

Sulfuric Acid

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Fertilizer giant OCP integrates growth with environmental, social stewardship



How do you manage major expansion while supporting natural and human resources? For the Moroccan company OCP Group, the question has become a guiding principle in all its business activities. In the port city of Jorf Lasfar, the site of a large-scale expansion project involving the development of 10 integrated fertilizer units, OCP prioritizes a strategy that combines increased production with careful preservation and social development.

With almost a century of expertise, OCP Group is the world leader in the phosphates market and phosphate derivatives. According to the U.S. Geological Survey of January 2016, 73 percent of the world's reserves of phosphate are in Morocco. By 2025, the company plans to invest about \$21 billion USD in its phosphate operations, with a large portion allotted to the Jorf Lasfar plants. Each of the 10 units will be capable of producing 1 million tons of fertilizer per year.

About OCP

Headquartered in Casablanca, the state-owned OCP was founded in 1920 and began underground phosphate extraction at its Khourigba mine the next year. OCP operates three phosphate mining sites, two in northern Morocco at Khourigba and Gantour, and the third in the more southerly Boucrâa. Boucrâa is managed jointly with OCP's subsidiary company, Phosphates de Boucrâa (Phosphates de Boucrâa). Some 120 km southwest of Casablanca, Khourigba is the largest OCP phosphate production zone. The mining site has four extraction areas and it currently covers seven phosphate levels.

In 1965 OCP grew beyond phosphate mining and moved into fertilizer production to respond to the international



The sulfuric acid unit of OCP's new Africa Fertilizer Complex in Jorf Lasfar includes this MECS® HRS™ tower.

market and develop the local phosphate industry. In 1984, OCP Group launched the Jorf Lasfar Industrial platform, located 80 km from Casablanca and 17 km southeast of El Jadida. At the Jorf Lasfar Phosphate Hub, a portion of production is converted locally into various fertilizers as well as purified phosphoric acid. The other portion is exported as merchant grade phosphoric acid through local port facilities.

OCP is active across the entire phosphate value chain; it mines, transforms and markets phosphates in all forms. With 160 clients across the 5 continents, OCP's commercial phosphate production in 2015 reached 26.3 million tons. Today, OCP is the number one producer and exporter of phosphate in all its forms in the world and is one of the largest companies in Morocco.

OCP produces solid and liquid fer-

tilizers, animal feeds, and basic components necessary to make other derivatives, all from Moroccan phosphate. These products include various qualities of phosphate rock, merchant and purified phosphoric acid, di-ammonium phosphate (DAP), mono-ammonium phosphate (MAP), triple super phosphate (TSP), as well as NPK, a ternary fertilizer comprised of three elements: phosphorus, nitrogen, and potassium.

As the largest employer and a major investor in the country, OCP Group is committed to the economic development of the nation. Recognizing that sustainable development offers new opportunities to the phosphate industry, OCP chose to integrate social, environmental, and economic issues within every level of its activity.

For OCP, environmental protection and sustainable development represent

What OCP Produces:

PHOSPHATE ROCK—intended mostly for fertilizer production.

PHOSPHORIC ACID—intermediate product between phosphate rock and fertilizer.

PURIFIED PHOSPHORIC ACID—used in food and industrial applications.

DAP—most common binary fertilizer.

MAP—binary fertilizer comprised of two elements, phosphorus and nitrogen.

TSP—all phosphate fertilizer.

NPK—ternary fertilizer comprised of phosphorus, nitrogen, and potassium.

a source of value creation. The group works to reduce water and energy use, as well as recycle and eliminate waste in an environmentally responsible way. Indeed, every ambitious program initiated by OCP combines industrial performance and environmental preservation.

OCP honors its commitments with training and development support programs that teach each woman and each man, in an inseparable unified way, a business expertise as well as a model of human behavior that can be adapted to changes while staying consistent with the Group's vision.

The company also makes substantial investments in social infrastructure to benefit communities and regions where its manufacturing activities are located. It supports health and education, particularly through building or renovating healthcare centers and schools, as well

as youth centers where young people can develop marketable skills.

