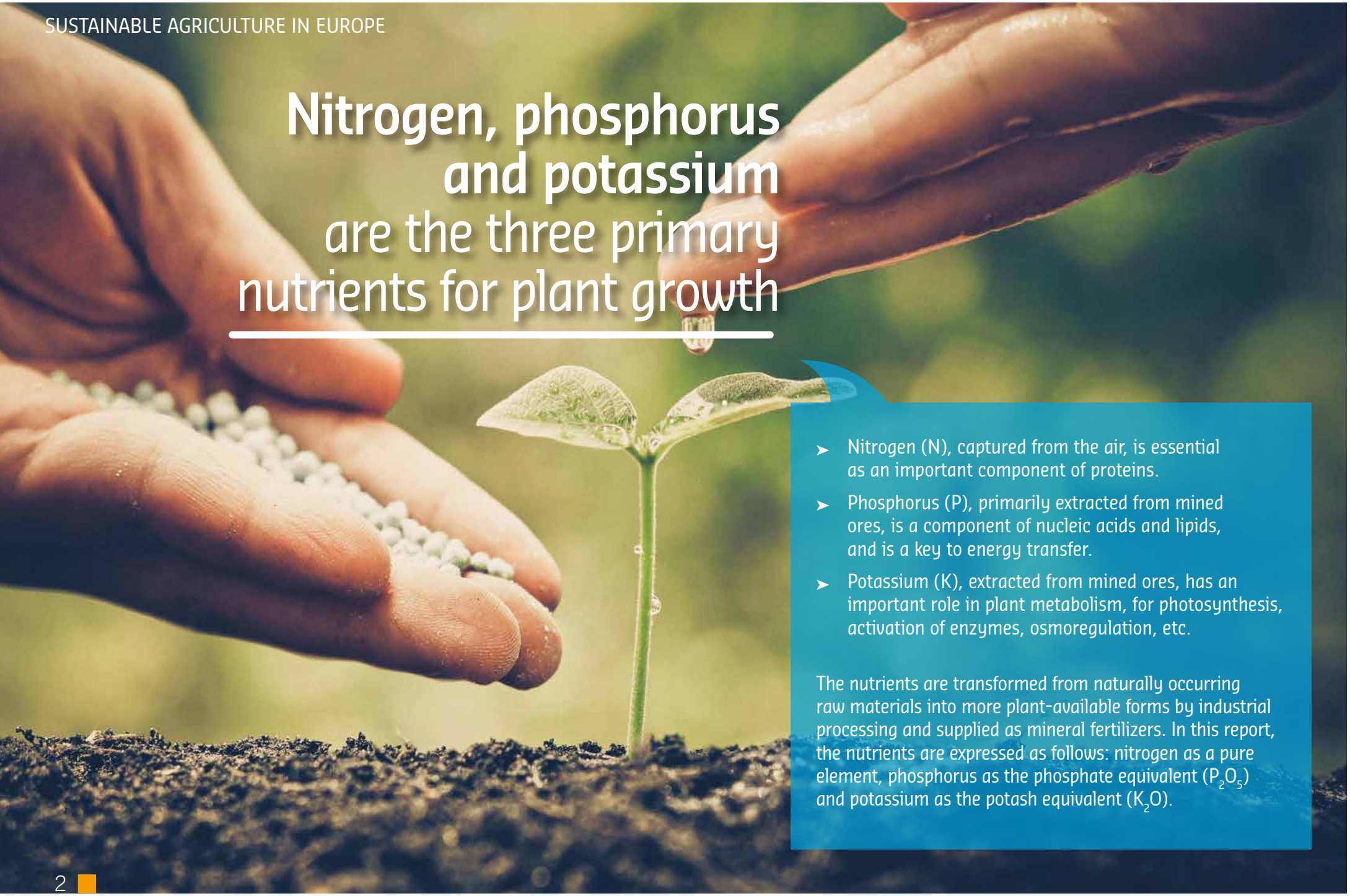
fertilizers europe

Forecast of food, farming and fertilizer use in the European Union 2017-2027

SUSTAINABLE AGRICULTURE IN EUROPE



Nitrogen, phosphorus and potassium are the three primary nutrients for plant growth

