Water within the Circular Economy:

OCP as a leading example for Water Optimisation and Reuse

CEO Water Mandate Multi-stakeholder Working Conference
28 August 2016
• Morocco’s Water Strategy

• OCP – a world leader in phosphate production

• A sustainable strategy for OCP’s water

• Integrating water reuse into OCP’s industrial process
Morocco’s Water National Strategy

Water National Plan

- **Water demand management and water valorization**
- **Water offer development and management**
- **Protection of water resources, natural environment and climate change adaptation**

Around three pillars:

- Modern regulatory framework through the law 10-95
- Protection against floods
- Valorizing existing hydro-infrastructure to produce energy
- Development of irrigation
- National competences development

Overall water reserves of 22 Billion m³/year:

- 18 bn m³/yr of surface water
- 4 bn m³/yr of groundwater
A water national strategy to ensure sustainability

Morocco’s water potential estimated at 22 billion m$^3$ per year. With a steady increase in the water demand in the coming 15 to 20 years due to the demographic evolution and the development of the Moroccan economy.

A water strategy put in place for the mobilization of water resources for households, irrigation,… through water related infrastructures, improving the protection against floods and producing hydro-electricity.

A water reuse plan

To meet these challenges, a program to mobilize non conventional water resources was put into place, through the reuse of used water with an objective of **325 Million m$^3$ mobilized by 2030.** Hence, this program will significantly contribute to decrease the expected deficits on certain basins. With 18 projects already in place, there are **38 million m$^3$ per year of water reuse.**
Water allocation: the industry absorbs 1% of the water

Inter-sectorial water allocation of the 13.3 Billion m³ mobilized national water resources in 2013

The potential of natural water resources in Morocco is estimated on average to 22 billion m³/year, which is the equivalence of 700 m³ per inhabitant per year, less than 1000 m³/hab/year, which is the threshold under which there will be a water scarcity and the launch of a water crisis.

Source: The Moroccan Ministry in charge of Water
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OCP is among the largest fertilizer companies in the world and the largest P₂O₅ pure player.

OCP AT A GLANCE: 2015 KEY FIGURES

- 71% of proven reserves worldwide*
- 20.7% contribution to national exports
- $23 bn Investment (2008-2025)
- 27% worldwide market share of phosphate in all forms in 2014
- 5% contribution to domestic GDP
- 1st worldwide exporter of phosphate in all forms
- 2nd world producer of phosphate fertilizers
- $821m of net profit
- $4.9 bn of revenue

* Source: US Geological Survey
With a unique strategic presence throughout the entire phosphate value chain

<table>
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<tr>
<th>Segment</th>
<th>Mining</th>
<th>Chemicals</th>
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<td>Value Chain Integration</td>
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| 2014 Global Trade Volumes Market Share | 29% | 55% | 16% |

*According to USGS*
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Water, A key resource of the phosphate industry

Phosphate reserves

Main uses

Mining
- Watering of vehicle tracks to reduce dust emission
- Phosphate washing/floation and adaptation of the pulp for transport

Processing
- Sulphuric acid production and steam production
- Phosphoric acid production
- Fertilizer production

Manufacturing of phosphoric acid
Manufacturing of fertilizers
A growing water demand to carry OCP business development

The growing agriculture demand around the world is driving fertilizers production. For OCP’s industrial processing, it’s translated into a growing water demand, which is forecasted to grow to 160 million m$^3$ of water per year.
OCP launched an integrated and sustainable water strategy

OCP put in place a water strategy around three main axes that combines industrial growth as well as natural resources optimization.

THE 3 LEVERS OF OCP'S WATER STRATEGY

1. **Optimal Use of Water Resources throughout the Entire Value Chain (Mining, Transportation, Processing)**

2. **Optimal Management of Freshwater Resources Use**

3. **Mobilizing Non-Conventional Water Resources (Treated Wastewater, Desalinated Seawater)**
Optimization of water usage over the entire value chain

In the mining facilities

Recovery of 80% of the water contained in the washing sludge thanks to the improvements of beneficiation process and sludge spreading system.

In the processing platform

Reduction of nearly 30% of specific water consumption of phosphoric acid production units through the adoption of the latest techniques for recycling process water.

In transportation

Slurry Pipeline technology is revolutionizing the transport of phosphates through the integration of the upstream and downstream parts of the value chain. This process saves nearly 3 Mm3 of water annually as a result of the preservation of the natural moisture of the rock.
To preserve national strategic groundwater resources, groundwater consumption for industrial use is substituted by surface water.

→ In order to satisfy the water needs of mining facilities in Khouribga and Gantour, OCP launched the construction of two surface water supply systems from the Ait Messaoud and the Al Massira dams.
Mobilization of non conventional water resources

OCP launched several initiatives to diversify water sources and to integrate new alternatives mainly wastewater treatment and reuse and desalination.

Sea water desalination

- The new reverse osmosis desalination plant built in Jorf Lasfar has, in its first phase, an annual production capacity of 25 Mm³ (an investment of US$ 82 million)
- This freshwater technique has been used by OCP since 2005 in its Laâyoune station.

Wastewater reuse

- Purification and reclamation of urban wastewater for phosphate washing and irrigation of green spaces...

A positive impact as a result of energy optimization

The desalination plant gets all its energy needs from the energy surplus of OCP’s industrial production units.

The biogas enables an electricity production which satisfies up to 30% of the plant’s energy needs.
OCP keeps its national conventional water resources usage at a constant level by bringing in more than $50 million * in new water sources.

*CAPEX & OPEX over 20 years
More than 60% of the industrial water needs will be met by non-conventional resources (treated wastewater and desalinated water)

2010
- PHOSPHATE PRODUCTION: 27 MT
- WATER CONSUMPTION ≈ 63 Mm³
- SURFACE WATER: 78%
- GROUNDWATER: 19%
- TREATED WASTEWATER: 3%

2025
- PHOSPHATE PRODUCTION: 55 MT
- WATER CONSUMPTION ≈ 168 Mm³
- SURFACE WATER: 54%
- DESALINATED WATER: 38%
- TREATED WASTEWATER: 8%
The success of the water strategy lies on the implication of all stakeholders through different partnerships:

- **Local authorities, municipalities, etc.**
  - Land acquisition;
  - Administrative assistance.

- **Regional hydraulic authorities**
  - Technical and administrative assistance...

- **National and international contractors**
  - Engineering;
  - Turnkey projects.

- **National freshwater agency**
  - Implement projects in partnership;
  - Technical assistance.

- **Financial backers: AFD/KFW**
  - Partial financing of the water program: 237 M$ & 271 M$.
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A successful integration of wastewater reuse throughout OCP’s industrial process

- Three wastewater treatment plants (WWTP) with a total capacity of 10 m$^3$/yr have been built in three mining cities in order to use the treated urban wastewater to wash phosphate and water green spaces in the Mohammed VI green city in Benguerir. These plants are equipped with advanced technologies to obtain very good water quality.

- In partnership with the national freshwater agency, the regional hydraulic authorities and the municipalities.

- Other WWTP projects in different Moroccan cities are under study (Kasba Tadla (≈1,3 Mm$^3$/yr), Eljadida (≈ 7), Safi (≈ 7))
Thanks to its partnership based approach, OCP is able to ensure the most optimal conservation of natural water resources, and confirm its position in a circular economy.

This reflects our strong and long-term commitment to future generations.

www.ocpgroup.ma