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The value of acknowledging societal costs of N_2O emissions

Calculating the costs of nitrous oxide (N_2O) emissions to society as well as business is vital to understand the true economic gains of reducing N_2O emissions, new research suggests. Increasing nitrogen use efficiency by 20% by 2020 could bring global annual benefits to the climate, health and environment worth US $160 (€118) billion, the researchers conclude.

N_2O is a major greenhouse gas emitted as a result of human activities such as agriculture, industry and fuel combustion. Measures to reduce its emissions through more efficient use of nitrogen can help mitigate climate change and lessen nitrogen losses from agriculture. The latter leads to improved food production as well as a reduction in nitrogen pollution. Estimations of the financial gains of these co-benefits could make a good economic case to motivate reductions in N_2O emissions.

This study, partly supported by the EU ÉCLAIRE[1] and NitroEurope[2] projects in cooperation with the United Nations Environment Programme[3], makes a distinction between two perspectives of the issue: the sector and societal views. The **sector view** considers that actions to reduce N_2O emissions should not come at any extra cost for the sectors responsible for the emissions. The **societal view** considers that in addition to business profitability, the benefits of reduced N_2O emissions to climate, human health and biodiversity need to be quantified and taken into account in order to better evaluate the net societal benefit as a driver for policy development in this field. Currently the **sector view** tends to dominate policy-making efforts, mainly because agriculture and industry experience only a small share of the costs of N_2O emissions (such as health costs) while the gains (such as improved fertilisation) are comparatively large.

The researchers therefore suggest that there is a need for policy to take a more societal view of N_2O emissions. To illustrate this, the study's authors investigate methods of improving nitrogen use efficiency–the amount of nitrogen in a product divided by the amount used in its production. In agriculture this can be calculated by dividing the amount of nitrogen exported from the fields as crops by the amount of applied nitrogen fertiliser. The authors also highlight the need to consider what they term 'full-chain nitrogen use efficiency', which allows the benefit of improvements at all stages of nitrogen use to be counted (e.g. before and after the application of fertilisers).

There are many actions that could improve overall nitrogen use efficiency, such as improving the efficiency of fertiliser use, recycling nitrogen from wastewater systems and lowering the amount of animal protein in the diet. It is estimated that improving the nitrogen use efficiency by 20% between 2008 and 2020 would save 23 million tonnes of nitrogen, resulting in a financial saving of about US $23 (€17) billion per year. In addition, the annual benefits to the climate, health and environment could amount to US $160 (€118) billion, highlighting the potential monetary benefits of considering the societal view in policy measures.

The researchers suggest that policy measures should foster innovative techniques to improve nitrogen use efficiency and aim to improve communication to promote their market benefits, including direct benefits for the agriculture sector. In particular they recommend that environmentally damaging nitrogen subsidies be avoided. Overall, they conclude that incorporating both sector and societal views into policy packages can highlight the true economic gains of reducing N_2O emissions and encourage the employment of these techniques.

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1.Effects of Climate Change on Air Pollution and Response Strategies for European Ecosystems (ÉCLAIRE) is supported by the European Commission under the Seventh Framework Programme. See: http://www.eclaire-fp7.eu

2.NitroEurope (NEU) was supported by the European Commission under the Sixth Framework Programme. See: http://www.nitroeurope.eu

3.http://www.unep.org/