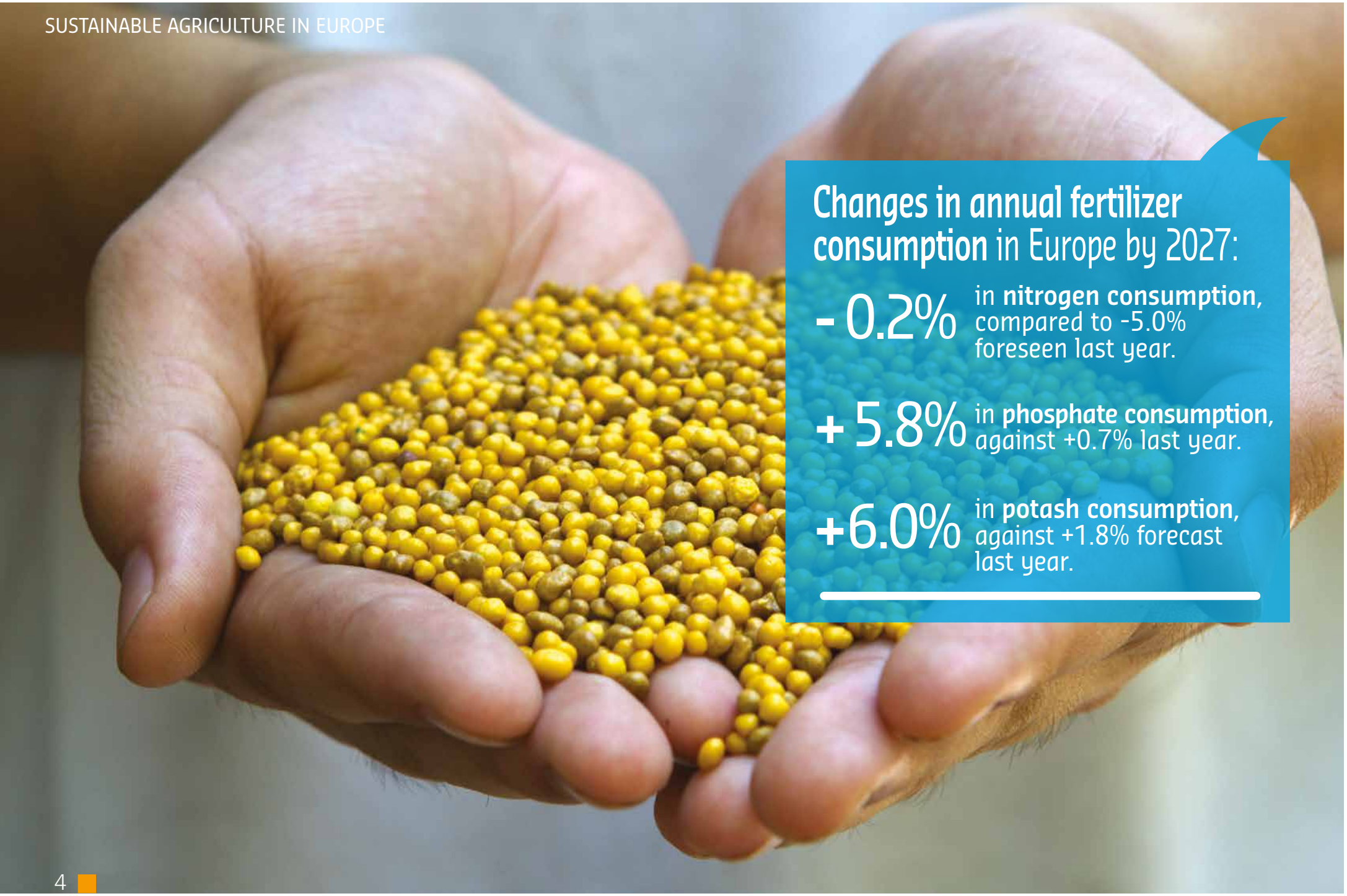
- Nitrogen (N), captured from the air, is essential as an important component of proteins.
- Phosphorus (P), primarily extracted from mined ores, is a component of nucleic acids and lipids, and is a key to energy transfer.
- Potassium (K), extracted from mined ores, has an important role in plant metabolism, for photosynthesis, activation of enzymes, osmoregulation, etc.

The nutrients are transformed from naturally occurring raw materials into more plant-available forms by industrial processing and supplied as mineral fertilizers. In this report, the nutrients are expressed as follows: nitrogen as a pure element, phosphorus as the phosphate equivalent (P_2O_5) and potassium as the potash equivalent (K_2O).

Contents

Fertilizer Europe's annual forecast of food farming and fertilizer use in the European Union has been independently recognized[1] as one of the most trusted inputs into the development of agricultural policy in Europe. Its data is regularly used by many international organizations including the European Commission (DG Agri, DG Environment and DG Energy), the FAO, the European Environment Agency (EEA) and the International Fertilizer Producer Association (IFA).