The Jorf Lasfar plants

Jorf Lasfar, located on the Moroccan coast, is the processing hub for materials excavated from the Khouribga mine. The group began overhauling its existing industrial operations at Jorf Lasfar in 2008 with several multiphase projects. The first phase of development includes four new fertilizer plants, each with its own sulfuric acid unit. Upon completion of the last phase, the Jorf Lasfar Fertilizer Hub will contain 10 fertilizer units all together, each capable of producing 1 million metric tons of fertilizer, 1.4 million metric tons of sulfuric acid, and 450,000 metric tons of phosphoric acid annually. The site also offers numerous facilities for the storage of raw material, as well as conditioning and handling of final products between the processing plants and the port.

The massive undertaking was inspired by expected increases in phosphate demand, driven by rising world population, changing diets, and the need to improve agriculture yields in Africa and other developing areas. Some 80 percent of Africa is currently uncultivated yet arable land. The company is responding to those statistics with the expanded Jorf Lasfar hub as well as several other development projects aimed at doubling mining production and tripling phosphate processing capacity by 2025.

Given the large scale of these projects, in 2010 OCP entered into a joint venture with U.S.-based Jacobs Engineering Inc., a leading global provider of design and management of large technical projects. In equal partnership between OCP and Jacobs, Jacobs Engineering SA (JESA) was formed. JESA, with both its management and technical expertise, is leading the construction of the new fertilizer plants as well as other OCP projects.

Minimizing environmental impact

Each fertilizer unit's sulfuric acid plant has been designed to minimize emissions. To keep its goal of lowest possible emissions, OCP engaged MECS DuPont to supply the necessary technologies, including its Heat Recover System (HRS™) for sulfuric acid production. The MECS® HRS™ system is designed not only to meet operational requirements, but also environmental (carbon credit) and economic targets, while offering a rapid return on investment. The SO₂ releases are at the level of 134 ppm instead of 450 ppm required by international standards. And nearly all SO₂ (99.9 percent) is captured and used for the pro-



Newly installed cold gas-to-gas exchanger/converter/economizer at OCP's Africa Fertilizer Complex in Jorf Lasfar, Morocco.

duction of sulfuric acid.

OCP's new fertilizer plants have significant steam requirements, especially for concentrating phosphoric acid (passing from 29 to 54 percent). The purpose of the MECS® HRS™ technology is to increase the amount of steam recovered and sent to other end users (mainly phosphoric acid plants), allowing the facility to reduce the quantity of steam pulled from the turbo generator and to drastically improve the energy production at the turbo generators.

In addition to the HRS™-related equipment (towers, heat exchangers, boilers, and dilutors), MECS is also supplying drying towers, final absorption towers, acid distributors, mist eliminators, acid piping, and catalyst, along with technical and operational assistance during construction and commissioning.

The MECS-designed sulfuric acid units will have a capacity of 4,200 MTPD, include a sulfur polishing filter, which will replace the hot gas filter to

optimize cost and space, and blowers to optimize energy costs and reduce maintenance and operations costs. Additional technologies will be leveraged to reduce pollution, including cesium catalyst in the fourth bed and an updated converter design.

Another great undertaking has been the 235 km slurry pipeline, a key piece of OCP's strategy to increase volume and cost competitiveness while substantially reducing the company's environmental footprint. The pipeline, which transports phosphate from the Khouribga mines to the Jorf Lasfar site, reduces handling by trucks and conveyer belts and eliminates drying activities and the need for rail transport, which represents a decrease of about \$6-7 USD per ton in transportation fees. Each year, the slurry pipeline is expected to reduce CO₂ emissions by at least 930,000 tons and save approximately 3 million cubic meters of water.

Other aspects of environmental conservation at Jorf Lasfar have been energy



New final absorbing tower at the acid unit of OCP's new fertilizer complex in Jorf Lasfar.

savings from a newly installed 62 MW thermoelectric plant and water use optimization from the seawater desalination unit. With the commissioning of the first phase, the plant is producing 25 million cubic meters of water.

Supporting African agriculture

In February 2016, the first of the new Jorf Lasfar plants came online. Called the Africa Fertilizer Complex, the unit is dedicated solely to African markets and represents OCP's commitment to supply the continent's farmers with enough fertilizers to increase their yields and conserve their soils.

OCP's new subsidiary, OCP AFRICA, also inaugurated in February, similarly serves these goals. The subsidiary is implementing, both internally and with its local partners, storage and blending facilities in ports and close to



Heat recovery equipment installed at new OCP fertilizer complex includes MECS®-supplied converter-superheater-economizer.



OCP main sites in Morocco

