

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

2018-2028

**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, osmo-regulation, 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).

Fertilizer Europe's annual forecast of food, farming and fertilizer use in the European Union has been independently recognized¹ 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 Agriculture, DG Environment and DG Energy), the Food and Agriculture Organization (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.

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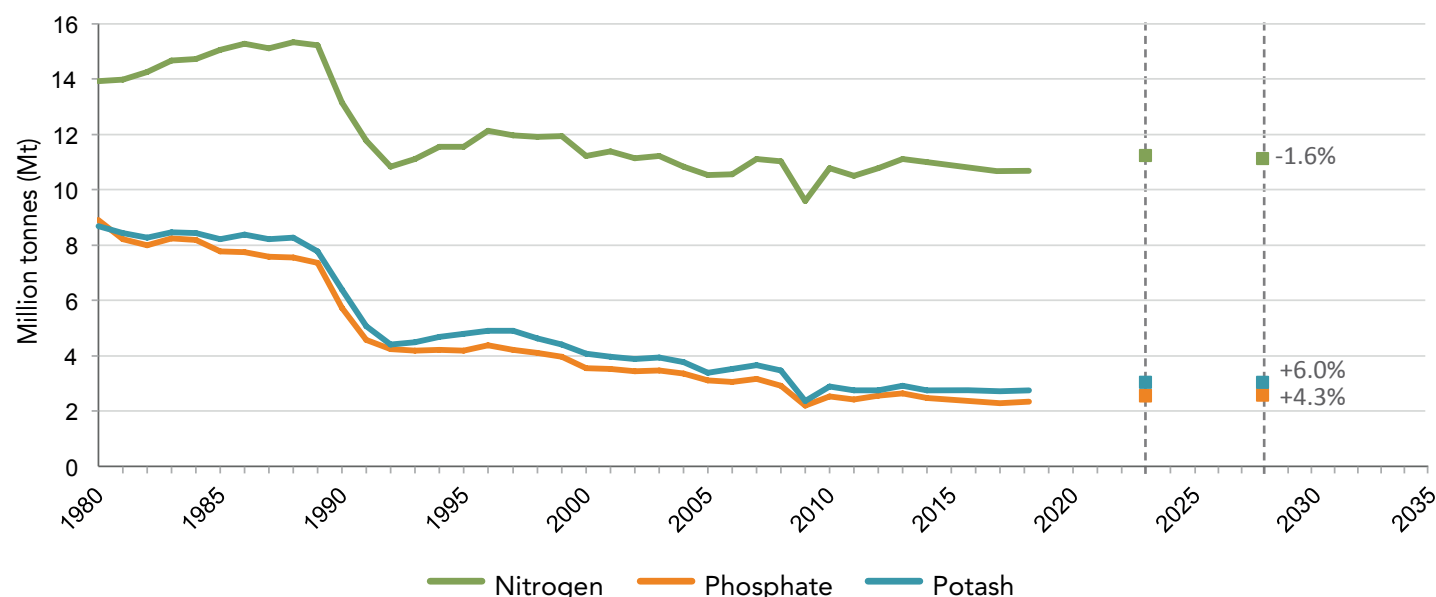
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Changes in annual fertilizer consumption in Europe by 2028:

- 1.6% in **nitrogen** consumption, compared to -0.2% foreseen last year.
- +4.3% in **phosphate** consumption, against +5.8% last year.
- +6.0% in **potash** consumption, identical to last year forecast.

FERTILIZER CONSUMPTION in the European Union



Over the season, fertilizers containing an average* of 11.3 million tons of nitrogen, 2.6 million tons of phosphate, and 3.0 million tons of potash were applied to 134.1 million hectares of farmland. 44.5 million cultivable hectares in the EU 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, 2.8 and 3.2 million

tons respectively by the 2027/2028 season, applied to 133.4 million hectares of farmland. After several years of recovery, annual fertilizer consumption over the next 10 years of Nitrogen is foreseen to decrease for the third consecutive year. For Phosphate and Potash, an increase of the consumption is forecasted but consumption will continue to remain below the levels recorded immediately prior to the 2008/2009 economic downturn. This is partly linked to a significant deterioration of the agricultural price environment

