

Task Force on Emission Inventories and Projections

Agriculture and Nature Panel

EU Fertiliser Regulations and conflicts with Emission Inventory Collation

Bernard Hyde TFEIP 2024

[Agriculture and Nature | TFEIP \(tfeip-secretariat.org\)](https://tfeip-secretariat.org)

Emission Inventories – why?

- Inventories are required for three purposes
 - to provide annual updates of total emissions in order to assess compliance with agreed commitments;
 - to identify the main sources of emissions in order to formulate approaches to make the most effective reductions in emissions;
 - to provide data for models of air quality dispersion and the impacts of the emissions

Emission Inventories – data collection

- Good practice principles
 - Use national published, peer –reviewed official data where possible
 - For KC it is good practice to use peer-reviewed published literature relevant to their national circumstances
 - If not available use international databases, but should reflect national circumstances as far as is possible
 - Focus more efforts on key categories
 - Consider whether input data meets TCCCA
 - Use data quality objectives to prioritise improvement
 - Review data collection and methodologies on a regular basis
 - Select those methods, emission factors and activity data that are most representative
 - Where new measurements are undertaken – reliable and comparable results are achieved through well designed measurement campaigns

GB updates – how (N fert as example)

- Bouwman et al. (2002), Aarhus lit review 2012, Pan et al. (2016) etc
- Other criteria included
 - Omission with chemical composition not identified
 - Omission if emissions expressed relative to urea for e.g.
 - Incomplete experimental design
- Emissions recorded and expressed as proportion of fert N applied, totalled for whole measurement period
- Most data reported as the means of two or more replicates

Fertilizer Regulations (EU) 2019/1009

- Regulation 2003/2003 partially harmonised the internal market for fertilisers
- Changes the way fertilisers receive CE mark and the labelling provided on the products
- Allows for a very range of products such as organic fertilisers, organo-mineral, growing media and biostimulants which Regulation 2003/2003 did not
- Make easier for producers of organic and recovered fertilisers to sell according to harmonised quality standards
- Introduces product Function Categories (PFCs) – Annex I
 - PFC 5 – Inhibitor
 - Nitrification inhibitor
 - Denitrification inhibitor
 - Urease inhibitor

PFC 5

- An inhibitor shall be an EU fertilising product the function of which is to improve the nutrient release patterns of a product providing plants with nutrients by delaying or stopping the activity of specific groups of micro-organisms or enzymes
- PFC 5(A) Nitrification Inhibitor
 - 1. A nitrification inhibitor shall inhibit the biological oxidation of ammoniacal nitrogen ($\text{NH}_3\text{-N}$) to nitrite nitrogen (NO_2^-), thus slowing the formation of nitrate nitrogen (NO_3^-).
 - 2. The ammoniacal nitrogen ($\text{NH}_3\text{-N}$) oxidation rate shall be measured by: (a) ammoniacal nitrogen ($\text{NH}_3\text{-N}$) disappearance, or (b) the sum of nitrite nitrogen (NO_2^-) and nitrate nitrogen (NO_3^-) production with respect to time.
 - Compared to a control sample where the nitrification inhibitor has not been added, a soil sample containing the nitrification inhibitor shall show a 20 % reduction in ammoniacal nitrogen ($\text{NH}_3\text{-N}$) oxidation rate based on an analysis carried out 14 days after application at the 95 % confidence level

PFC 5

- An inhibitor shall be an EU fertilising product the function of which is to improve the nutrient release patterns of a product providing plants with nutrients by delaying or stopping the activity of specific groups of micro-organisms or enzymes
- PFC 5(B) Denitrification Inhibitor
 - 1. A denitrification inhibitor shall inhibit the formation of nitrous oxide (N_2O) by slowing down or blocking the conversion of nitrate (NO_3^-) to dinitrogen (N_2) without influencing the nitrification process as described in PFC 5(A).
 - 2. Compared to a control sample where the denitrification inhibitor has not been added, an in vitro test containing the denitrification inhibitor shall show a 20 % reduction in rate of the release of nitrous oxide (N_2O) based on an analysis carried out 14 days after application at the 95 % confidence level.

PFC 5

- An inhibitor shall be an EU fertilising product the function of which is to improve the nutrient release patterns of a product providing plants with nutrients by delaying or stopping the activity of specific groups of micro-organisms or enzymes
- PFC 5(C) Urease Inhibitor
 - 1. A urease inhibitor shall inhibit hydrolytic action on urea ($\text{CH}_4\text{N}_2\text{O}$) by the urease enzyme, primarily targeted to reduce ammonia volatilisation.
 - 2. Compared to a control sample where the urease inhibitor has not been added, an in vitro test containing the urease inhibitor shall show a 20 % reduction in the rate of hydrolysis of urea ($\text{CH}_4\text{N}_2\text{O}$) based on an analysis carried out 14 days after application at the 95 % confidence level.

Conflicts

- PFC's require short 14 day "in vitro" study to meet PFC criteria
 - In effect "proof of concept"
- "In vitro" does not reflect in use conditions "in vivo"
 - How can this be addressed ?
- Basis of emission factor development for main fertilisers is well established
 - See previous slide
- Basis of reduction/abatement factor for some inhibitors is well established
 - Based on similar review process as emission factor development
- How should the PFC assessment be treated in inventory compilation ?
 - Trying to reflect in use conditions
 - Substantially more evidence required under real world conditions than PFC requirements
 - Thus minimum scientific criteria should apply

Minimum scientific criteria for new fertilising products

- Propose the following
 1. Emissions should be measured for individual sub-source categories (e.g. synthetic fertiliser, animal manure).
 2. Measurements should be made in the major crop-growing regions within a country and if relevant, in different geographic and soil regions and under different management regimes and over an extended period of time following the core scientific principles of measurement of nitrogenous emissions from soils.
 3. For substances marketed as urease inhibitors, continuous measurements should be made of the ammonia (NH_3) emission for a minimum period of 14 days after individual fertiliser or manure applications. However, under cold, dry conditions, it may be relevant to continue measurements for a longer period.
 4. For substances marketed as nitrification or denitrification inhibitors, measurements should be taken over an entire year (including fallow periods), and preferably over a series of years, to account for the effects of differences in weather conditions and inter-annual climatic variability. Measurements should be taken at least once per day following major disturbances that would cause emissions to increase above background levels (e.g. during and after rainfall events, ploughing, or fertiliser application). Less frequent measurements (once per day or less) are acceptable during periods when emissions are close to background levels.
-

- QUESTIONS
& COMMENTS