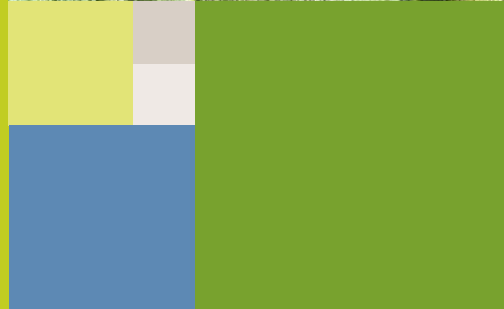




Knowledge grows

# CEO Water Mandate Report 2016: Communication on Progress



# Who we are

## Our Mission

*Responsibly feed the world and protect the planet.*

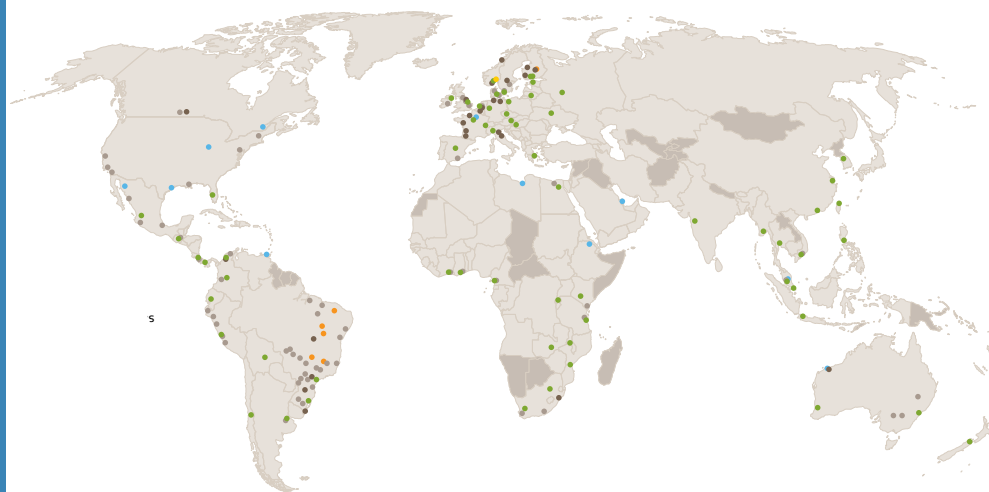
## Our Vision

*A collaborative society; a world without hunger; a planet respected.*

Yara's knowledge, products and solutions grow farmers', distributors' and industrial customers' businesses profitably and responsibly, while protecting the earth's resources, food and environment.

Our fertilizers, crop nutrition programs and technologies increase yields, improve product quality and reduce the environmental impact of agricultural practices. Our industrial and environmental solutions improve air quality by reducing emissions from industry and transportation, and serve as key ingredients in the production of a wide range of goods. We foster a culture that promotes the safety of our employees, contractors and societies.

Founded in 1905 to solve emerging famine in Europe, today Yara has a worldwide presence, with close to 15,000 employees and sales to about 160 countries.



- Countries with sales
  - Sales offices and R&D sites
  - Yara Plants
  - Smaller sites <sup>1)</sup>
  - Phosphate mines
  - Joint ventures
  - Head office
- 1) Yara operated terminals and logistical production sites

# Contents

04	Yara's Approach
06	Direct Operations
10	Value Chain Engagement
12	Collective Action, Public Policy and Community Engagement
14	Transparency

An underwater photograph of two children swimming towards the camera. The child in the foreground is a boy wearing blue and red swimming goggles and a pink swim cap, smiling. The child in the background is a girl wearing purple swimming goggles and a pink swim cap, also smiling. The water is clear and blue.

## About this report

Yara has been a 'CEO Water Mandate' signatory since July 2014. Launched in July 2007 by the UN Secretary-General, the CEO Water Mandate is a unique public-private initiative designed to assist companies in the development, implementation, and disclosure of water sustainability policies and practices.

Established by the UN Global Compact, the initiative was created out of the acknowledgement that global water challenges create risk for the private sector, public sector, local communities, and the environment alike. This report has been assembled from Yara's GRI reporting, the annual reports and other sources.



# Yara's Approach

Yara is dedicated to grow farmers' businesses profitably and responsibly, while protecting the earth's resources, food and environment. We continuously raise the bar for resource efficiency and environmental stewardship in our own operations, and provide knowledge, products and solutions for sustainable agriculture, employing our expertise in nutrient and water use efficiency.