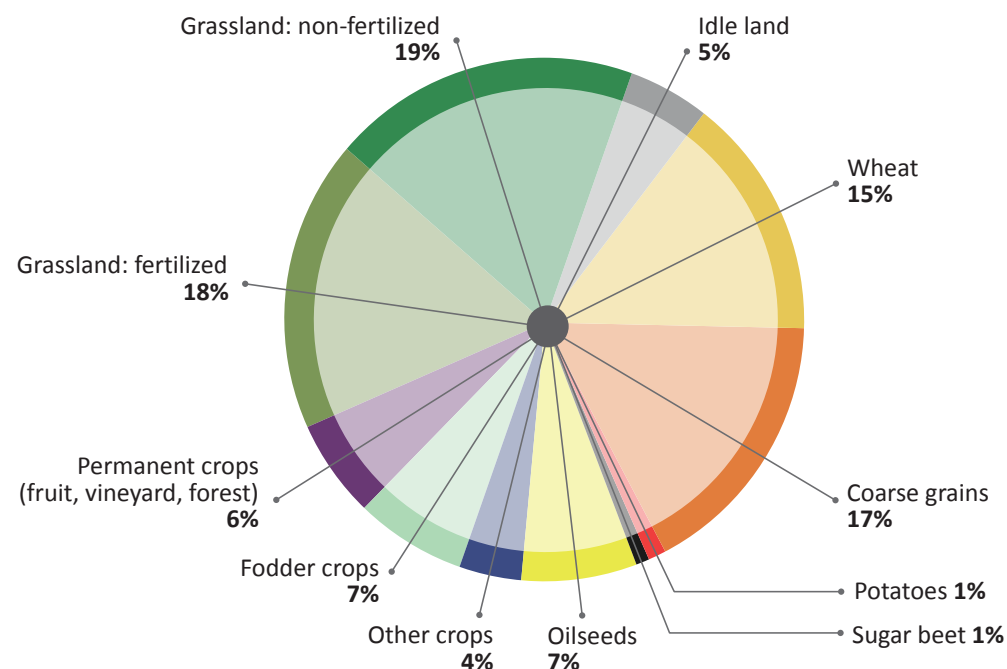
and of the terms of trade for global agriculture observed in the recent years. In addition, the current European regulatory context focuses more and more on environmental issues. Being water quality, climate change, or air quality, all these political priorities of several European countries and the European Union are challenging EU's farming sector as a whole and fertilizer use by farmers as well.

* Average based on the last three growing seasons - 2015/2016, 2016/2017, 2017/2018.

A young woman with blonde hair, wearing a blue denim shirt, is holding a large bundle of green wheat stalks. She is looking down at the wheat with a focused expression. The background is a soft-focus field of golden wheat under bright sunlight.

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 134.1 million hectares. A further 44.5 million farmable hectares are not fertilized, of which 34.6 million are unfertilized grassland and 9.9 million idle or set-aside land.

Within the fertilized area, arable crops account for 68% (a.o. 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 (a.o. 36% cereals,

