



SUSTAINABLE GROWTH OPPORTUNITIES

1 LOW-COST POSITION

PhosAgro's environmentally friendly fertilizers give the Russian agriculture a unique competitive edge: low-cost of end products and exceptional safety. The environmental safety of Russian fertilizers is the cornerstone on which the green brand will be built, making it possible to control the safety of green products all the way through the value chain, from the feedstock used by Russian manufacturers to produce mineral fertilizers and animal feed additives to the sale of food products to end consumers.

2 AGRICULTURE DIGITALISATION

PhosAgro and one of Russia's leading developers of agricultural solutions, entered into a cooperation agreement to design and implement digital solutions for farmers. The agreement seeks to create and deploy an integrated digital system, where a farmer has access to all tools for crop monitoring and management throughout the season, from crop planning to analysing agronomic efficiency of technologies based on the season's results.

3 BEST AVAILABLE TECHNIQUES (BAT)

In 2019, the Federal Agency on Technical Regulating and Metrology (Rosstandart) approved a reference document for best available techniques «Production of Ammonia, Mineral Fertilizers and Inorganic Acids».



HTAS TECHNOLOGY

PhosAgro launched an HTAS-based ammonia facility with a capacity of up to 760 kt of NH₃ per year at its Apatit site (Cherepovets) in 2017. Ammonia production from natural gas derives from the catalytic steam reforming and steam/air reforming processes that include a syngas purification and treatment unit, with ammonia synthesised at a pressure of 128.7 ± 190 ATG in the synthesis loop.

HTAS technology performs better than the industry average by resource and energy consumption, as well as by pollutant emission per unit. The minimum resource and energy consumption for HTAS, in terms of 1 t of products are: natural gas – 955 nm³ (avg. – 1,050 nm³), electricity – 20 kWh (avg. – 59 kWh).

DCDA TECHNOLOGY

Volkhov, Balakovo and Cherepovets branches of Apatit operate low- and high-capacity Double Contact Double Absorption (DCDA) sulphuric acid systems to minimise harmful emissions into the atmosphere. Emissions from sulphuric acid production at PhosAgro's facilities are in line with the levels associated with best available techniques: SO₂ – 1.67 to 3.3 kg / t 100% H₂SO₄, sulphuric acid – 0.15 kg / t 100% H₂SO₄.

REACTION CRYSTALLISATION METHOD

Crystalline ammonium sulphate is produced by neutralising sulphuric acid with gaseous ammonia and crystallising ammonium sulphate from the resulting solution in a vacuum crystalliser. This technology boasts high capacity per unit based on a modern highly automated and manageable toolkit, as well as reduced

unit energy consumption and low unit emissions. The production process for crystalline ammonium sulphate at Apatit (Cherepovets) is unique to Russia. Ammonia emissions are in line with the BAT technological indicators and on a par with other ammonium sulphate technologies implemented in Russia.

ACID NEUTRALISATION WITH CALCIUM CARBONATE

Volkhov branch of Apatit employs a complex fertilizer production method which is unique to Russia. The process involves neutralising a mixture of phosphoric and sulphuric acids with calcium carbonate, mixing the neutralised pulp with a nitrogen-containing component (for NPKS fertilizers) and potassium chloride with subsequent granulation and drying in DDG, classification of dried granules, and conditioning and cleaning of waste gases. Harmful emissions meet the BAT technological requirements: ammonia (NH₃) – 2.6 kg/t, nitrogen dioxide (NO₂) – 0.6 kg/t.

STRIPPING IN CO₂ FLOW

Urea produced from liquid ammonia and gaseous carbon dioxide using CO₂ stripping technology from Stamicarbon (Netherlands). Unreacted NH₃ and CO₂ are extracted from the synthesis melt and condensed at high pressure, yielding low-pressure steam suitable for utilisation. Unreacted substances are removed at high pressure by blowing CO₂. The technology reduces water content in the reused components, which improves synthesis conditions and energy efficiency. The technology at Apatit is in line with the BAT indicators for pollutant emissions.