Inf. Doc. WGSR-56

Ammonia emissions in relation to mitigation practices: what may happen by 2020?

From the co-chairs of the Task Force on Reactive Nitrogen

Recent data published by the Centre for Emissions Inventories and Projections[1] are noted, which show that ammonia emissions are mostly increasing across Europe since 2013. If the most recent data published (2015) are considered in relation with 2013 and 2014 and the trends are projected forward to 2020, then they can be compared with the 2020 ceilings under the revised Gothenburg Protocol. This approach is simply based on projecting forward the current trend, and requires no assumptions about future agricultural or energy models.

The approach can be implemented in two ways:

a) using the 2005 baseline given in Table 4 of the revised Gothenburg Protocol, or
b) using updated estimates of emissions for 2005 as reported by countries and given in the webdab database by CEIP.[1]

These two methods give different answers because of updates by Parties to their inventories. The sum of emissions reported for 2005 in the revised Gothenburg Protocol was 4079 kt NH_3 as compared with the 2005 value of emissions of 4364 kt NH3 as reported by CEIP in webdab.

Projecting forward the most recent trends in ammonia emissions to 2020, gives a total ammonia emission of 4456 kt NH_3 for the countries listed in Table 4 of the revised Gothenburg Protocol. This is 16% above the 2020 ceiling committed in the revised Gothenburg Protocol (according to the 2005 baseline given in Table 4 of the revised protocol).

If the 2005 baseline, as now reported by countries is used (according to the data reported by CEIP), then projecting the most recent trends (2013-2015) forward to 2020 gives a total ammonia emission for the countries listed in Table 4 of the Revised Gothenburg Protocol that is 9% above the revised Gothenburg ceiling.

Under either calculation, this shows that several Parties are on course to exceed the ammonia emissions limits for 2020. The numbers for the European Union are similar, at 20% and 9% above the ceilings, respectively.

According to CEIP[1], increases in ammonia emissions between 2013 and 2015 were reported by 24 out of 32 parties listed in Table 4, showing a very widespread concern. More recent evidence also supports the observations.

For example, in data recently released for the UK (in this case including 2016), increases in ammonia emissions were attributed to larger numbers of a cattle and to increased use of urea fertilizer.[2] Interrogation of the UK inventory shows that other factors include increasing time spent by cattle indoors and increasing poultry numbers, both of which will further increase emissions. Based on the three-year trend from CEIP (2013-2015)[1], UK is projected to be 18% above the 2020 ceiling, while the four-year trend (2013-2016) indicates that UK would be 20% above the 2020 ceiling. This example therefore supports that these changes highlight a real feature to be given serious consideration across the UNECE.

Increases in cattle numbers may also explain part of the trend in other areas of Europe. In the European Union, quotas limiting milk production ("milk quotas") were ended in 2015. This effect therefore may be expected to be seen even more strongly following 2015. The increased share of urea in the UK market is also being seen across Europe, according to data provided by Fertilizers Europe (Figure 1) which shows increasing amounts of urea imports. Other activity changes including increased poultry numbers may also be responsible across the UNECE.

[1] http://webdab1.umweltbundesamt.at

[2] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/681445/Emissions_of_air_pollutants_statistical_release_FINALv4.pdf