[1] *Exploring land use trends in Europe: a comparison of forecasting approaches and results: H. van Delden, et al. iEMSs International Congress on Environmental Modelling and Software 2012, Leipzig, Germany.*



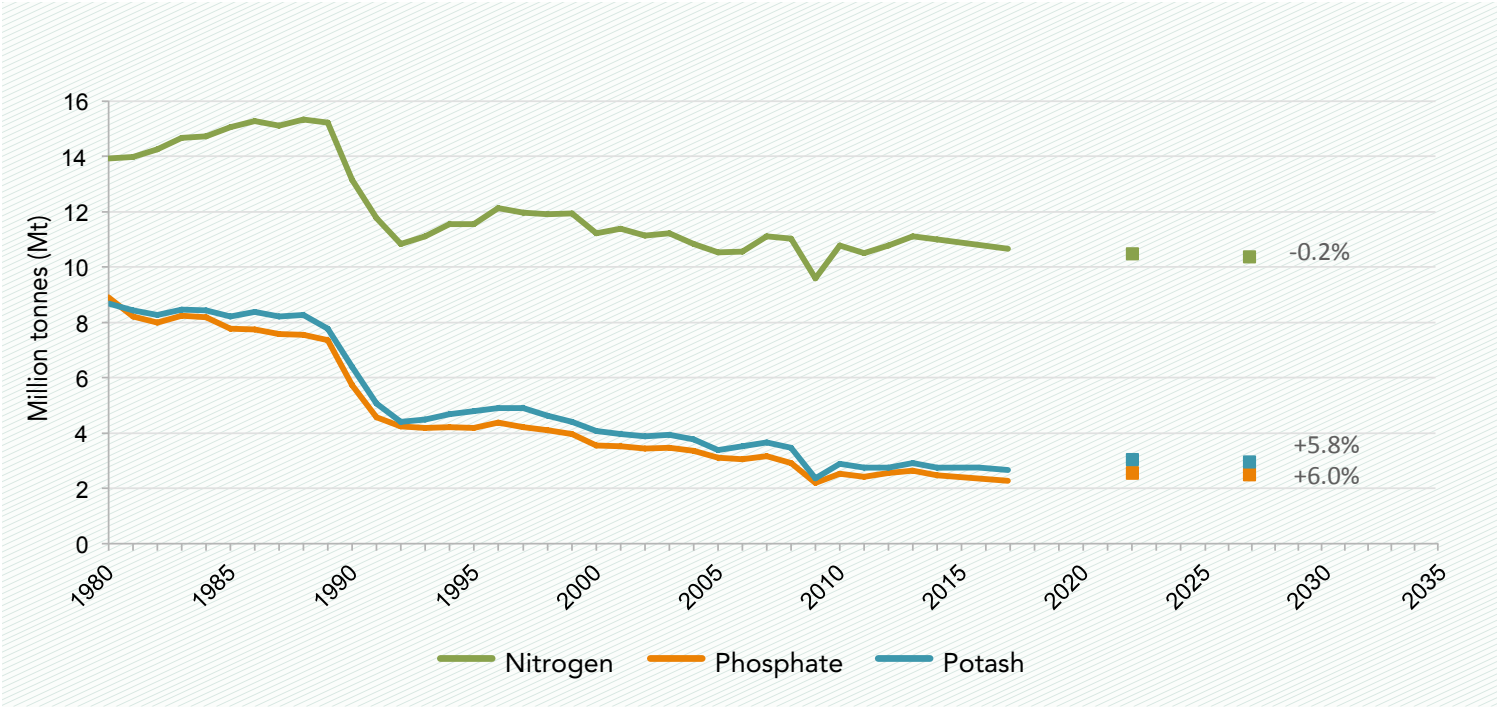
Changes in annual fertilizer consumption in Europe by 2027:

- 0.2% in **nitrogen consumption**, compared to -5.0% foreseen last year.

+ 5.8% in **phosphate consumption**, against +0.7% last year.

+6.0% in **potash consumption**, against +1.8% forecast last year.

Fertilizer consumption in the European Union



Over the year, fertilizers containing an average* of 11.2 million tons of nitrogen, 2.6 million tons of phosphate, and 2.9 million tons of potash were applied to 134.5 million hectares of farmland. 44.4 million farmable hectares were not fertilized.

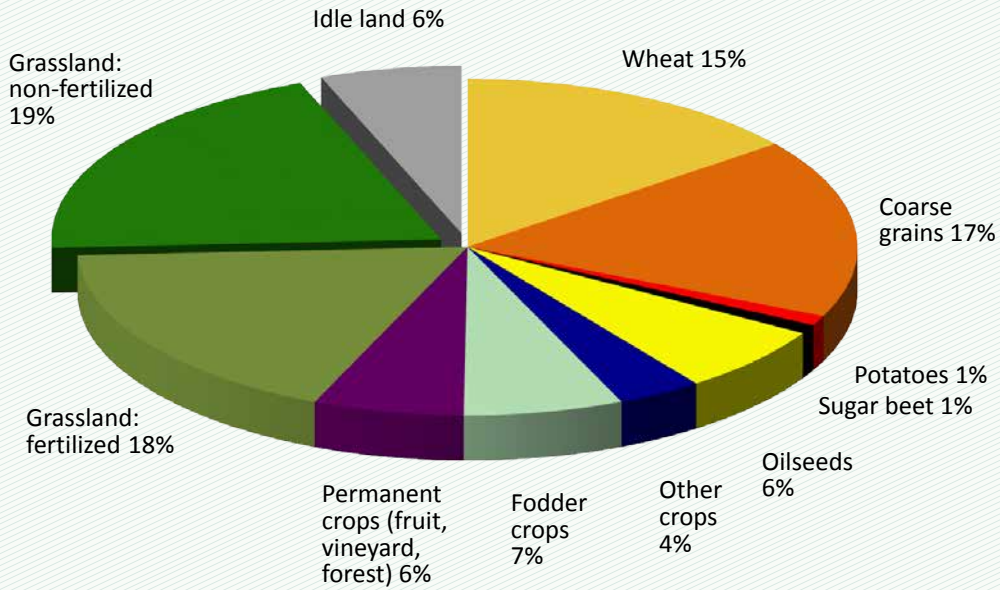
Consideration of the economic outlook and the anticipated evolution of Europe's cropping area has led Fertilizers Europe to expect annual nitrogen, phosphate and potash fertilizer consumption to reach 11.1, 2.7 and 3.1 million tons respectively by the 2026/2027 season, applied to 134.0 million hectares of farmland.