Smarter and more efficient use of water in agriculture is key to meet future food demand without compromising freshwater sources. Agriculture today uses 11% of the world's land surface, but accounts for 70% of freshwater withdrawals worldwide. By 2050, global demand for water is expected to increase by 55% from current levels, and world agriculture will need to produce 50% more food on essentially the same land and with limited water available.


Currently, irrigated agriculture accounts for about 20% of all cultivated land and 40% of the global food production. Irrigated agriculture is two to three times as productive as rainfed agriculture, but carries a much larger impact on water resources. Expansion of irrigated land could become a necessity to increase food supply, but more resource efficient irrigation technologies and improved

agricultural practices also offer great potential. Water use efficiency in both irrigated and rainfed agriculture must be improved, and crop nutrition plays an important role in achieving this.

Public opinion exchanges on water use for agriculture is mainly focused on issues such as irrigation technologies, water retention in soils, and drought tolerant crop varieties. However, water footprint analyses point to the importance of nutrient management, as nutrient supply exerts strong control over yield and water consumption in crop production. Our research demonstrates that optimum crop nutrition supports higher water use efficiency (WUE) by reducing soil evaporation and drainage losses, and by increasing the harvestable portion of the plant's biomass. Similarly, crops that are not optimally fertilized require more water for every kilo of final product.

Yara is through its HESQ Policy dedicated to excellence in its company performance on health, safety, environment and quality (HESQ), which also implies minimizing emissions to water. While the release of fertilizer from Yara's own operations is at a very low level, losses of fertilizers to the environment is a challenge in the agricultural sector. Yara engages to promote increased productivity and reduced environmental impact from fertilizer use.





While fertilizers are fundamental to feeding the global population, using them correctly is of great importance to avoid any adverse impacts on the environment. This pertains to both organic and mineral fertilizers. Over-supply or wrong application can lead to nutrient pollution of freshwater bodies and undesired growth, such as algae blooms in rivers and seas. Knowing which nutrients to add, along with the right amount, place and time, is key to achieving optimum crop growth with the least possible losses of nutrients to the environment.

To this end, Yara promotes nutrient management systems and tools designed to achieve better fertilizer use efficiency in the agricultural sector. Nutrient management means that fertilizer demand is calculated based on soil analysis, yield expectations, desired crop quality and climate. We firmly believe that any organic nutrients available at the farm should be used first. Mineral fertilizers should then be added to close the calculated nutrient gap, using nutrient management systems to guide farmers to the correct choice of fertilizer products and application methods. Furthermore, we encourage farmers to apply precision tools and technology to add just the nutrients needed, in the right amount and at the right time, thereby greatly reducing negative environmental impact while optimizing the yield.

Given the potential for better water management and increase in water use efficiency in agriculture, our reporting and activities are focused on our downstream operations and value chain engagement. While we work continuously to reduce water withdrawal and emissions to water within our own operations, our potentially largest contributions to solving the global water challenges will come in the fields, at the hands of farmers across the world.

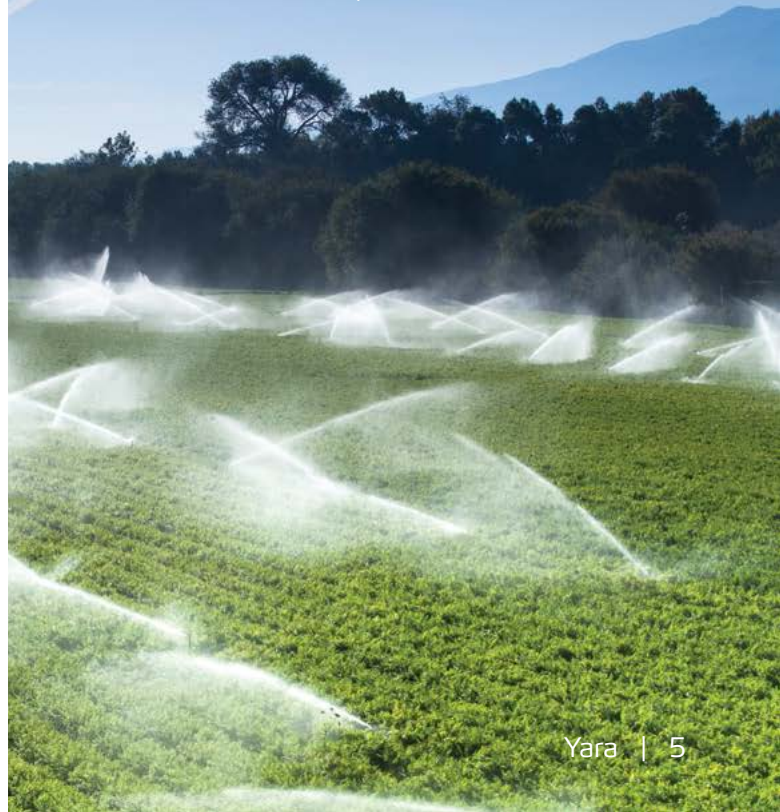
## Crop nutrition increases crop water use efficiency

