

Innovative solutions for a

**SUSTAINABLE MANAGEMENT
OF NITROGEN IN AGRICULTURE**





DNMARK in brief

Nitrogen inputs can be both too much and too little. Low inputs lead to reduced food production, while high inputs are harmful to the environment.

DNMARK is a cross-disciplinary research alliance that aims to develop innovative solutions for a sustainable nitrogen management in Danish farming; solutions that will improve resource utilisation without having a negative impact on the environment and climate.

The alliance consists of a number of Danish and international universities, agribusinesses, public institutions, as well as interest groups.

The alliance is funded by the Danish Council for Strategic Research, and the project will run from 2013 to 2018.

Objectives and focus

The main objective of DNMARK is to develop sustainable solutions for the nitrogen problems that Danish society is facing.

Solutions which will benefit both the Danish food industry, society, and the environment. Previous attempts to find a solution to reduce nitrogen flow to the environment have often not lived up to expectations or resulted in new problems; and the alliance is therefore faced with a complex challenge.

Focus on INNOVATIVE solutions



- Limitations on the use of nitrogen is a difficult trade-off between food production and environmental care. In DNMARK, we will develop innovative win-win solutions for improving the management of nitrogen; we want to show that it is possible to have a sustainable and effective utilisation of nitrogen which does not compromise nature or public health – and which also optimises food production.

*Head of alliance, Senior Scientist
Tommy Dalgaard, Aarhus Universitet.*



Research

Areas of research

The alliance will conduct research and develop solutions for different aspects of the nitrogen cycle.

The following aspects will be studied:

Research component 1: The national nitrogen model

Research component 2: Nitrogen in landscapes

Research component 3: Economics and incentives

Research component 4: Studies of nitrogen

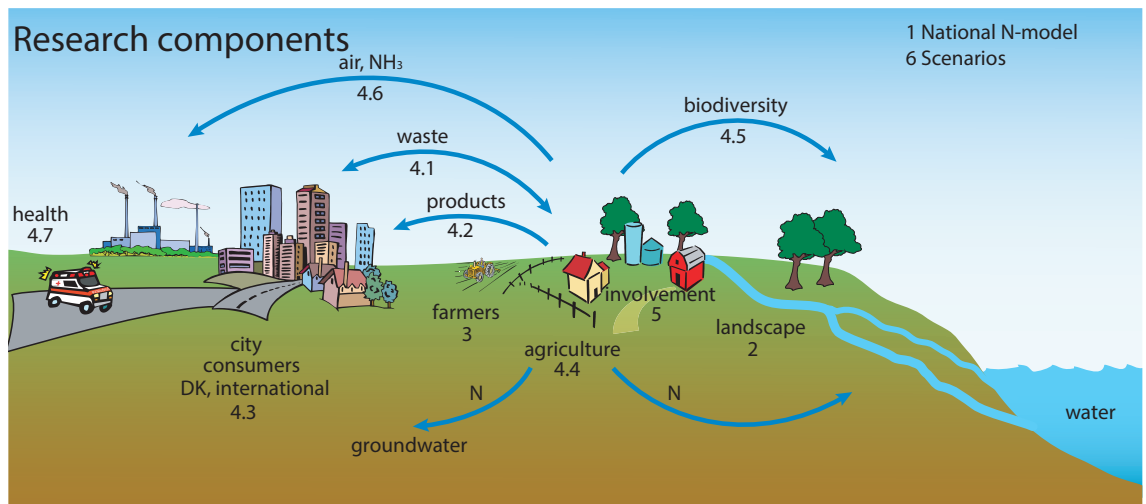
Research component 5: Inclusive planning

Research component 6: Solution scenarios

Pilot areas

It is important for the alliance to develop and test solutions in close collaboration with a wide range of stakeholders from different parts of Denmark. A key focus area is the Limfjord area, where the alliance will collaborate with the municipalities of Skive and Jammerbugt. The alliance will also collaborate with the municipalities of Varde, Horsens and Odsherred. Stakeholders from other areas will be included when necessary to allow the various aspects of research to be developed in an optimal manner.

Figure illustrating the nitrogen cycle; numbers refer to the different research components.



Facts about NITROGEN

Nitrogen is necessary in order to maintain food and biomass production. But farming is the main source of nitrogen pollution, which can have serious consequences for economy, environment, public health, and climate. On an EU scale, estimates indicate that nitrogen emissions from agriculture and urban areas cost between €150 and €750 per inhabitant per year. Conversely, Danish restrictions on the use of nitrogen in farming has been costly in terms of reduced food production.

