



Knowledge grows

Our Position On

Agriculture and Climate

Introduction and background information

Agriculture is a major source of greenhouse (GHG) emissions. In 2005 this sector accounted for approximately 12.5 billion tons - or 24%ⁱ - of global emissions. The main sources of these emissions are:

1. Land use change, i.e. natural land being cultivated and thereby turning natural carbon sinks into farmland (5.9 billion tons CO₂eq or 47% of agricultural emissions, which is more than the total European emissions)
2. Methane emissions from cattle and rice production (2.4 billion tons CO₂eq or 19% of agricultural emissions)
3. N₂O, i.e. so called laughing gas, from organic and mineral N inputs to the soil (2.1 billion tons CO₂eq or 17% of agricultural emissions)
4. GHG emissions from biomass burning and manure handling (1.1 billion tons CO₂eq or 9% of agricultural emissions)
5. CO₂ and N₂O from fertilizer production (0.4 billion tons CO₂eq or 3% of agricultural emissions)
6. GHG emissions from farm machinery, irrigation, and pesticide production (0.6 billion tons CO₂eq or 5% of agricultural emissions)

In addition to the challenge of climate change, the world is also faced with the challenge of achieving global food security. According to FAO, food production has to increase by 60% by 2050ⁱⁱ due to a growing population and changing diets. Therefore the world is faced with a combined challenge of producing more food – but with less greenhouse gas emissions. According to a Stanford University study this has been achieved during the past decades through the use of mineral fertilizers, which has prevented GHG emissions of up to 590 gigatons of CO₂ between 1965 and 2005ⁱⁱⁱ.

This position paper is focused on emissions from sources 1, 3 and 5, due to Yara International's knowledge and experience in these areas.

Yara International's position

High yield agriculture is climate friendly agriculture, and Yara believes that the agricultural sector has a huge potential for emissions reduction.

The first target regarding the agricultural sector should be to reduce land use change for agriculture. Yara is convinced that the knowledge and technology exist to increase

productivity on existing land to a level that would not make it necessary to increase arable land. We also believe that the solutions are relatively inexpensive to implement. Therefore, the target during the coming decades should be to increase food production on existing land, i.e. without cultivating new land.

A pre-requisite to achieve this goal is that land use efficiency – as well as resource efficiency – is put at the top of the political agenda when outlining new agricultural policies and incentives. By doing so, emissions from deforestation and land use change can be significantly reduced. Mineral fertilizers will play an important role to improve land use efficiency and to prevent deforestation and emissions from land use change.

Yara also has the firm belief that the agricultural sector has to reduce the carbon footprint of agricultural production as such. New cleaning technology has made it possible to reduce GHG emissions from fertilizer production to a minimum.

Sustainable intensification of agriculture including optimal use of mineral fertilizers will lead to increased yields on existing farmland while minimizing environmental impact.

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However, the type of fertilizers used is not insignificant. For most crops and growing conditions, nitrate based fertilizers have proved to be the most efficient nitrogen source with less environmental impact than other types of fertilizers.

To correctly evaluate any achievements in terms of GHG emissions, the carbon footprint of crop production should be measured based on life-cycle assessment principles, i.e. including production, transportation and use of all farming inputs. The carbon footprint should be calculated relatively to tons produced, rather than on a per hectare basis in order to consider the productivity of the monitored system adequately.

The issues of *land use efficiency* and *fertilizer* use are discussed in separate position papers, and both are available on www.yara.com

ⁱ Bellarby et al. (2008)

ⁱⁱ Alexandratos, N. and J. Bruinsma. 2012. *World agriculture towards 2030/2050: the 2012 revision*. ESA Working paper No. 12-03. Rome, FAO.

ⁱⁱⁱ Jennifer A. Burney, Steven J. Davis, and David B. Lobell. 2010. *Greenhouse gas mitigation by agricultural intensification*. PNAS 2010 107 (26).

About Yara

Yara's knowledge, products and solutions grow farmers and industrial customers' businesses profitably and responsibly, while nurturing and protecting the earth's resources, food and environment.

Our fertilizers, crop nutrition programs and technologies increase yields, improve produce quality, and reduce environmental impact from agricultural practices. Our industrial and environmental solutions reduce emissions and improve air quality from industry and transportation, and serve as key ingredients in the production of a wide range of goods.

Founded in 1905 to solve emerging famine in Europe, Yara today has a global presence with more than 12,000 employees and sales to more than 150 countries. www.yara.com

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