with NECD and UNFCCC reviews to limit burden on countries and reviewers

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Proposal for in-depth review 2018-2023

Review in 2018-19 will focus on non EU MS,
Strategy for years 2021 – 2023 will be prepared for EMEP SB meeting 2020

2018	2019	2020
Moldova	Turkey	Liechtenstein
Armenia	B&H	Switzerland
Finland	FYR of Macedonia	Kyrgyzstan
Belarus	Serbia	Kazakhstan
Ukraine	Russian Fed	Monaco
Montenegro	Albania	
Azerbaijan	Georgia	EU

2021	2022	2023
Croatia	Estonia	Austria
Cyprus	Bulgari	Portugal
Czech Rep.	Iceland	Malta
Greece	Luxembourg	UK
Romania	France	Norway
Netherlands	Sweden	Lithuania
Slovakia	Germany	Ireland
Slovenia	Spain	Poland
Hungary	Latvia	EU

Red font indicates countries with irregular reporting of data
Blue font indicates countries reviewed in 2017

- ✓ Selection of Parties to be reviewed in particular year will be updated depending on submitted data, recommendations of review teams and EMEP
- ✓ Review will be harmonised to the extent possible with review conducted under NECD directive

Convention on Long-range Transboundary Air Pollution
emep Co - operative programme for monitoring and evaluation of the long-range transmissions of air pollutants in Europe

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Gridded data for modelers

Third joint session of the Steering Body to EMEP and the Working Group on Effects

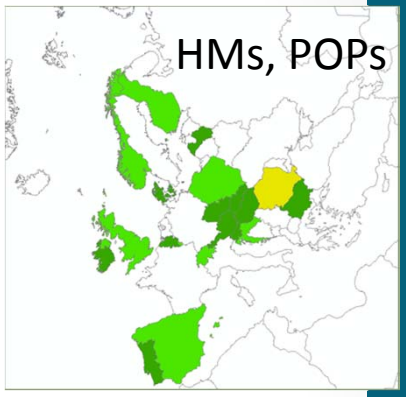
11-15 September 2017, Geneva

Katarina Mareckova, Robert Wankmüller, Marion Pinteris, Melanie Tista, Christine Brendl ,

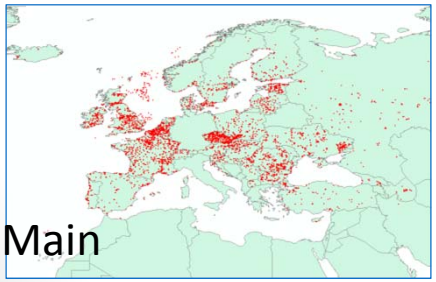
Grid and LPS reporting in 2017

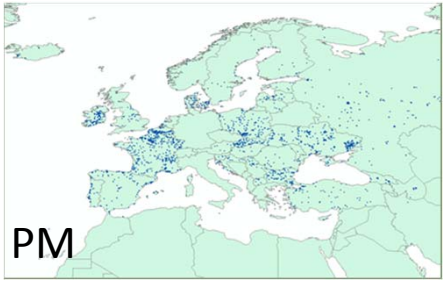
- **21 Parties** reported sectoral gridded emissions in **0.1°x0.1° long-lat** resolution for 2015, **5 Parties** reported additional historical gridded emissions at least for 1990, 1995, 2000, 2005 and 2010

Only 2005 grid reporting (0.1°)
Only 2015 grid reporting (0.1°)
2015 grid reporting + additional years (0.1°)