Project outcome

The ideas generated by the alliance will be synthesised into the following three solution scenarios:

1. New production chains with a more effective nitrogen utilisation and recirculation.
2. Geographically targeted measures based on local intelligent management and planning.
3. New consumption patterns resulting in altered land use and nitrogen circulation.

Project outputs include a comprehensive and dynamic nitrogen budget for all of Denmark. This will give researchers and decision-makers a powerful tool to assess different measures prior to implementation.

It is expected that the DNMARK project will place Denmark at the forefront internationally in terms of knowledge on effective nitrogen management.

Partners

Primary Research Partners

- Alterra Research Institute, Wageningen UR
- Department of Agroecology, AU
- Department of Bioscience, AU
- Department of Culture and Society, AU
- Department of Environmental Science, AU
- Department of Food and Resource Economics, UCPH
- Department of Geosciences and Natural Resource Management, UCPH
- Department of Plant and Environmental Science, UCPH
- Department of Public Health, AU
- GEUS, Ministry of Climate, Energy and Building
- Knowledge Centre for Agriculture

Primary Innovation Partners

- Aalborg Water Supplies Ltd
- ALECTIA
- ARLA Foods
- Association for Recycling of Organic Waste in Agriculture
- Conterra Ltd
- Danish Nature Agency, Aalborg
- HedeDanmark Ltd
- Horsens Municipality
- Jammerbugt Municipality
- Odsherred Municipality
- Pig Research Centre
- Skive Municipality
- Varde Municipality
- YARA Danmark Ltd

AU = Aarhus University

UCPH = The University of Copenhagen

International Reference Group

- EU Joint Research Centre, Ispra, Italy
- Institute of Applied Systems Analysis, Austria
- Marie Curie Training Network: Recovery and Use of Nutrients, Energy and Organic Matter from Animal Waste
- The James Hutton Institute, Scotland
- UN Task Force on Reactive Nitrogen
- University of East Anglia, UK
- University of Kiel, Germany
- University of Leeds, Geography Department, UK
- USDA, Beltsville, Maryland
- WHO Europe, Healthy City Coordinator, Belfast

Stakeholder Network

- Animation Hub, Viborg
- Asthma and Allergy Denmark
- BioRefining Alliance, Frederiksberg
- CONCITO
- Danish Crown
- DHI Group
- DTU Food
- Experimentarium, Hellerup
- Eurostat
- European Environment Agency
- Farm4you, AgroBusiness Park, Foulum
- Gefion, local agricultural advisory centre
- Jysk Landbrugsrådgivning, local agricultural advisory centre
- LandboNord, local agricultural advisory centre
- Statistics Denmark
- The Danish Complementary Healthcare Council
- The Danish Health and Medicines Authority
- The Danish Lung Association
- The Danish Ministry of the Environment
- The Economic Council & The Environmental Economic Council
- The Ministry of Food, Agriculture and Fisheries of Denmark
- The National Centre for Register-based Research, AU



FAQ DNMARK

What do the letters DNMARK stand for?

DNMARK is an abbreviation of “Danish Nitrogen Mitigation Assessment: Research and Know-how for a sustainable, low-nitrogen food production”.

What is the size of the budget?

Total funding comes to DKK 30.9 million over the five years with partner contributions. The Danish Council for Strategic Research’s Programme Commission on Health, Food and Welfare has contributed 20 million to the project.

Further Questions?

▶ www.dnmark.org

or

▶ Head of alliance, Senior Scientist
Tommy Dalgaard, AU,
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"With DNMARK, we hope to find targeted solutions which our farmers can benefit from."

*Corporate Environmental Manager
Jan D. Johannesen, Arla*

"We need DNMARK to develop visionary nitrogen solutions for the benefit of both agriculture and the environment."

*Vice President Lars Hvidtfeldt
Danish Agriculture & Food Council*

"We need measures that can protect the water environment as well as offer opportunities to farmers in the Limfjord area."

*Nature and Environmental Manager
Per Schriver, Skive Municipality*

"With this alliance, we will gain new knowledge about the nitrogen cycle and optimisation of nitrogen use in agriculture."

*Professor Lars Stoumann Jensen
University of Copenhagen*

"The alliance's strength is that businesses, research institutions and authorities will find innovative solutions in collaboration."

*Project Manager Irene Wiborg
Knowledge Centre for Agriculture*

www.dnmark.org