Water use efficiency can be expressed as crop yield per unit of water used by the crop. Two major factors determine water use in agriculture:

1. **Evaporation** describes unproductive water loss from the soil surface
2. **Transpiration** is productive water consumption linked to photosynthesis and crop growth

The two factors are connected and significantly influenced by crop nutrition. As much as 60% of seasonally available water can be lost through bare soil evaporation from crop land, but optimal fertilizer application promotes crop canopy development and ground cover by leaves, minimizing the soil's exposure to direct sunlight. In addition, well-nourished crops produce better root systems, to take up more water from the soil and reduce drainage losses. Altogether this leaves more water available for crop transpiration and growth.

Yara does extensive R&D to help improve the water footprint of growing crops. The water footprint quantifies crop water use through evaporation and transpiration, how much irrigation water is used and to what extent freshwater is polluted.



# Direct Operations

Yara carefully manages its direct use of and emissions to water. We use water primarily for cooling purposes in our production sites and, to a lesser extent, in steam production and manufacturing processes.

## Water use for production

Yara used in total 906 million m<sup>3</sup> of water in our production in 2016. This covers all Yara's major production sites (28 large volume chemical and mining sites included in the 2016 reporting).

Most of the water used (98%) was surface water, which includes water from wetlands, rivers, lakes and oceans. The rest was split equally between ground water and water purchased from municipal water supplies or other water utilities. Nearly all the water withdrawn by Yara is returned to the water course unpolluted. Water recycling corresponded to 8% of fresh water withdrawal (70 million m<sup>3</sup>).

Most of the Yara sites have certified environmental management systems in place. 19 out of 28 sites are currently certified to the ISO 14001 standards, with the Belle Plaine plant in Canada being the most recent to achieve such certification. Each certified site has assessed risks related both to the use of water as well as discharges to water as a part of their environmental impact assessments. Nine sites have carried out specific water risk assessment for their operations covering risks related to flooding, drought, use of water and discharges to water. In addition, five sites are working together with local communities and other stakeholders to discuss water quality and address water risks and issues.

The Yara site in Ravenna, Italy, has identified the potential flooding of the Candiano Canal to represent a risk to the site. Mitigating actions for the high canal water level are covered by the site's emergency procedure to prevent nutrient leakages in case of flooding.

Water management related to mining operations has currently triggered significant public interest in

Finland. Yara's Siilinjärvi apatite mine has assessed water management in detail as a part of the national Mining Stress Test program, conducted by the Ministry of Environment. The assessment included safety of dam constructions, tailings dams and water lagoons, potential leakage risks of harmful substances, water balance scenarios for example in a case of extraordinary precipitation, and finally emergency preparedness and communication practices.

Needs for improvement related to sanitary systems have been identified at three sites. A sanitary water treatment plant is under construction in Cartagena, Colombia. The sanitary water system of the Yara Pardies plant in France has been connected to the municipal waste water treatment system, and today covers about half the sanitary water from the site. The Yara plant in Kokkola, Finland, has initiated a project to lead sanitary water from part of the production area to a municipal waste water treatment plant, thus ensuring adequate treatment for all sanitary water generated on site.

Risks related to rivers providing the main water supply have been assessed in Köping, Sweden, and Rostock, Germany, where the River Warnow is also the source for drinking water of the Rostock city.

### Environmental management standard

*Yara commits to have all its current major production sites certified according to the environmental management standard ISO 14001. This includes assessing risks related to both the use of water as well as discharges to water, as a part of the environmental impact assessment.*



## Water conservation and waste-water treatment

Yara's environmental policy was last updated in February 2017. The latest update highlights our precautionary approach to environmental management, in which we identify risks and take preventive measures to mitigate the potential harm to people or the environment. Where public regulations do not provide adequate controls, Yara will work with governments, society and businesses to shape regulations and practices that work to this commitment.