Annual fertilizer consumption over the next 10 years will continue to remain below the levels recorded immediately prior to the 2008/2009 economic downturn.

* Average based on the last three growing seasons - 2014/2015, 2015/2016, 2016/2017.

Arable crops account for 60% of the fertilized area in Western Europe and 86% Central and Eastern European countries.

Agricultural land use in the European Union



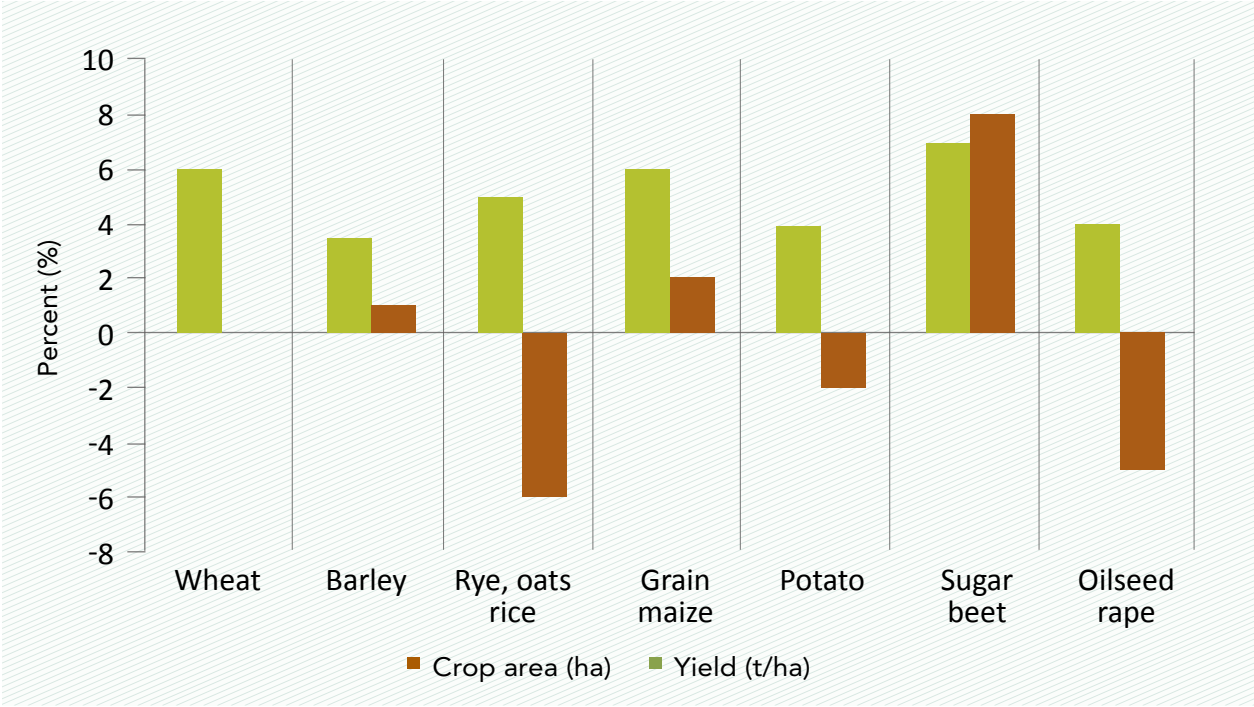
The fertilized area in countries of the European Union comprises 134.5 million hectares. A further 44.4 million farmable hectares are not fertilized, of which 34.4 million are unfertilized grassland and 10.0 million idle or set-aside land.

Within the fertilized area, arable crops account for 68% (43% cereals, 9% oilseeds, 9% fodder crops). Permanent crops account for 8% of the area and grassland for a further 24%. The unfertilized area is evenly spread across the countries of the European Union but there are significant differences in fertilized crop areas between the countries of Western, and Central and Eastern Europe.

