

# Credit System to Solve Agricultural Nitrogen Pollution Globally

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## Abstract

To boost food production, increasing amount of nitrogen (N) has been used in agriculture and contributed to N pollution of air, water and to multiple impacts on human and ecosystems' health. Establishment of a N credit system will decrease agricultural pollution and improve shared responsibilities among farmers, suppliers, processors, retailers, consumers and governments.

Keywords: Nitrogen pollution, credit system, agriculture

## 1. Agricultural N challenges

During the past decades, an increasing amount of nitrogen (N) has been used in agriculture to boost food production to feed the increasing global human population. The marked increase in N use has also contributed to severe N pollution of air and water and to multiple impacts on human and ecosystems' health; the so-called safe planetary boundary for N has been exceeded by a factor of about two. In 2010, agriculture accounted for 85% of total anthropogenic N release to the environment. Unlike point source pollution from industries and communities, N pollution from farms is diffuse as it is resulted from large numbers of independently managed farms, and is therefore very difficult to control by technical or regulatory interventions.

## 2. N credit system

Inspired by existing carbon credit systems introduced to mitigate global warming through economic incentives to reduce atmospheric carbon dioxide emissions, we proposed a N credit system (NCS) to find a generic principle for incentive-based mitigation of N pollution that acknowledges

both the responsibilities and limitations of the multiple parties in the food chain, viz. consumers, farmers, suppliers, processors, retailers and governments.



Fig. 1: **Framework of a generic NCS to mitigate N pollution.** VAT, value added taxes, CBA, cost and benefit analysis. Farmers pursue profit, People seek both food sufficiency and healthy food choice and a clean environment (Planet).

### **3. Design and regional application of NCS**

We subsequently explained the background, purpose and design of the NCS and confirmed that the feasibility and priorities for the NCS depend strongly on the development stage of the implementing country regarding food security, education, economy, access to technology and presence of institutions. To address these regional differences, we also propose a Tiered approach to build NCSs appropriate to different stages of development and relevant natural resources and discussed the implementation in contrasting regions of the world (e.g. Sub-Saharan Africa, China, India, Brazil, Australia, New Zealand, the United States of America and the European Union). We believe the establishment of this NCS will effectively decrease agricultural pollution and improve shared responsibilities among farmers, suppliers, processors, retailers, consumers and governments.