

NITROUS OXIDE — A HIDDEN THREAT:

Pathways for Industry & Agriculture to
Reduce Emissions from Synthetic Fertilizer

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Overview

Synthetic nitrogen fertilizer is a cornerstone of modern agricultural production. Farmers rely on synthetic fertilizer as a necessary soil nutrient to maximize crop yields and protect their economic viability. Yet the environmental and health impacts of emissions from synthetic nitrogen fertilizer are wide-ranging and increasingly urgent to address.

In the United States, synthetic nitrogen fertilizer use in agriculture is a major contributor to greenhouse gas (GHG) emissions including nitrous oxide (N_2O) emissions. N_2O emissions from synthetic fertilizer enter the atmosphere during the production of synthetic fertilizer and when fertilizer is applied to farms and fields.

The U.S. is the world's fourth-largest producer of synthetic nitrogen fertilizers. By 2030, domestic production of synthetic nitrogen fertilizers is expected to quadruple.

Domestic production and the use of synthetic nitrogen fertilizer generated 80 million metric tons of CO_2e from direct and indirect N_2O emissions in 2022, accounting for about 1.3% of the total U.S. gross GHG emissions.

Now is the time to take action to reduce N_2O 's long-lasting and negative impact on planetary and human health.

Funders, farmers, agriculture corporations, and advocates must come together to implement common-sense recommendations to reduce N_2O emissions during synthetic fertilizer production and application in the fields.

Reducing N_2O Emissions in the U.S.

GOALS FOR 2050

The United States, in collaboration with farmers, fertilizer companies, and the agriculture and food industries, should establish a target of achieving nitrous oxide emissions reduction from synthetic nitrogen fertilizer production and use by 2050.

To cultivate actionable results over the coming decades, we propose interim targets designed to drive enabling policies, market incentives, and regulatory actions, creating a clear pathway toward reducing emissions from synthetic fertilizer production and use. These goals include:

- **Reduce N_2O emissions from domestic fertilizer production by 75% by 2035** (compared to 2020 levels).
- **Achieve net-zero GHG emissions from domestic fertilizer production by 2050.**
- **Reduce the United States' total agricultural N_2O emissions related to synthetic nitrogen fertilizer, manure, and organic amendments use by at least 50% by 2050** while safeguarding water quality, air quality, environment, and public health.

RECOMMENDED ACTIONS

As funders and partners take action, it is prudent that farmers and on-farm practices are central to decision making surrounding the investments, policies, and industrial systems that are advanced to address nitrous oxide emissions.

By collectively implementing the following recommendations, the United States' agriculture industry can make significant progress in reducing N₂O emissions and help lead the way towards a more resilient climate.

Recommendations to Reduce N₂O Emissions From Domestic Synthetic Fertilizer Production and Application by 2050



UPSTREAM

Actions the fertilizer industry can take to reduce N₂O emissions during the fertilizer production process

- » Invest in and deploy existing pollution control technology in the synthetic fertilizer production process.
- » Conduct further research to identify proper synthetic fertilizer application ratios.
- » Prioritize local, rural farm communities as the domestic green fertilizer market grows.



DOWNSTREAM

Actions farmers can take to make a difference on the farm and field

- » Change the timing of nitrogen applications to support crop yields while reducing emissions.
- » Deploy alternative irrigation practices like drip and subsurface irrigation.
- » Reevaluate crop choices and crop production locations.
- » Accelerate sustainable approaches to nitrogen management.
- » Advance soil health practices and tools.



REGULATORY

Actions federal/state policy makers can take to accelerate N₂O emissions reduction

- » Expand resources to properly enforce existing or new emission reduction policies and regulations.
- » Update policies and incentives to grow the nation's green fertilizer economy.
- » Leverage permitting and enforcement within the current federal and state laws to encourage and increase the usage of pollution control technology in the fertilizer production process.
- » Enact technology-based pollution control standards at federal and state levels for nitrous oxide emissions from nitric acid plants.
- » Improve federal farm subsidy programs and the Crop Insurance Program to reduce agricultural emissions and improve farm resilience.
- » Reform federal conservation programs to increase incentives for better field management practices.
- » Update EQIP allocations to states to accelerate wider adoption of nitrogen and irrigation efficiency strategies.
- » Focus federal programmatic support for soil health practices.



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<http://www.mcknight.org/N2Oaction>

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