In Western Europe (EU-15), the fertilized area comprises 60% arable crops (37% cereals, 6% oilseeds, 9% fodder crops), 10% permanent crops (vineyards, orchards, forests) and 30% fertilized grassland. Agriculture in Central and Eastern Europe (EU-13), however, is far more directed towards arable production, which accounts for 86% of the fertilized area (56% cereals, 14% oilseeds, 9% fodder crops), with permanent crops and fertilized grassland only comprising 3% and 11% of the fertilized area respectively.

The grain sector (wheat, coarse grains and oilseeds) accounts for 61% of total nutrient consumption, with wheat accounting for 26%. **Fodder crops and grassland** account for a further 22%.

Changes in farming and food crops 2017-2027

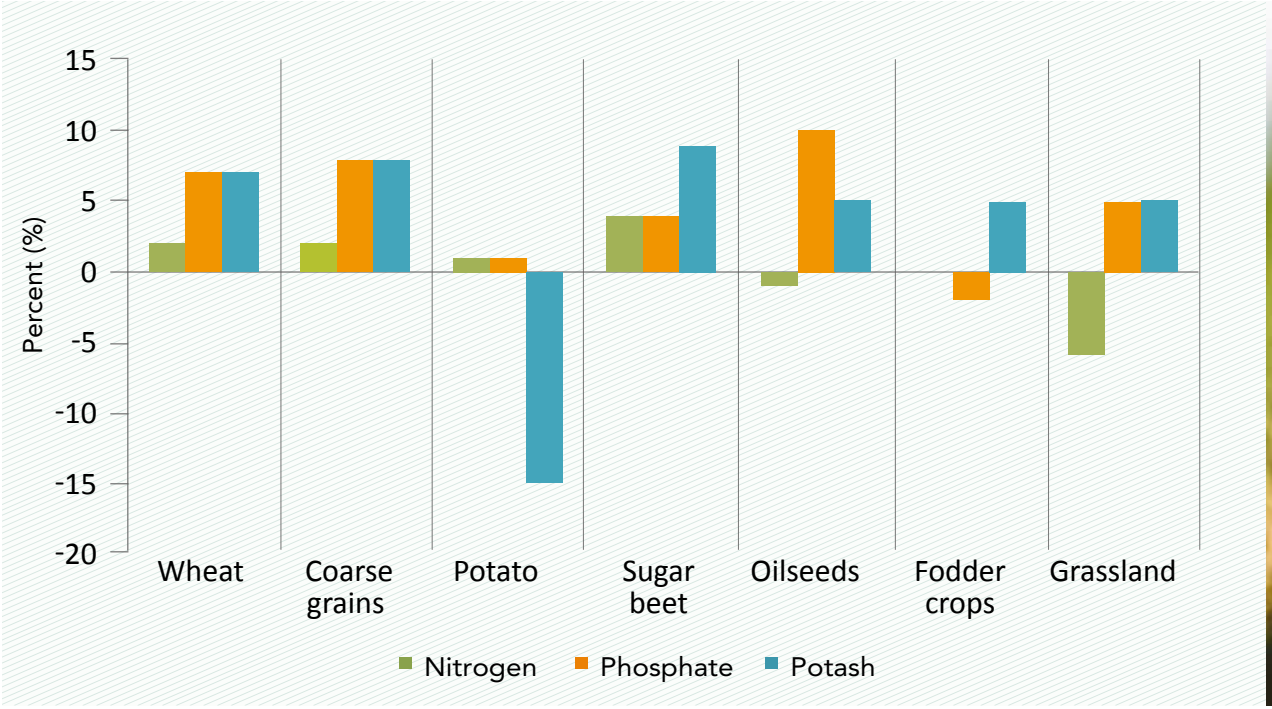


The anticipated cropping pattern in the European Union over the next 10 years will see a decrease (-0.6%) in the agricultural area devoted to cereals. This decrease, however, will be compensated compensated by an overall increase in crop yield of 5%.

Compared to last year, the decrease of cropping area for potatoes is smaller (-1.6%) and still compensated by a slight increase in yield (2%). The biggest changes are foreseen for sugar beet where the area is forecast to increase by 8.2%, with an expected 7% yield increase and for oilseed rape where the cropping area is expected to decrease by 5.2%, with a forecast growth in yield of (only) 4%.

Over the next ten years, **nutrient consumption** (N+P+K) for agriculture will increase by 3%.