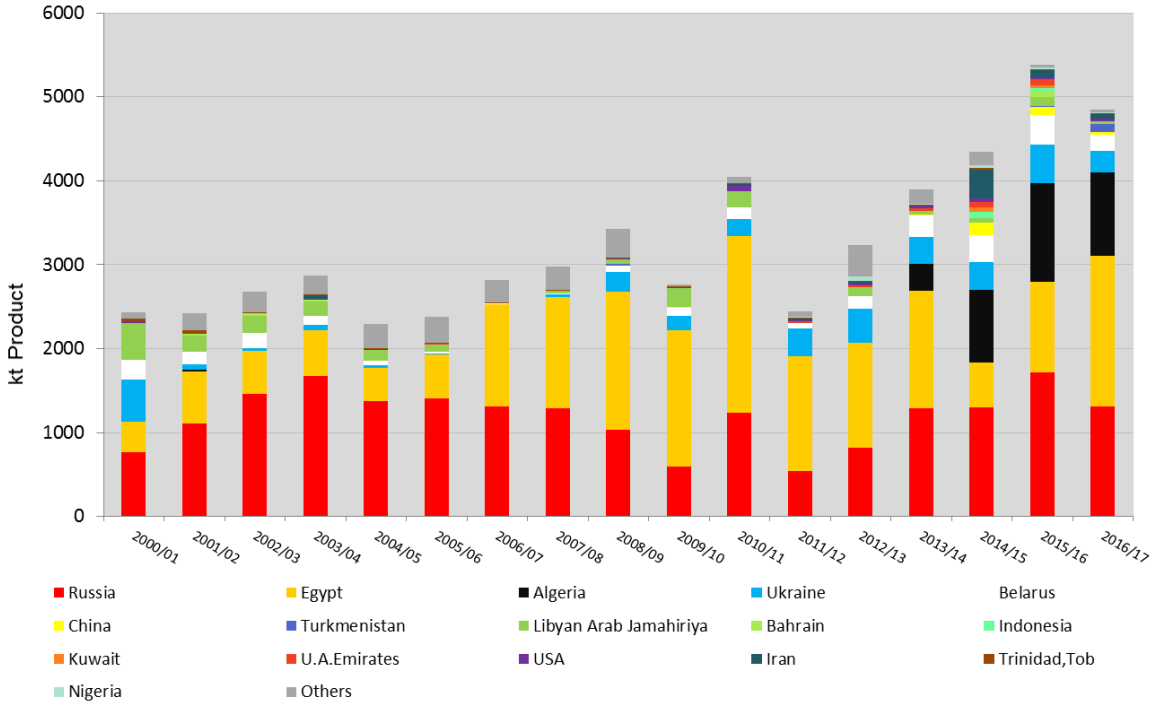

Figure 1: Eurostat UREA Imports to EU28 (extra trade) Full Seasons (July-June) 2000/01 - 2016/17 (Image courtesy Tiffanie Stefani, Fertilizers Europe).

The countries for which substantial exceedance of the 2020 ceilings may be anticipated according to the recent trends for 2013 to 2015 include: Austria (10%, **6%**), Czech Republic (-5%, **5%**), Denmark (18%, **12%**), Estonia (34%, **36%**), France (16%, **16%**), Germany (53%, **29%**), Hungary (17%, **21%**), Ireland (6%, **5%**), Latvia (26%, **23%**), Luxembourg (19%, **2%**), Netherlands (13%, **2%**), Norway (30%, **12%**), Portugal (26%, **14%**), Slovakia (34%, **13%**), Slovenia (10%, **-5%**), Spain (63%, **20%**), Sweden (34%, **18%**) and UK (18%, **18%**). For each country two numbers are given in brackets. The first number is the percentage to which projected emissions exceed the 2020 commitment, based on the 2005 baseline given in Table 4 of the revised Gothenburg Protocol. The second number (**in bold**) is the percentage to which projected emissions exceed the 2020 commitment, based on the 2005 baseline currently reported by parties according to the CEIP database[1]. While the second number is considered more reliable based on inventory updates, both numbers are shown for comparison to indicate the extent to which the methodologies have been updated.

Figure 2 illustrates the trends in NH_3 emissions for these countries as reported by CEIP up to 2015, here normalized to the latest CEIP emission figures for 2005.

Based on the trends for 2013 to 2015, the countries projected to meet the 2020 ceilings of the revised Gothenburg Protocol include: Belarus (-31%, **-31%**), Belgium (-10%, **-6%**), Bulgaria (-31%, **-12%**), Croatia (-21%, **-17%**), Cyprus (-8%, **-9%**), Finland (-7%, **-1%**), Italy (-7%, **-8%**), Lithuania (-17%, **0%**), Malta (-25%, **-26%**), Poland (-6%, **-15%**) and Romania (-9%, **-12%**), where the negative percentages indicate the amount by which projected emissions are lower than the ceilings.

In considering these numbers, attention is drawn to the UNECE *Framework Code for Good Agricultural Practice for Reducing Ammonia Emissions* (ECE/EB.AIR/120)[3] which provides a foundation for countries to prepare and publish their own *National Ammonia Codes*, as required under the first Gothenburg Protocol (in force since 2005). In developing policies to meet the commitments of the revised Gothenburg Protocol for 2020, parties may also benefit from noting the five leading measures for ammonia emissions reduction as reported previously by the Task Force on Reactive Nitrogen (ECE/EB.AIR/WG.5/2011/16, paragraph 16): These five leading measures focus on:

1. Low-emission application of manures and fertilizers to land,

[3] http://www.unece.org/index.php?id=41358

2. Animal feeding strategies to reduce nitrogen excretion,
3. Low emission techniques for all new stores for cattle and pig slurries and poultry manure,
4. Strategies to improve nitrogen use efficiencies and reduce nitrogen surpluses,
5. Low emission techniques in new and largely rebuilt pig and poultry housing.

By implementing policies in these areas, countries should in most cases have the means to reach 2020 ceilings. The use of low-emission methods for spreading manure to land must be central to any viable policy to reduce ammonia emissions. In addition, it is notable that Germany is now the first country in the EU to introduce a specific policy on urea fertilizers in its Fertilizer Regulations: "*From 1 February 2020, urea fertilizer may only be applied if a urease inhibitor has been added, or if it is incorporated immediately, i.e. no later than four hours after application.*" (Bundesrat (15 February 2017)[4]

Attention is similarly drawn to the observation that the fertilizer value of total nitrogen pollution losses from EU agriculture amounts to around 14 billion Euro per year (based the European Nitrogen Assessment and a fertilizer price of 0.80 Euro per kilogram). This is equivalent to approximately 25% of the total EU Common Agricultural Policy budget. There is therefore a very strong case to promote the use of cost-effective methods to reduce ammonia emissions within the wider context maximizing the economic benefits of keeping nitrogen on the farm rather than in the air.