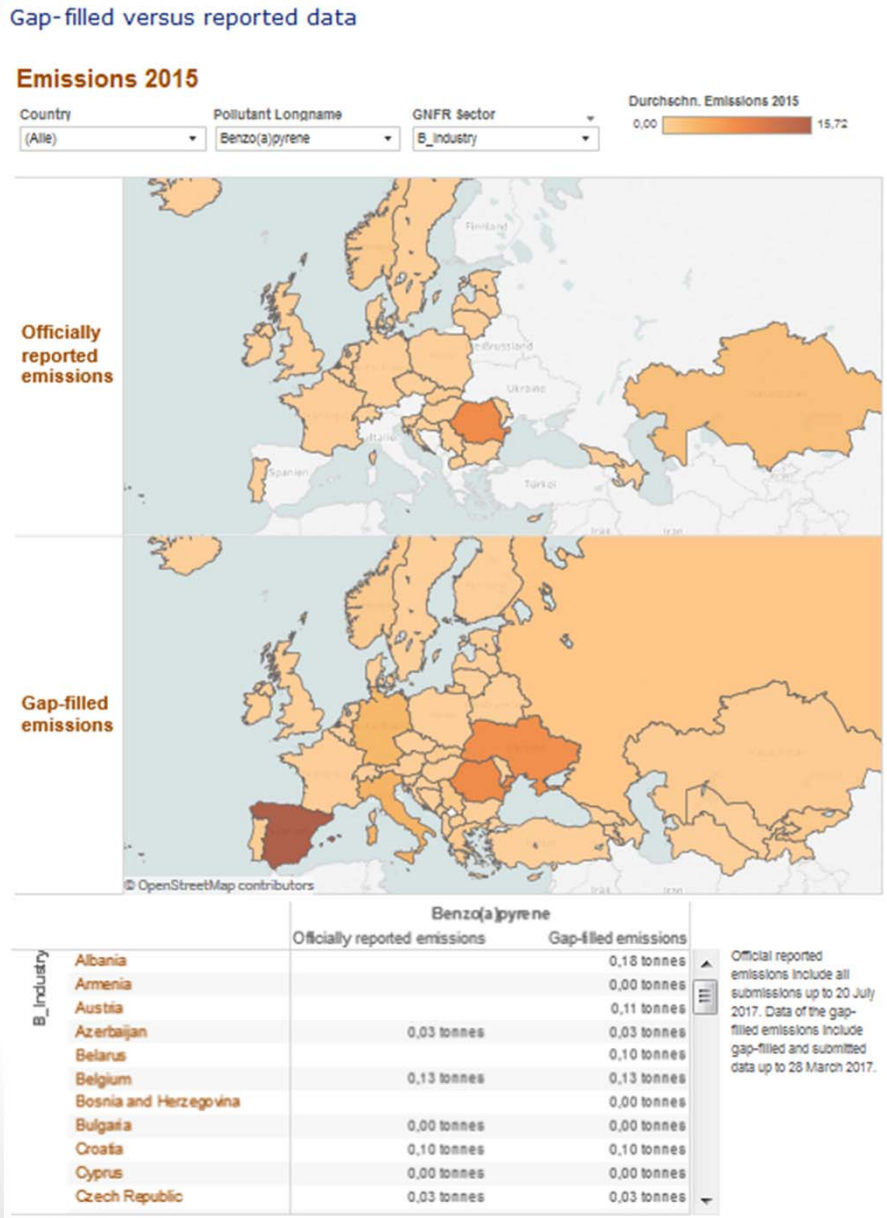


- **28 Parties** reported sectoral **LPS emissions** for 2015, **3 Parties** reported additional historical LPS emissions at least for 1990, 1995, 2000, 2005 and 2010





Gap-filled versus reported data 2015



CEIP Website, interactive data viewers

http://www.ceip.at/data_viewers/gapfilled_vs_reported/

Selection:

- ✓Country
- ✓Pollutant
- ✓GNFR Sector

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2017: Gap-filling and improvements

- Gap-filling 2017:
  - 63 % of the data entries (NT, GNFR) have been reported, whereof **2 % have been replaced**
  - **37 % of the data entries have been gap-filled (expert estimates)**

- In case of several estimates to fill a gap, a **new method to detect the best estimate was developed** by using plausible reported data of other countries in comparison with population data, GDP and area size

- Additional data sources and advanced calculations
  - additional literature data
  - Calculations are further developed by including population data, GDP data and (for the HMs) PM_{10} emission data

Planned Improvements (gap-filling)