Changes in fertilizer use by crop 2017-2027



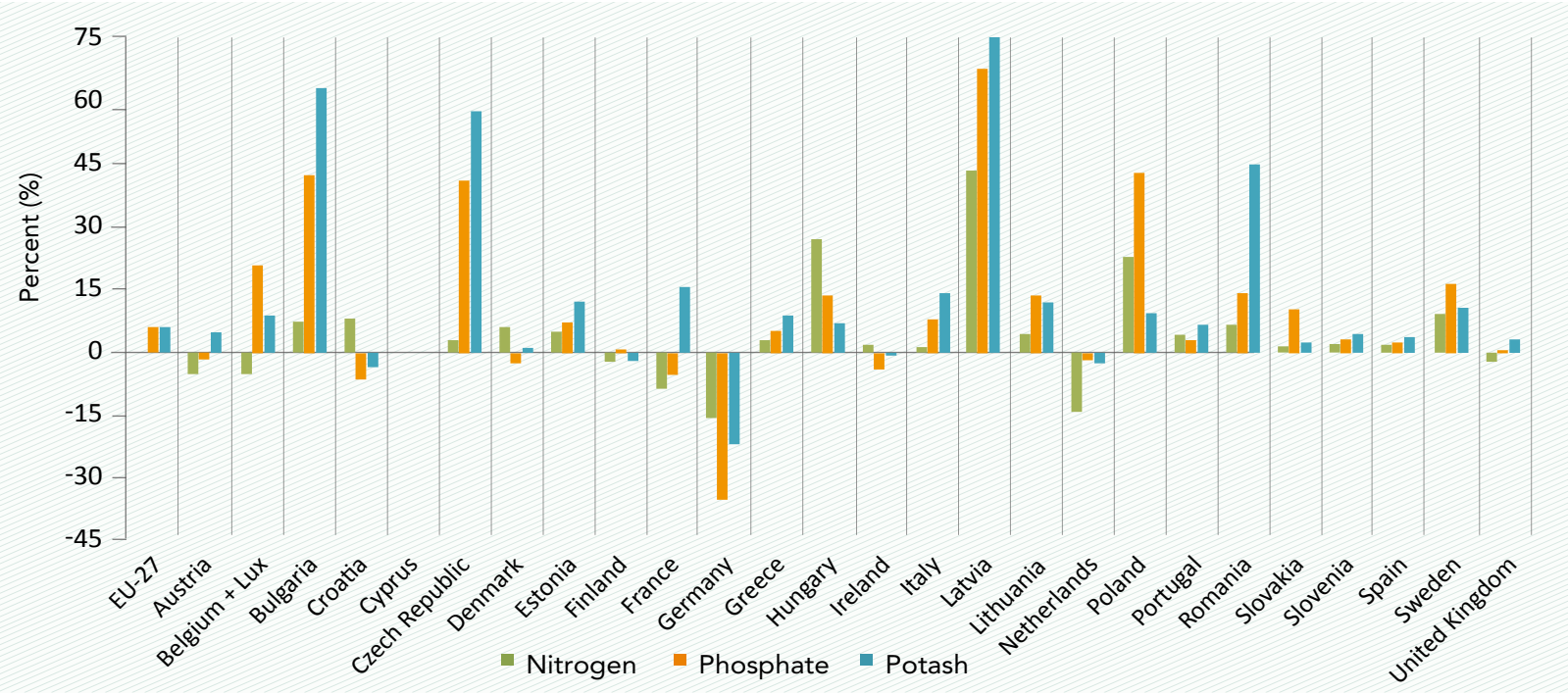
As the forecasted yield increases are on a positive trends for all major crops (for example cereals +5% compared to +3% forecasted last year), the nutrient consumption (N+P+K) is expected to slightly increase (+1.8%).

Except for potato where a decrease of 5% is forecasted, nutrient consumption will increase in all crops with for instance +6% for sugar beet and +4% for cereals.

In fodder crops, the decrease foreseen in the last years as an impact of the abolition of milk quotas, which should induce a trend towards greater productivity, is now stabilized and a small recovery of +1% is expected. At the same time, the decrease for grassland is now foreseen at around -3%.

For a second year, **Germany is foreseen to have the highest decrease in consumption of all three nutrients** mainly because of a tightening of the rules for the use of fertilizers in there. Most Central and Eastern European countries (EU-12) showed a trend for higher nutrient consumption.

Changes in regional fertilizer use 2017-2027



The evolution of nitrogen use by country is similar to last year. Increased consumption is foreseen in most Central and Eastern European countries (EU-12), while significant decreases are foreseen in the Western European countries, with the highest decreases in Germany, The Netherlands, France, Austria and Belgium.

For nitrogen, the average growth in consumption in Central and Eastern European countries reached 14.4 % (comparable to the last forecast). For Western countries, the expected decrease of -5.7% is more similar to the forecast of 2 years ago (-4.9%) and is still driven by an expected increased pressure on the use of fertilizers in Germany.

For phosphate and potash, significant growth is reported in almost all Central and Eastern European countries, as well as in Austria, Belgium/Luxembourg, Greece, Italy, Portugal, Spain and Sweden contributing to the recovery (+5.8% and +6.0%) foreseen for these nutrients in the European Union over the next 10 years.

However, after several years of relatively solid growth, it looks as if the fertilizer market is now slowing down, especially for nitrogen. With lower commodity prices and the Russian embargo, European farmers are still feeling the pressure. Consequently, they have become more cautious in their spending, even on essential inputs like fertilizers.

