



Tropentag, September 16-18, 2026, hybrid conference

“Towards multi-functional agro-ecosystems
promoting climate resilient futures”

Electrolysis-based nitrogen fertilisers: Opportunities for import substitution, sustainable and resilient food systems

ANDREAS STAMM¹, CHRISTINE BOSCH², FERNANDA NAN³

¹*Idos, Transformation of Economic and Social Systems, Germany*

²*University of Hohenheim, Inst. of Agric. Sci. in the Tropics (Hans-Ruthenberg-Institute), Germany*

³*University of Montevideo (UM), Engineering, Uruguay*

Abstract

Commercial farmers and smallholders across the world are affected by price increases, especially for nitrogen fertilisers and the disruption of important international supply chains. The extent of the impacts depends on the duration of the disruptions, on the structure of the agricultural sectors and the intensity of land use. The differences among regions of Global South are significant. In America, an average of 187 kg is applied per hectare of arable land, in Sub-Saharan-Africa only 18 kg. In both regions, fertiliser usage is high in commercial and export-oriented production and lower related to food production. Thus, it is likely that prices for agricultural products, e.g. cocoa and pineapples from Africa or banana and melon from Latin America will increase if the crisis drags on. More severe are the impacts on food security, in Latin America because a large proportion of food production depends on synthetic fertilisers. In Africa, food insecurity and the prevalence of undernourishment reflects high indicators in comparison with Latin American ones.

Technological innovation may offer options to mitigate problems related to import dependency on the balance of payments and to food security. Increased maturity of electrolytic hydrogen and downstream technologies allow the production of hydrogen with local renewable energies and the ammonia synthesis as basis of nitrogen fertilisers. A number of industry-scale green ammonia projects are in the pipeline in both regions and a relevant project has recently achieved Final Investment Decision in Paraguay. In Uruguay, a key ammonia and green hydrogen project is under study, exports would be destined to European countries. In Kenya, a first mid-sized green ammonia project is up and running. This second option of local ammonia production is highly relevant for Sub-Saharan-Africa, where the problems related to vulnerable international supply chains are exacerbated by deficient transport infrastructure, which raises the farm gate prices of fertilisers or even prevents the access of farmers.

Against this background, we examine the contexts in which projects are implemented, including resource availability, institutional set-up, and government policies. Based on expert interviews and comparative analysis, we want to understand the potential and readiness for decentralised hydrogen-based fertiliser production.

Keywords: Agricultural sector, ammonia, disruption, food production, food security, global South, nitrogen fertilisers, price increases, renewable energies, technological innovation