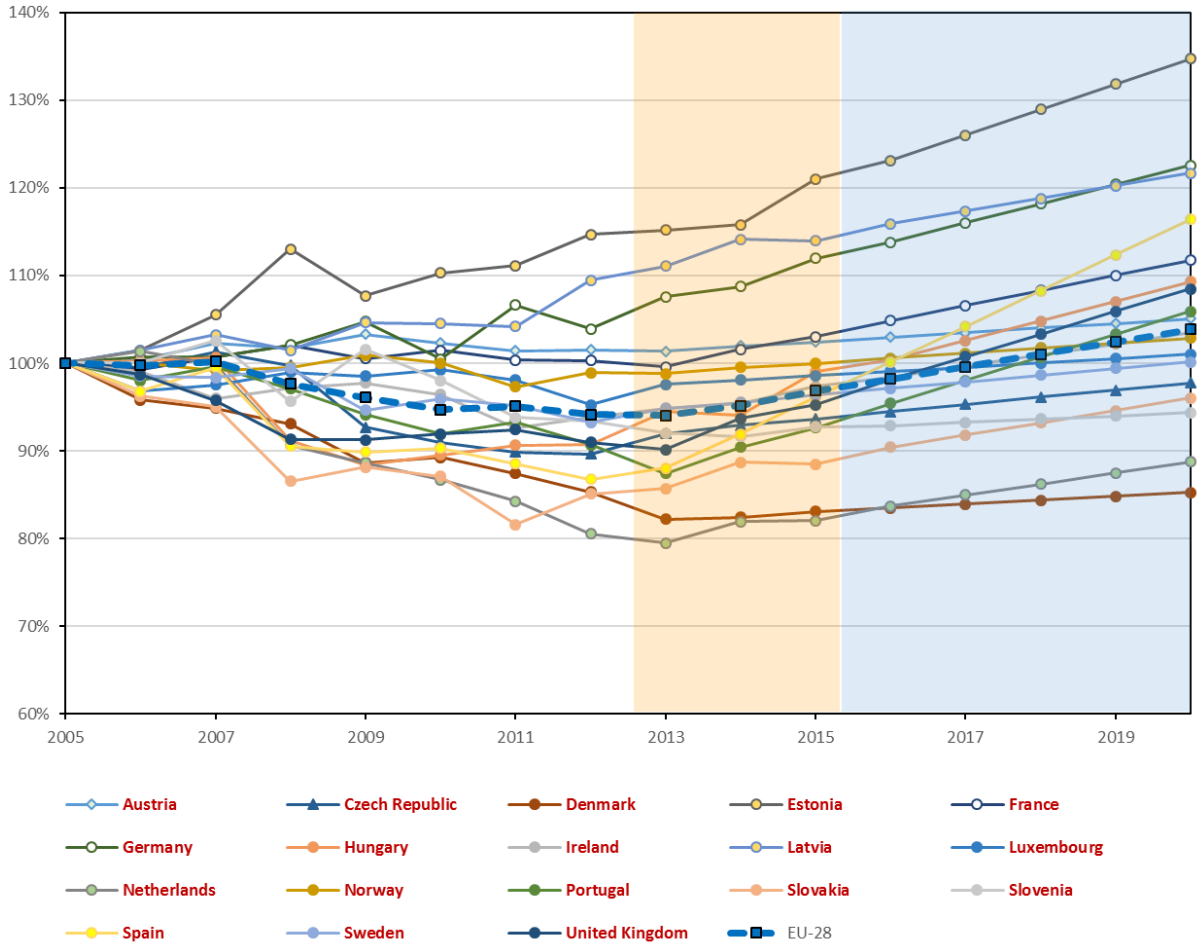

Figure 2: Ammonia emissions normalized to 2005 for countries where emissions are currently increasing and where they are projected to be larger than the 2020 ammonia ceilings of the revised Gothenburg Protocol. Based on data reported by CEIP[1] for up to 2015. Project values for the years 2016 to 2020 (blue shaded area) are based on linear projection from data reported for the period 2013 to 2015 (brown shaded area).

[4] Drucksache 148/17 (Section 6 (2)) Verordnung des Bundesministeriums für Ernährung und Landwirtschaft. Verordnung zur Neuordnung der guten fachlichen Praxis beim Düngen. http://www.bmel.de/SharedDocs/Downloads/Service/Rechtsgrundlagen/Entwuerfe/EntwurfDuengeverordnung.pdf?__blob=publicationFile