



Alcoa Inc.



Alcoa's Natural Engineered Wastewater Treatment System Eliminates Wastewater Discharge

CASE STUDY

Summary

The Alcoa-designed Natural Engineered Wastewater Treatment (NEWT) system at the Maâden Alcoa joint venture project in Saudi Arabia will enable reduction of freshwater demand by nearly 25%, achieve zero wastewater discharge, and save more than US\$7 million in annual water purchases. The project's early plans included a traditional and expensive onsite management system to handle the 5,000 cubic meters (1.3 million gallons) of wastewater that the three facilities will generate each day once all are operational in 2014. Alcoa's success with a full-scale engineered wetland at the Alcoa Technical Center near Pittsburgh, Pennsylvania, USA, offered an alternative that would provide sustainable access to water, meet or exceed regulatory requirements as a zero-discharge facility, and ultimately result in a significant cost reduction.

Objective of Intervention

The engineered wetlands technology, which was first deployed at the Alcoa Technical Centre—the largest metals research Centre in the world—is enabling sustainable treatment of sanitary and industrial wastewater in various locations around the world. The system installed at the Mâaden Alcoa joint venture is the first of its kind in Saudi Arabia and serves as the project's alumina refinery, aluminium smelter, and rolling mill in Ras Al Khair. Water is critically limited in this desert region, and it will become increasingly expensive to obtain.

Type of Intervention and Location

Innovative technology



Description of Intervention

The 9-hectare (22-acre) NEWT system has a design capacity of 7,500 cubic meters per day (2 million gallons per day) and comprises the following three steps (see illustration): 1. Removal of solids and anaerobic treatment to separate and break down the organic material in the water; 2. An engineered wetland that uses vegetation for low-level treatment of the organic material and further removal of nutrients, such as nitrogen; and 3. Polishing and disinfection. The 5,000 cubic meters of water treated by the system each day will be reused in the manufacturing process and for irrigation at the site, reducing freshwater needs by almost 25% and saving US\$7 million annually in water purchases.

Intangible or Tangible Benefit

Compared with the traditional wastewater treatment system originally envisioned for the site, the NEWT system represented a significant capital and operating cost reduction compared to a traditional tank-based system; Reduced the start-up schedule to meet the smelters 2012 first hot metal goal; Eliminated an estimated 1,000 metric tons of steel for piping and tanks; Eliminated the use of disinfectant chemicals; Reduces energy consumption through a passive process; Significantly reduces sludge generation and disposal; **Reduces** ongoing operating costs by an estimated US\$1 million per year; and Will achieve zero wastewater discharge once the refinery comes online in the third quarter of 2014.

About Alcoa Inc.

Alcoa is a global leader in lightweight metals technology, engineering, and manufacturing. Our technologies enhance transportation, from automotive and commercial transport to air and space travel, and improve industrial and consumer electronics products. We enable smart buildings; sustainable food and beverage packaging; high performance defence vehicles across air, land, and sea; deeper oil and gas drilling; and more efficient power generation. We pioneered the aluminium industry over 125 years ago, and today, our 59,000 people in 30 countries deliver value-added products made of titanium, nickel, and aluminium and produce best-in-class bauxite, alumina, and primary aluminium products. We are active in all major aspects of the aluminium industry: technology, mining, refining, smelting, fabricating, and recycling. We were again included in the Dow Jones Sustainability Index for the 13th consecutive year in 2014.