Fertilisers Efficiency Enhancers

August 2025

Nitrogen stabilisers: a solution to reduce agricultural emission and achieve a sustainable agri-food system

Today, the chemical and fertiliser industry face unprecedented challenges: competitiveness and resilience must be achieved while respecting planetary boundaries and environmental commitments. The EU Vision for Agriculture and Food[1] identifies food as a key sector for competitiveness, while also recognising the environmental and climate pressure caused by the agri-food value chain and the significant economic challenges faced by farmers due to the global geopolitical and trade uncertainties.

This is why, now more than ever, nitrogen stabilisers—such as nitrification and urease inhibitors (NI and UI) —must be part of the solution. These readily available technologies have decades of proven efficacy and can help meet the EU's climate ambitions while supporting farmers in boosting yields and reducing production costs. Moreover, they contribute to addressing the global dual challenge of meeting rising food demand and coping with the decreasing amount of arable land per capita.

By increasing nitrogen use efficiency (NUE) through a reduction of nitrogen losses, urease and nitrification inhibitors bridge the gap between environmental responsibility and economic growth and competitiveness by offering a cost-effective, easy-to-use, scientifically proven and efficient solution to reduce agricultural emissions and enable sustainable food systems. In fact, these technologies significantly reduce ammonia (NH_3 by UIs) and nitrous oxide (N_2O by UIs and NIs) emissions as well as nitrate (NO_3-) leaching (by NIs) from mineral and organic nitrogen fertilisation.

About Urease Inhibitors (UIs)

UIs are a proven technology applied to urea for over 25 years in more than 130 countries[2]. For their contribution to meeting ammonia (NH_3) reduction targets[3], UIs are considered mandatory or best practice recommendations in many European countries including Germany[4], Denmark[5], France[6], Poland[7] and Ireland[8]. UIs can reduce ammonia emissions from urea by approximately 70%, thus helping to counter eutrophication, acidification and small particle dust. This contributes to preserving

[1] eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52025DC0075

[2] Although in several EU countries these technologies are supported in the framework of national legislation and/voluntary initiatives, UI and NI use in Europe is still limited compared to other parts of the world, such as in the US. More details are available in the attached annex.

[3] UI also contribute to the achievement of the National Emission Ceiling Directive targets, including ammonia emissions: https://iopscience.iop.org/article/10.1088/1748-9326/ac16fe/pdf

[4] https://www.gesetze-im-internet.de/d_v_2017/D%C3%BCV.pdf

[5] https://www.retsinformation.dk/eli/lta/2019/760

[6] France has listed NIs among the agricultural practices which are eligible for the Label Bas-Carbone/Méthode Grandes Cultures to reduce the carbon footprint of agriculture: https://www.ecologie.gouv.fr/sites/default/files/M%C3%A9thode%20LBC%20Grandes%20cultures.pdf)

[7] https://www.cdr.gov.pl/aktualnosci-instytucje/3678-od-1-sierpnia-2021-r-nie-bedzie-mozna-stosowac-mocznika-w-formie-granulowanej#:~:text=2021%20Ods%C5%82ony%3A%207819-,Od%201%20sierpnia%202021%20r.,dnia%201%20sierpnia%202021%20r

[8] https://www.teagasc.ie/media/website/publications/2020/NH3-Ammonia-MACC.pdf

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EU Transparency Register n° 64879142323-90

biodiversity and improve air quality. Moreover, recent research show that UIs[9] can also reduce indirect and direct nitrous oxide (N_2O) emissions by an average of 23 %.

About Nitrification Inhibitors (NIs)

NIs are applicable to all urea and ammonium containing fertilisers, including organic fertilisers like manure. The application of NIs reduces nitrous oxide (N_2O) emissions by 44% and nitrate (NO_3-) leaching by 47 % which results into climate change mitigation, water quality preservation and a reduced risk of eutrophication[10].

In summary, nitrogen stabilisers enable an improved nutrients use efficiency (NUE), offering a solution to tackle the issue of excess nutrients in the environment[11]. In fact, a higher NUE means that less nitrogen is required for food production. In practice, nitrogen stabilisers allow for higher crop yields or the same yield levels with a reduced quantity of nitrogen fertiliser. The improvement of NUE also contributes to a higher return on investment for farmers and a lower carbon footprint for crop and food at once.

Need for a consistent policy framework supporting nitrogen stabilisers

A supportive and consistent policy framework supporting the use of nitrogen stabilisers as well as full access to evidence-based information on the agronomic, economic and environmental benefits of UIs and NIs should be coupled with concrete measures to incentivise the use of these.

The lessons learnt at national level in countries where policies promoting the use of nitrogen stabilisers are already established[12] should offer a basis to further develop a supportive policy framework encouraging the use of nitrogen stabilisers in Europe.

While the benefits of nitrogen stabilisers are already recognised by the European Commission[13], the use of these technologies should be acknowledged in all relevant climate, environmental and agricultural legislation, including the Nitrates Directive[14], the National Emission Reduction Commitments Directive[15], or the Common Agricultural Policy, to enable urease and nitrification inhibitors reach their full potential.

Fertilisers Efficiency Enhancers is ready to help Europe grasp the opportunities arising from the transition to a climate-neutral agriculture, and to contribute to the development of a policy meeting EU's climate and environmental targets.

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[9] https://www.sciencedirect.com/science/article/pii/S0160412019324353

[10] NI are recognized both as a nitrogen mitigation technology and as a technological GHG emission mitigation option in the JRC Technical Report "Modelling environmental and climate ambition in the agricultural sector with the CAPRI model".

[11] "The Commission will act to reduce nutrient losses by at least 50%, while ensuring that there is no deterioration in soil fertility. This will reduce the use of fertilisers by at least 20% by 2030." (https://ec.europa.eu/food/sites/food/files/safety/docs/f2f_action-plan_2020_strategy-info_en.pdf).

[12] i.e. Germany, Denmark, France, Ireland or Greece

[13] Impact Assessment for the EU 2040 Climate Targets resource.html

[14] NI contribute to reducing nitrate leaching (Chen et al 2023, Grados et al. 2022)

[15] UI contribute to reducing ammonia and nitrous oxide emissions (Chen et al 2023, Grados et al 2022, Fan et al 2022, Li et al 2022, Katner and Searchinger 2018)