### Yara's commitment

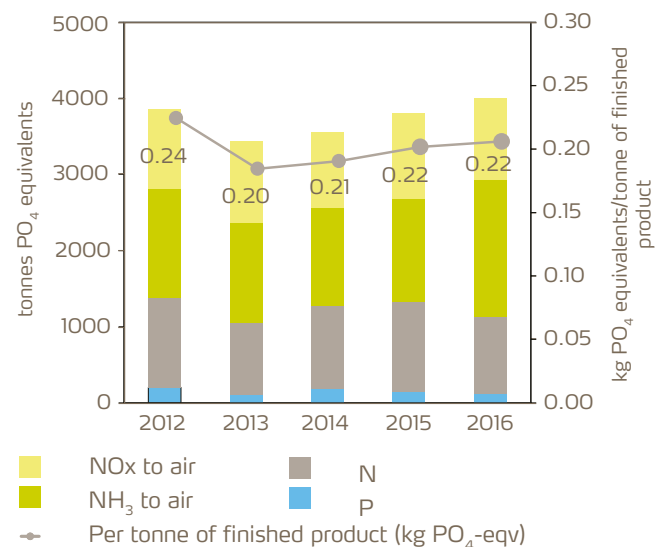
*We will promote sustainable agriculture and deliver environmental solutions contributing to global growth while addressing food security, resource efficiency and environmental protection. We will emphasize energy efficient operations and reduce emissions and environmental impact of our processes and products.*

For Yara's own production plants, this implies continuous focus to reduce emissions, set targets and initiate actions to improve environmental performance. Compliance with statutory requirements, permits and corporate standards is a minimum expectation for any operation.

Emissions to water in Yara are measured, analyzed and registered according to national regulations. The main potential impact on water caused by nitrogen and phosphorus emissions is eutrophication. Thus, the water and air emission data is combined to characterize their eutrophication potential, measured in tonnes of  $\text{PO}_4$  equivalents.

In 2016, Yara's emissions impacting eutrophication totaled 4,001 tonnes of  $\text{PO}_4$  equivalents. The total volume of water discharge was 787 million  $\text{m}^3$ . A large part of this is cooling water which is returned unpolluted. 87% of the water volume was discharged into the sea, 4% into rivers and 9% into lakes in 2016.

### Emissions contributing to eutrophication



Several Yara sites are taking actions to separate their waste water streams more efficiently and to prevent spillages and accidental discharges. Yara's site in Le Havre, France, has isolated an area with earlier contamination and equipped the ponds with pumps to drain polluted water for treatment. Yara's sites in Porsgrunn and Glomfjord, Norway; Köping, Sweden and Uusikaupunki, Finland have all invested in improving their waste water treatment systems with the goal of reducing nutrient discharges to water. The Yara mine in Angico dos Dias, Brazil, and the Belle Plaine plant in Canada are investigating how to improve treatment and separation of water from storm flooding. Yara Uusikaupunki and Siilinjärvi plants in Finland as well as the Cartagena site in Columbia are taking actions to improve the circulation of nutrient-containing waters. The Yara site in Rio Grande, Brazil, has an action plan in place to reduce emissions and effluents, and to increase recycling.

The Yara site in Rostock, Germany, discharges its waste water to a small river, the Mühlbach. Actions are ongoing with the local authorities to clarify the water status of the river by detailed data sampling, and to protect and enhance the water quality with the aim of achieving good status. As a first step, Yara Rostock has contributed to this by increasing the basin capacity for rainwater prior to biological treatment to reduce nitrogen emissions to the river. Thus the lowest discharge of nitrogen in the history of the plant has been reached.

## New technology

Treatment of waste water where nitrogen is present in low concentrations is a rising challenge for fertilizer plants. Testing of novel waste water treatment technologies and investigating their feasibility is currently ongoing e.g. in Yara's plants in Tertre, Belgium; Le Havre, France; Sluiskil, the Netherlands and Siilinjärvi, Finland, each facing their specific challenge with the water quality.