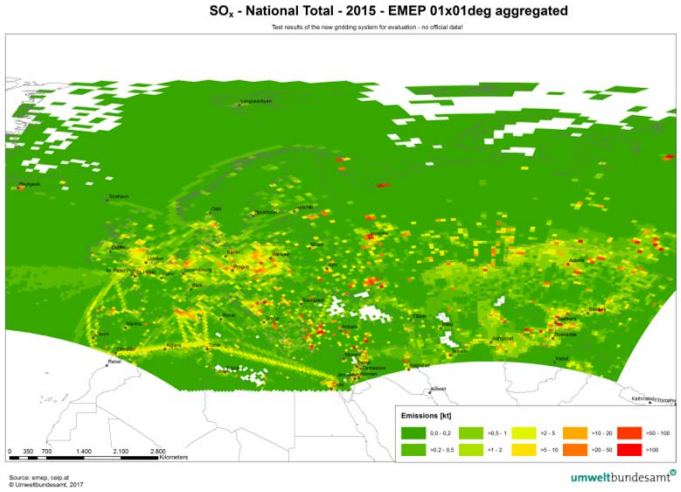
- Further and **extended analysis** of submissions
  - evaluate quality and credibility of the data
- **New /improved calculation methods** for missing data
  - Correlation with other pollutants, e.g. Correlation of Hg with PM_{10}
  - Correlation with socioeconomic data, e.g. Correlation of HMs with population data
- **Use additional and updated data sources**, estimates and projections for expert estimates
  - Literature data, NECD review findings, other projects
  - Cooperation: EMEP centres, TMs, AMAP, GMA, JRC,EEA, etc.
- Further elaborate contacts with EMEP Parties

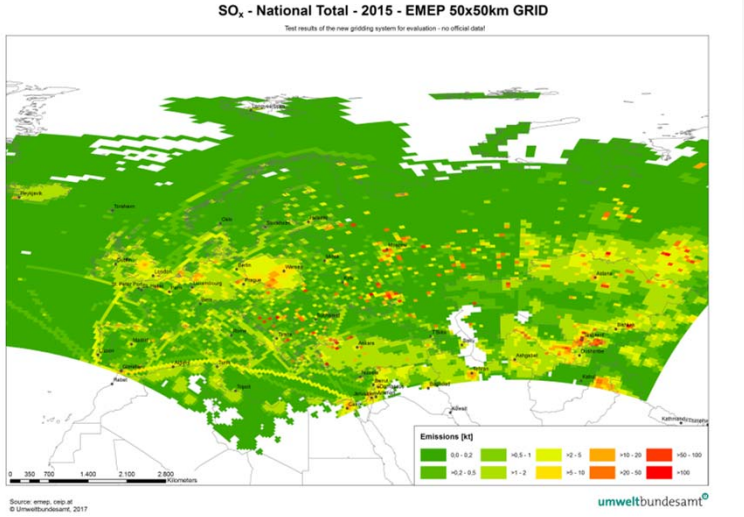
Identified problems on reported gridded data and LPS emissions

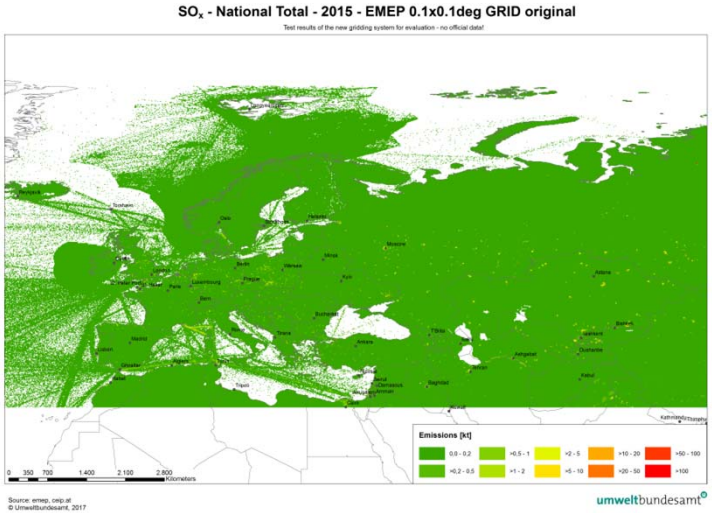
- Exchanged longitude/latitude coordinates (2 cases)
- LPS placed outside country borders (2 cases)
  (Also some E-PRTR LPS data used as proxy information were placed outside country borders)