Pollutants covered by **EU National Emission Ceilings** legislation and 2030 targets:

SO_2
Sulphur dioxide
-79%

NOx
Nitrogen oxide
-63%

PM 2.5
Fine particulate matter
-49%

NMVOC
Volatile organic compounds
-40%

NH_3
Ammonia
-19%

Sources: European Commission 2017, http://ec.europa.eu/environment/air/reduction/index.htm

Agriculture and air quality: reducing ammonia emissions

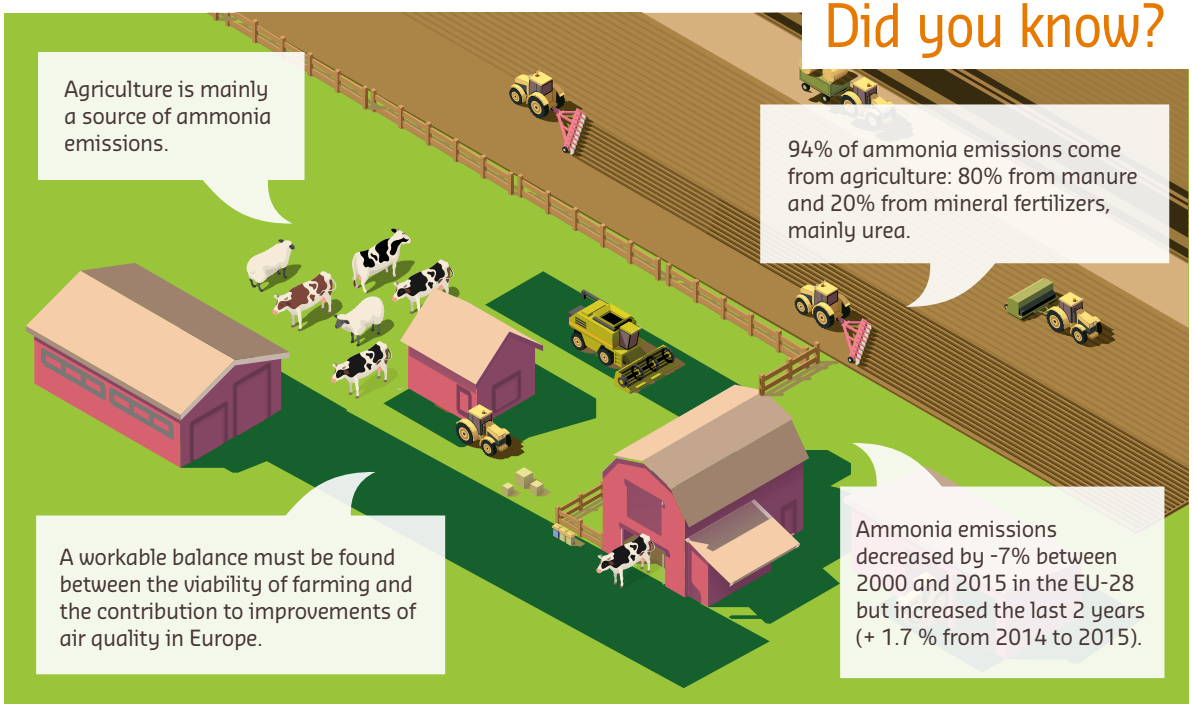
Towards the implementation of the NEC Directive

The revised National Emissions Ceilings (NEC) Directive (Directive (EU) 2016/2284) has recently been adopted by the EU. It sets 2020 and 2030 emission reduction commitments for sulfur dioxide (SO_2), nitrogen oxide (NOx), non-methane volatile organic compounds (NMVOCs), ammonia (NH_3) and particulate matter (PM2.5). The reduction commitments agreed for 2030, which are very ambitious for a number of EU countries, have been formulated by European decision-makers with the intention to reduce the health impacts of air pollution by around half compared with 2005. Furthermore, the Directive requires EU countries to draw up National Air Pollution Control Programs in order to ensure that the reductions are achieved. The NEC Directive foresees that the EU will have to reduce its total NH_3 emissions by 19% for all years from 2030 onwards (compared to 2005).

The challenge of minimizing ammonia emissions in the agriculture sector

In October 2017, the European Environment Agency (EAA) published its latest air quality report. The main conclusion of the this report is that all economic sectors will need to contribute to the effective implementation of the policy, including those such as agriculture, which has reduced less than other sectors in the past. In fact, air pollution has several important environmental impacts and may directly affect vegetation and fauna, as well as the quality of water and soil including the ecosystem services they support. For example, nitrogen oxides (NOx, the sum of nitrogen monoxide (NO) and NO_2) and NH_3 emissions disrupt terrestrial and aquatic ecosystems by introducing excessive amounts of nutrient nitrogen, leading to eutrophication.

Agriculture and air quality: Did you know?



