

## PARTNERS



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# NITROSCOPE

SCOPING EUROPEAN N FLUXES FOR SUSTAINABLE  
N MANAGEMENT AND CONSERVATION PRACTICES

## Objective

NitroScope provides Europe with reliable, integrated solutions to measure, understand and reduce nitrogen losses. By combining advanced sensing technologies, high-frequency data collection, process-based and data-driven modelling, advanced N management and conservation strategies and farmer-centred approaches, the project aims to increase nitrogen use efficiency (NUE) while reducing nitrate leaching and nitrous oxide (N<sub>2</sub>O) emissions across diverse European pedo-climatic zones.

## Monitoring sites

NitroScope operates one of the most comprehensive nitrogen monitoring networks ever deployed in Europe, integrating more than 100 monitoring locations across contrasting soils, climates, crops and management systems.

The network is structured into three complementary categories— 5 pilot sites, 9 intensive monitoring sites, and +100 regional data collection sites—each serving a distinct scientific and operational role. Together, they enable nitrogen fluxes to be quantified from field to national, up to continental scale, support the testing of advanced N management mitigation strategies under real conditions, and generate the robust evidence needed for region-specific emission factors, decision-support tools and improved nitrogen management across Europe.

## Monitoring network

### Pilot sites

Five pilot sites serve as field-scale testbeds where NitroScope actively evaluates improved nitrogen management and conservation strategies under real agronomic conditions.

Implemented across different pedo-climatic zones and monitored over two growing seasons, pilot sites link management practices to measured impacts on NUE, crop performance and nitrogen losses, supporting the development of practical, scalable mitigation solutions.

### Intensive monitoring sites

Nine intensive monitoring sites provide high-frequency, continuous measurements (24/7) over approximately 24 months, starting in February 2027, capturing short-term variability and “hot moments” in nitrogen fluxes that cannot be detected with seasonal monitoring alone.

These sites are equipped with advanced systems to monitor soil nitrogen dynamics (including NO<sub>3</sub>, NH<sub>4</sub>) at multiple depths, gaseous emissions (including N<sub>2</sub>O, NH<sub>3</sub> and NO<sub>x</sub>), soil moisture and temperature, as well as crop and canopy dynamics through proximal and remote sensing. They deliver the reference datasets required to improve process understanding and reduce modelling uncertainty.

### Regional data collection sites

Approximately 100 regional data collection sites ensure broad spatial coverage across Europe, representing variability in soils, climate and cropping systems.

Monitored over multiple growing seasons, these sites provide harmonised datasets that support model calibration and validation, comparison across pedo-climatic zones, and the upscaling of nitrogen flux estimates to national and European levels.