- Challenge: In the short timeframe between grid-reporting and delivering gridded data to modelers is not enough time for detailled quality checks

Example of gridded data SOx







Interval	*Klasse*	*Count_50km*	*Count_01.deg gri*	*Prozen_50kn*	*Prozent_01a*
0	0	3801	4862	18,28	23,38
>0 - 0,2 kt	1	9712	10388	46,71	49,96
>0,2 - 0,5 kt	2	2733	2447	13,14	11,77
>0,5 - 1 kt	3	1619	1271	7,79	6,11
>1 - 2 kt	4	1378	816	6,63	3,92
>2 - 5 kt	5	943	535	4,53	2,57
>5 - 10 kt	6	325	207	1,56	1,00
>10 - 20 kt	7	155	127	0,75	0,61
>20 - 50 kt	8	89	89	0,43	0,43
>50 - 100 kt	9	29	32	0,14	0,15
>100 kt	10	10	19	0,05	0,09
Total		**20794**	**20793**	**100**	**100**

Automatic quality checks implemented so far

- Detection and exclusion of LPS data outside country borders *
- Warning in case of grid cells outside country borders (to detect e.g. coordinate exchange reporting errors) *
- For each Country/Area/Pollutant: Checking if the grid sum of the individual sectors and the national total matches exactly the gap-filled emission values

* Exceptions for emissions reported over sea must be considered

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Gridding: Plans for 2018/2019

- Improve distribution by focusing on top differences identified by comparisons with other data sets
- Use **updated EDGAR proxies** for areas without grid reporting (from EDGAR v4.2 to v4.3.1) *
- Use **shipping** proxies based on FMI data *
- Calculate gridded emissions also for **historical years** (at least 2005, 2010 and 2015) – optional
- **Start gridding work earlier** (beginning of April) despite of the grid reporting deadline to get more time for quality checks

* Preparatory work started in 2017

Technical reports published by CEIP in 2017

- **1/2017** Joint CEIP/MSC-E technical report on emission inventory improvement for HMs modeling
- **4/2017** Joint CEIP/MSC-E technical report on emission inventory improvement for POPs modeling
- **2/2017** Inventory Review 2017
- **3-1/2017** Methodologies applied to the CEIP GNFR gap-filling 2017. Part I: Heavy Metals (Pb, Cd, Hg)
- **3-2/2017** Methodologies applied to the CEIP GNFR gap-filling 2017. Part II: Persistent organic pollutants
- **3-3/2017** Methodologies applied to the CEIP GNFR gap-filling 2017. Part III: Main pollutants and Particulate Matter
- **5/2017** Methodologies applied to the technical review of emission data
- **6/2017** Documentation of the new EMEP gridding system

- Emission chapter in : "*Transboundary particulate matter, photo-oxidants, acidifying and eutrophying components*" Joint MSC-W & CCC & CEIP Report, Status report 2017

CEIP Key Activities 2018-2019 (Summary)

Standard activities (CEIP Mandate)

- ✓ **Processing and archiving of data reported by Parties**
- ✓ Maintenance and improvement of EMEP **emission database (WebDab)**
- ✓ **Review** of inventory data (initial, in-depth)
- ✓ Maintenance and improvement of "**Gridding tool**"
- ✓ **Emission data sets for modellers** (gap filling and gridding, documentation of system)
- ✓ Develop tests and perform **checks of gridded data**
- ✓ **Support to UNECE secretariat and IC** (compliance issues, adjustment review, add hoc..)
- ✓ **Support to Parties** (capacity building, online guidance, add hoc, trainings,.....)
- ✓ **Cooperation** with EMEP centres and TFs, organisations (JRC, AMAP, EEA, EC, …) and other projects (CAM, NECD review,…)
- ✓ **Outreach and Publications of findings** (review findings, technical reports, status reports, assessment reports …)

- ✓ **Improvement of expert estimates and spatial distribution**
- ✓ Develop **spatial distribution** (0.1x0.1 long-lat) for selected **historical years**

- ✓ Assessment **of BC emissions** (cooperation with AMAP)
- ✓ Support work on **condensable and semi-volatile compounds**