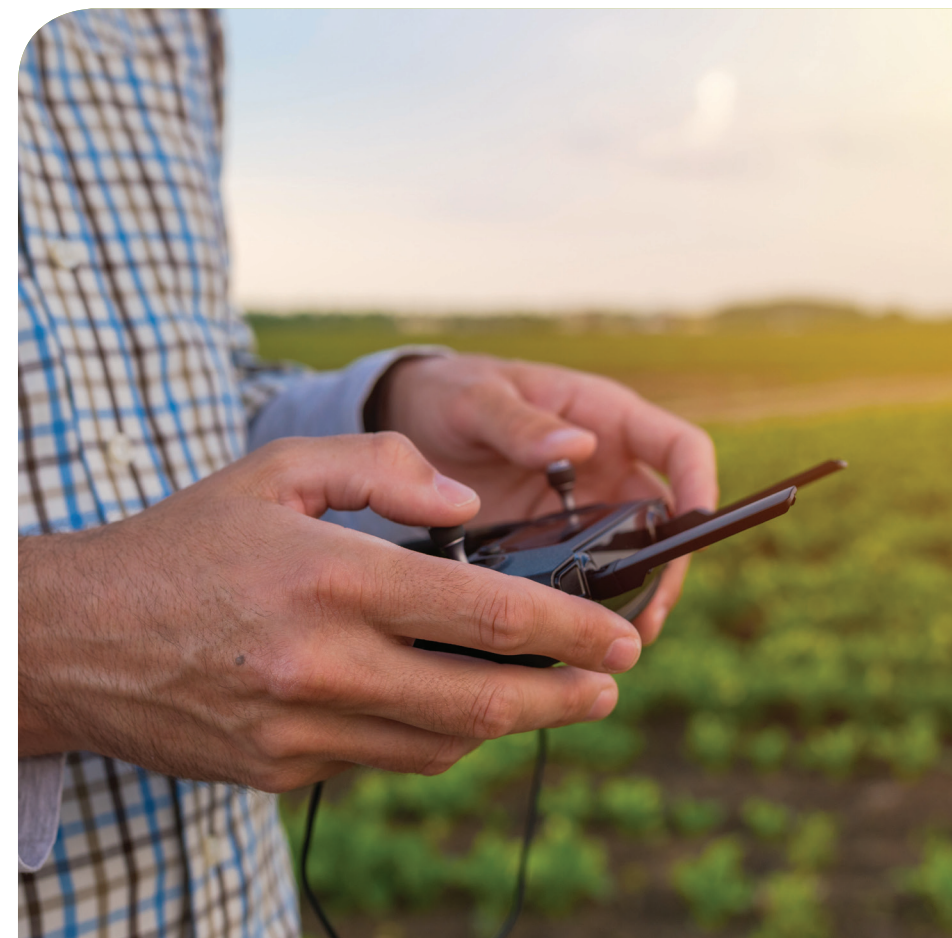
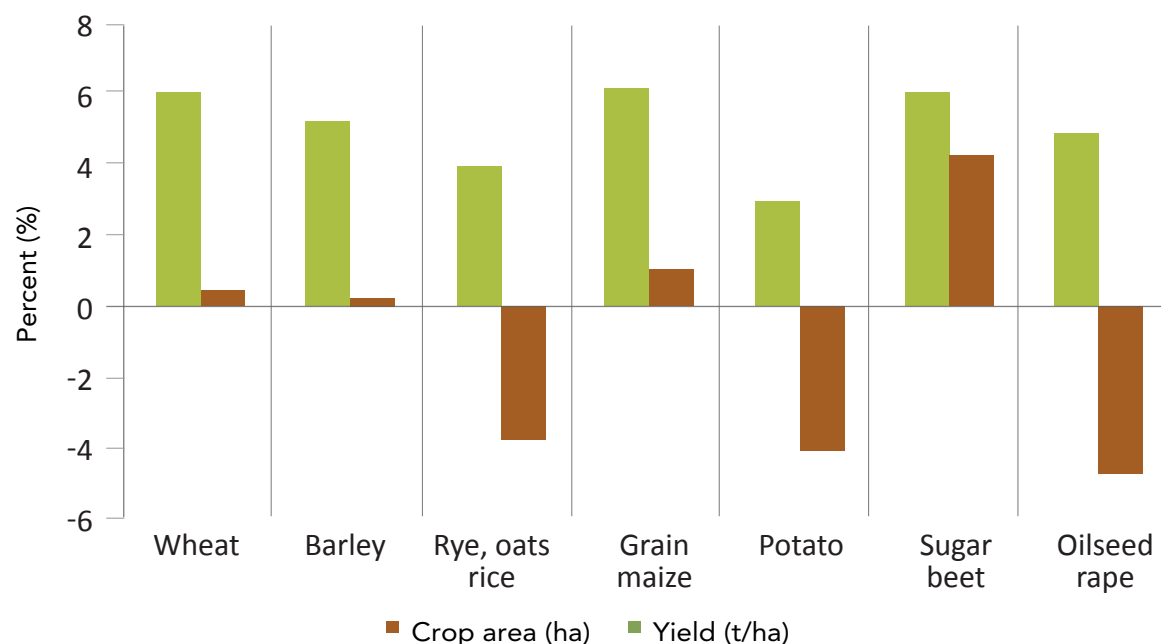
6% oilseeds, 9% fodder crops), 11% permanent crops (vineyards, orchards, forests) and 30% fertilized grassland. Agriculture in Central and Eastern Europe (EU-13), however, is far more directed towards arable production, which accounts for 86% of the fertilized area (a.o. 56% cereals, 14% oilseeds, 8% fodder crops), with permanent crops and fertilized grassland only comprising 3% and 10% 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