## New tailings paste plant in Siilinjärvi

Yara's mine in Siilinjärvi, Finland, produces around one million tonnes of apatite concentrate and generates approximately 10 million tonnes of tailings each year. As the tailings pond was filling up, Yara decided to invest EUR 75 million in a new tailings paste plant. Opened in May 2017, the new plant leverages best available techniques and two paste thickeners to improve the deposition properties of the sand going into the pond. This new and unique solution will allow mining to continue at the site until 2035 and avoid the environmental impact caused by a larger tailings pond.





## Raising awareness

Yara's activities are guided by the principles of Product Stewardship, outlined by Fertilizers Europe and the International Fertilizer Association (IFA). Based on a commitment to promote sustainability and safe practices throughout the life cycle of fertilizers, the principles ensure that proper care is taken along the entire value chain, from product development and sourcing of raw materials, through production, storage and distribution, to sales, delivery and application. Assessments of health, safety, environmental and security impacts of products and services cover all life cycle stages.

All Yara's operations in Europe are in full compliance with the requirements of the Fertilizers Europe Product Stewardship Program. Outside Europe, Yara is implementing the IFA Protect & Sustain product stewardship program on a country by country basis. Yara has contributed to the development of this program. 21 Yara units have received the IFA Protect & Sustain certificate since the launch of the program in 2010, eighteen of them reaching the highest "Excellence" level. The whole Yara business in USA, Canada and Mexico, a large part of Yara's business in Brazil, Latin America and Asia, as well as an increasing share of Yara's business in Africa, are covered. Remaining units will follow suit, as Yara aims to have all operations outside Europe certified to the program.

## Water sustainability incorporated in decision-making

Yara prepares an environmental impact assessment for any new major operation or extension. As a part of this, potential damage to nature or impact to natural resources are evaluated, and necessary prevention, management and remediation measures are considered. This includes also Due Diligence assessments for new acquisitions.

Such assessments have been made recently, for example, in Siilinjärvi, Finland, for the enlargement of the apatite mine area, as well as at other sites where start-up of mining activities is under consideration.



## Zero emissions, zero ballast water vessel

In 2017, Yara and Kongsberg Gruppen joined forces to build the world's first autonomous, all-electric zero emissions ship. This innovative container feeder will be shipping products from our Porsgrunn production plant in Norway to the nearby ports of Brevik and Larvik. It will initially operate as a manned vessel from late 2018, moving to remote operation in 2019 and expected to be capable of performing fully autonomous operations from 2020.

The zero emissions ship will reduce NOx and CO<sub>2</sub> emissions and improve road safety by removing up to 40,000 truck journeys in populated urban areas. Furthermore, it will also be the world's first commercial zero ballast vessel, avoiding pollution from ballast water discharges. Yara's six existing vessels all have ballast water and sewage treatment plants to prevent emissions of polluted water to sea.

# Value Chain Engagement

Yara, as the world's leading producer of mineral fertilizers, is a key player in promoting and facilitating sustainable agriculture. We engage with farmers and partners along our value chain to share knowledge and collaborate on projects seeking to sustainably intensify agricultural production, meeting future food demand.

For more than a century, Yara has developed extensive agronomic knowledge that we share with farmers, helping them to boost their yields while contributing to sustainable agriculture. With our global reach, we help farmers to apply fertilizer the optimum way and engage with a wide range of both public and private stakeholders to find sustainable solutions for agriculture, including water management.

We are committed to promoting sustainability and safe practices throughout the life cycle of fertilizers. Assessment of health, safety, environmental and security impacts of products and services covers all life cycle stages, and we have a systematic approach to monitoring and reviewing the quality and handling of all our products.



## Yara Water Solution

Yara is actively developing and expanding the Yara Water Solution, to accurately manage combined water and fertilizer needs under water-scarce conditions. The Yara Water Solution forms part of our Farm Management System offering and enables farmers to irrigate on-demand, typically saving 20–30% of water.

The innovative Yara Water-Sensor is a key component in our solutions for better water management. It provides a continuous, non-destructive and remote measurement of plant water status, which in turn is translated by software into precision supply of water and nutrients. The sensor is currently marketed for citrus and olives, and Yara's R&D departments carry out trial work to increase the range of options for use.

Yara also markets several precision farming tools, which will help optimize crop nutrition and support water use efficiency. These tools include the handheld N-Tester and the tractor mountable N-Sensor to measure instantaneous nitrogen demand of the crop.