Air pollution also negatively impacts the farming sector as ground-level O_3 damages agricultural crops, forests and plants by reducing their growth rates.

Solutions for reconciling food production and control of ammonia emissions

European farms play a crucial role in providing healthy, high-quality food for all European consumers, and beyond. However, the agricultural sector is also EU's main source of ammonia emissions due to manure and mineral fertilizers. The UNECE Framework Code for Good Agricultural Practice for Reducing Ammonia Emissions for instance lists a number of measures, ranging from livestock manure management to use of mineral fertilizers or livestock feeding strategies. As far as mineral fertilizers are concerned, the NEC Directive suggests several options. The first and most obvious option is to replace urea-based fertilizers with ammonium-nitrate-based fertilizers. This is also recommended by the UNECE Task Force on Reactive Nitrogen. Ammonia emissions can also be reduced by treating urea-based fertilizers with urease inhibitors.

The agricultural sector can make a significant contribution to EU's air quality efforts. Nevertheless, care must be taken to balance air pollution and climate mitigation with the potential impacts, particularly on farm economy and food production, and to optimise the different environmental and economic co-benefits of mitigation efforts.

Furthermore, a large number of projects and studies have identified various measures to mitigate emissions of air pollutants from the agriculture sector. As one selected example, the EU LIFE+ project 'AgriClimateChange' (2013) identified a number of different measures:

Agronomic measures - including: (i) nitrogen balance at farm level; (ii) introduction of leguminous plants on arable land to improve fertility and increase carbon sequestration; (iii) conservation of agriculture based on no-tillage methods to increase carbon sequestration; (iv) implementation of cover crops to restore fertility and reduce the need to use nitrogen fertilizers.

Livestock measures - including: (i) manure storage covering; (ii) manure spreading closer to the ground; and (iii) use of manure and farm residues to feed biogas plants.

Agri-environmental measures - such as maintaining and encouraging farms to develop low-carbon farming practices based on farmers' skills and interests.

Sources: European Commission website on Clean Air (http://ec.europa.eu/environment/air/index_en.htm)
European Environment Agency (EAA), 2017, Air quality in Europe — 2017 report, 74 pp
AgriClimateChange, 2013, Combating climate change through farming: application of a common evaluation system in the 4 largest agricultural economies of the EU, LIFE09 ENV/ES/000441

How the forecast is made

Fertilizers Europe's forecast is an annual exercise that uses the following procedure:

- at the end of each growing season, a general European scenario is established, based on quantitative information (from the FAO-OECD, USDA, FAPRI and the European Commission) and a qualitative analysis made by Fertilizers Europe experts;
- the general scenario is then adapted to the specificities of each country and national forecasts made;
- the national forecasts are then analysed and discussed by all the experts;
- when the market and economic situation require it, the forecasters carry out a last update of the current situation before integration and publication.

The forecast is an upward crop-based procedure where fertilizer consumption is evaluated by assessing the evolution of the cropping area and the nutrient application rates for each crop. However, two different methodologies are used to achieve this crop-based procedure:

- In the majority of European Union countries, representing 98.4% of its agricultural area and fertilizer consumption, the forecast is an expert-based approach constructed from national forecasts generated by Fertilizers Europe's members.
- In Croatia, Cyprus and Latvia, evaluation of the crop area and production as well as application rates used for N, P and K nutrients on each crop is based on a combination of data taken out of the IFA-FAO database, European Commission,etc. When precise figures are not available, the evaluation is based on an agronomic model developed by the group of forecasters, for both the current value and the 10 year forecast value.
- Malta is currently not covered in the forecast.

REFERENCE VOLUMES

The reference volumes used to calculate the percentage changes in fertilizer demand are based on the average value of the last three growing seasons (for the current exercise: 2014/2015, 2015/2016 and 2016/2017). This mitigates the extent to which exceptional years (positive or negative) may impact the calculated evolution of demand.

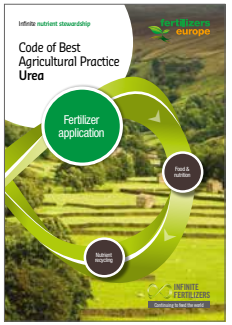
INFINITE FERTILIZERS

Continuing to feed the world

Fertilizers are integral to modern agriculture - they provide farmers with the means to meet increasing global food and energy needs. The European fertilizer industry is committed to the development and production of innovative products, application and recycling techniques to maximize the productivity and the sustainability of European agriculture. Following the fertilizer loop, it combines active product stewardship and close collaboration with the farming community with increasing interaction along the entire food chain to maximize nutrient-use efficiency and reduce the environmental footprint of food production.

Available publications

Fertilizers Europe has developed a variety of publications, each corresponding to the product stewardship and nutrient stewardship side of Infinite Fertilizers. Should you be interested in obtaining any of these publications, please contact the secretariat of Fertilizers Europe.



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