food crops 2018-2028



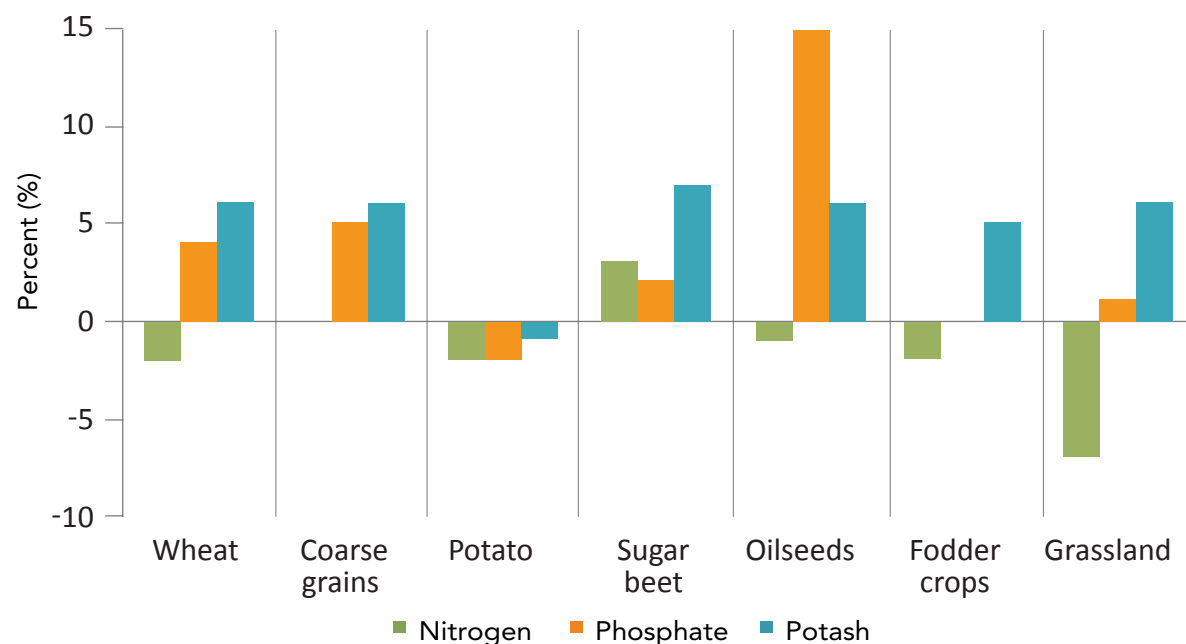
The anticipated cropping pattern in the European Union over the next 10 years sees a decrease (-1.0%) in the agricultural area devoted to cereals. This decrease, however, is compensated by an overall increase in crop yield of 6%.

Compared to last year, all trends remain similar. The decreases in area for oilseed rape (-5%), potato (-4%) and cereals (-1%) are compensated by increases in yield (+5%, +3% and +6% respectively). The biggest change is again foreseen for sugar beet where the area is forecast to increase by 4%, with an expected yield increase of 6%.

A close-up photograph of a person's hand pouring small, light blue granules of fertilizer onto the soil around a young green plant seedling. The seedling has two leaves and a thin stem. The background is a soft, out-of-focus green, suggesting a garden or field setting. A semi-transparent green box with rounded corners is overlaid on the right side of the image, containing white text.

Over the next ten years,
nutrient consumption
(N+P+K) for agriculture
will increase by **0.7%**.

CHANGES IN FERTILIZER USE by crop 2018-2028



As the forecasted yield estimates are on a positive trends for all major crops (+3% for potato to +6% for wheat, grain maize and sugar beet), the nutrient consumption (N+P+K) is expected to slightly increase (+0.7%).

Except for grassland and potato where decreases of N+P+K consumption of 4% and 2% respectively are forecasted, nutrient consumption