### 20% less water for citrus

The Yara Water Solution was calibrated and tested for more than two years in a drip irrigated commercial orange orchard in Murcia, Spain before being marketed. The trials showed a potential for water savings of 20% without sacrificing yield and quality. Further field trials to calibrate and validate the solution for citrus and olive trees are ongoing in Spain, Brazil, the USA and Australia.

### Successful testing on coffee

2016 saw the conclusion of the first feasibility studies of the Yara Water-Sensor on coffee trees, and results were promising. They show that the sensor can detect drought stress in coffee with a high sensitivity. Further trials are planned to fine-tune the Yara Water Solution to this crop.

## MyYara – advanced farming tools in one place

MyYara is our new platform for engaging with farmers. It harnesses the potential of bringing our tools and services together in one portal to help farmers improve profitability, crop performance and sustainability. It will also allow us to do Big Data analyses based on data from farmers, enabling us to better understand their needs and develop solutions accordingly.

The MyYara platform consists of two large modules, one for broad acre crops, the other for fertigation solutions for water-scarce conditions. Within fertigation, Yara offers a full crop solution comprised of the Yara Water Solution along with fertigation software, water-soluble fertilizers and analytical services. When combined with an efficient irrigation system, both nutrients and water can be managed to obtain the maximum yield and quality.

MyYara was launched for pilot testing by selected farmers in France, Germany and the UK in May 2017 and will be rolled out to other countries in 2017–2018.





# Collective Action, Public Policy and Community Engagement

Besides developing supporting technology and knowledge on how to improve water use efficiency in farming, Yara works broadly to seek implementation of this knowledge. We engage in dialogue and cooperation with a wide range of stakeholders, locally and globally.

Taking a clear stance on water, Yara has published a position paper outlining its main knowledge and views on the global challenge of freshwater availability. More specifically, Yara has also published position papers on both the EU Common Agricultural Policy reform and the company's Baltic Sea engagement, promoting how agriculture can be both productive and environmentally sound.

Agriculture has often been perceived as an environmental problem, but our view – that it can also be part of the solution – is becoming increasingly widespread. Yara promotes resource efficiency, inducing green growth and sustainable agriculture, and we have a particular African engagement. We have entered several value chain business partnerships, promoting food security and sustainable agriculture, including better water use efficiency.

Yara participated actively in the process leading to the UN Sustainable Development Goals (SDGs), and is committed to help meet the goals. In 2016, we took an active role in promoting the goals as the official private sector respondent for Norway at the UN High Level Political Forum, and by actively engaging in dialogue on how to promote the UN Sustainable Development Goals at several major global events and UN meetings.

The topic of water use efficiency is central in several partnerships and collaborative initiatives where Yara is involved. We are a partner in the EU-project WEAM4i (Water & Energy Advanced Management for Irrigation). The aim of the project is to improve the efficiency of water use and reduce the costs of power irrigation systems. WEAM4i is a European project co-funded by the European Union under the 7th Framework Program.

## IMPROVED project for water reuse

Water is a crucial resource for the chemical industry around the ports of Ghent, Antwerp and Zeeland, in the Netherlands, where we have our largest European plant, Yara Sluiskil. Research from the European Commission indicate significant potential for improving water reuse in this water-stressed area. This has spurred a public-private research project involving regional authorities, universities and manufacturing companies, among them Yara.

The IMPROVED project (Integrale Mobiele PROCeswatervoorziening Voor een Economische Delta) will investigate ways to use the water streams from the chemical factories, testing purification methods, demonstrating on-site water reuse and developing future water treatment strategies. Yara Sluiskil is selected to be one of three pilot plants to conduct on-site testing in 2017–2018.



# Transparency

Yara emphasizes transparency and accountability. We have chosen the Global Reporting Initiative (GRI) framework to guide our reporting, to communicate principles and performance to our stakeholders. We also report according to the UN Global Compact framework, based on our commitments and policies. Our engagement, actions and performance is strongly linked to our vision and strategic framework.

For the full GRI reporting, please refer to:

<http://yara.com/sustainability/reporting/>

Our commitment to the CEO Water Mandate has been confirmed in our Annual Report 2016, in the Report from the Board of Directors.

**Yara Grows Knowledge** to nurture life by delivering solutions for sustainable agriculture and the environment. Our fertilizers and crop nutrition programs help produce the food required for a growing world population. Our industrial products and solutions reduce emissions; improve air quality and support safe and efficient operations.







# About Yara

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