

## **Agriculture and livestock farming: Impact on air quality and climate**

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### **Abstract**

The invention of the Haber-Bosch-process has caused unprecedented changes in global nitrogen cycles, converting atmospheric N<sub>2</sub> into various reactive nitrogen compounds. The increased use of nitrogen fertilizers (ammonium salts or urea) allowed for a growing world population. However, it also resulted in increased emissions of reactive nitrogen compounds into the Earth's atmosphere and thereby caused severe effects on the environment and on human health. N-fluxes are influencing acidification, eutrophication, global warming, and biodiversity. Therefore, soil quality, water quality, air quality, ecosystem exposure to nitrogen deposition, biodiversity, and climate change are coupled problems. In general, the agricultural sector is the largest contributor to global anthropogenic non-CO<sub>2</sub> greenhouse gas (GHG) emissions. The future challenge is the implementation of mitigation measures within the agricultural sector. The mitigation measures are necessary to avoid a further increase of the mainly nitrogen-related emissions, while meeting the growing global demand for animal-based food. About a quarter of the global GHG emissions result from agriculture, forestry and other land use. Deforestation, agricultural emissions from soil, nutrient management, livestock, and fossil fuel belong to the major sources. Emissions of CO<sub>2</sub> and CH<sub>4</sub> mainly result from livestock farming whereas N<sub>2</sub>O-emissions mainly result from manure storage, agricultural soils and biomass burning. The emissions of N<sub>2</sub>O are closely linked to the efficiency of nitrogen-utilisation within the major pathways of a livestock system. In addition, the agricultural sector is a significant contributor to emissions relevant to air quality. About 95% of the NH<sub>3</sub> emissions are caused by agricultural activities. NH<sub>3</sub>, in turn, influences the formation of secondary aerosols (e.g. ammonium nitrate and ammonium sulfate). The cultivation of soil and the farming of animals is also a source of primary (biological) aerosols. Moreover, agricultural activities release NO and organic compounds that result from biochemically induced nitrification processes as well as from the decomposition of undigested proteins in the dung of farm animals and the biogenic emissions of crops, respectively. The overarching aim of EFAC 4 is the ass

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