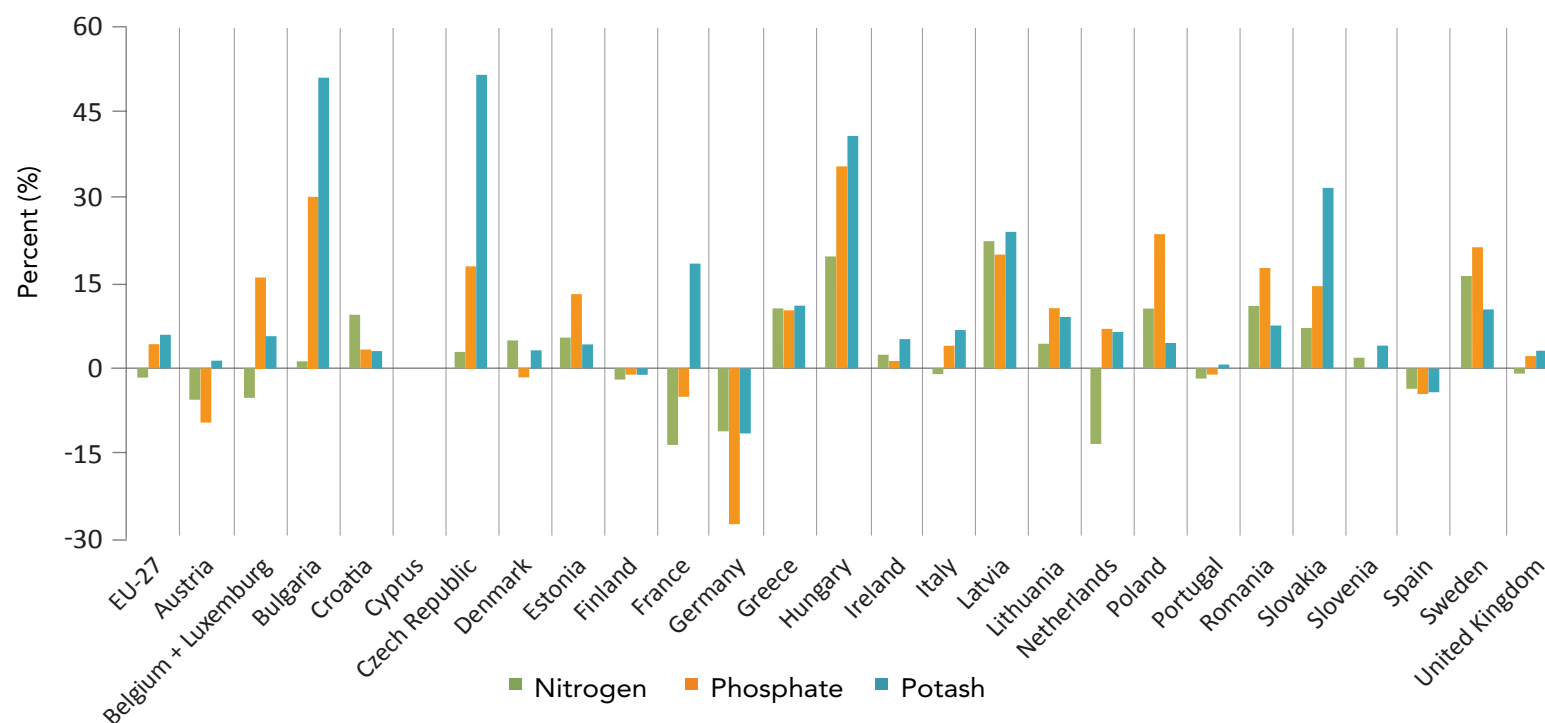
will increase in all major crops with for instance +6% for sugar beet and +4% for cereals.

The tightening of the environmental rules is foreseen to affect the nitrogen consumption in all crops except sugar beet. This means that the aforementioned general increase of nutrient consumption will be driven by the increase of phosphate and potash applications.



The last 2 years, Germany was forecasted as facing the highest decrease in consumption of all three nutrients mainly because of a tightening of the rules for the use of fertilizers in general. For the period 2018-2028, it appears that **this trend is also impacting other EU-15 countries**. Still most Central and Eastern European countries (EU-13) demonstrate a trend for higher nutrients consumption.

CHANGES IN REGIONAL fertilizer use 2018-2028



Increased consumption of Nitrogen is foreseen in most Central and Eastern European countries (EU-13) but lower than last year, while significant decrease are foreseen in almost all Western European countries, with the highest decreases in The Netherlands, France, Germany, Austria and Belgium. Spain and Portugal are now also foreseeing a slight decrease.

For Nitrogen, the average growth in consumption in Central and Eastern European countries reached 9.7 % (compare to 14.4% last year). For Western countries, the expected decrease of -6.1% is similar to last year (-5.7%).

For phosphate and potash, growth is reported in most European countries, except Austria, Finland, France, Germany, Portugal and Spain

contributing to the recovery (+4.3% and +6.0%) foreseen for these nutrients in the European Union over the next 10 years. Since 2010, a relatively solid growth of nutrients has been observed. However, it looks as if the fertilizer market is now slowing down, especially for Nitrogen due to a combination of environmental and market pressure both on farmers and producers.



FEEDING LIFE 2030
THE EUROPEAN FERTILIZER INDUSTRY AT THE
CROSSROADS BETWEEN NUTRITION AND ENERGY



FEEDING LIFE 2030: The European Fertilizer Industry at the Crossroads between Nutrition and Energy

Celebrating 30 years of existence in 2018, Fertilizers Europe representing the majority of fertilizer producers in Europe, has published a report outlining the Vision for the European fertilizer industry in 2030.

Looking into the future of European agriculture in general and the fertilizer industry in particular, the challenges of a productive and sustainable future food production and the challenges stemming from Europe's ambition to decarbonise the economy and underpin the circular economy will be intertwined. The European mineral fertilizer industry will be at the crossroads where these two challenges meet.

Fertilizers Europe's Vision "Feeding Life 2030" highlights how the European fertilizer industry can play vital part in addressing these challenges.

Feeding Life 2030

According to the Wageningen University's estimates, fertilizers help feed almost 50% of the global population. Meanwhile, the UN estimates that the world's population will continue to grow, reaching 8.6 billion by 2030 (up from 7.6 billion today). In other words, we need to find a way to feed an extra Germany every year.

In Europe, unlike in many other parts of the world, the undernourishment is not any longer a major concern as large majority of farmers

apply fertilizers to enhance the yield and quality of their products. The focus in Europe is therefore on meeting future food needs in a more sustainable way.

Mineral fertilizers are and will remain an essential source of nutrients for the plants, as they are needed to balance and supplement organic sources in order to give plants the optimal growing conditions. The challenge is to improve the efficiency of fertilizer use, and in our Vision the solution lies in 'applying more knowledge per hectare'.

The Vision also foresees that professional farmers and growers will become even more knowledgeable and demanding in terms of nutrient input by 2030. The next generation of farmers is expected to focus increasingly on nutrient use efficiency, in order to produce sustainably and profitably by optimising overall application thus increasing yields. To do this, farmers will rely more profoundly on professional advice, planning and new tools as well as technology that will allow them to apply fertilizer where it is required when it is required and in the exact amount that is needed.

Better fertilizer products and products more targeted to the specific crop, encompassing the latest knowledge combined with new technologies, are an important part of this. So are new tools allowing for real-time assessment



of the fertilizer needs of crops in the field which, combined with GPS and intelligent equipment, makes it possible to adjust application so the plants are fed according to their needs.

The application of knowledge is likely to improve the quality of yields and provide farmers with a decent return on investments. It will also have a very positive effect on the environment, as better and more targeted fertilisation will increase the growth of plants and thereby diminish losses to the environment.



Decarbonisation ammonia as a missing link

The EU's objective of net zero emissions economy by 2050, represents a huge challenge for the mineral fertilizer industry, given the natural gas-based and energy-intensive nature of nitrogen fertilizer production.

While it is difficult to imagine nitrogen fertilizer production to be totally carbon-free without extensive use of carbon capture and storage, with the technologies we know today such a future is realistic and possible, in principle.

As the EU progresses towards decarbonising its energy supply and relying more on renewable energy, such as wind and solar power and the production of hydrogen, the question of hydrogen storage becomes more pressing.

In our vision, the nitrogen fertiliser industry, as a producer of ammonia, offers the key to unlocking clean energy potential by acting as a carbon-free energy carrier. It is the missing link in making decarbonisation a reality.

The industry will also be challenged by the demand for better and more targeted fertilizers, and it will increase its efforts in terms of innovation and product development, being ready to take advantage of new science and technologies related to plant growth. The fertilizer producers in Europe will also continue working on optimising resource use and looking for more effective ways to recycle a wide range of by-products in its production process, turning them into valuable plant nutrients.

From Vision to Reality

The Feeding Life 2030 report offers a forward-looking and ambitious Vision of the future of European fertilizer industry in 2030 and beyond. It is aimed at initiating a discussion with stakeholders on the role mineral fertilizer industry will play in addressing some key societal challenges.

This Fertilizers Europe Vision to 2030 is not defending the status quo, instead it is looking forward, challenging what we as industry currently do. It requires strong commitment from industry leaders and strong support from policy-makers to ensure a stable and predictable legislative framework which will allow us to translate this ambitious vision into reality.



To obtain a print copy of the report contact:
communications@fertilizerseurope.com

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 Fertilizer Europe's members.
- > In Croatia, Cyprus, Latvia and Slovakia, 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,...; 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 years forecasted 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.





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