

Water-free milk powder factory

Lagos de Moreno, Mexico

water scarcity impact



Reduced withdrawal	●
Reduced consumption	●
Improved water quality	
Increased productivity	
Net basin benefit	●

volumetric impact

730 000 m³/yr

capital cost

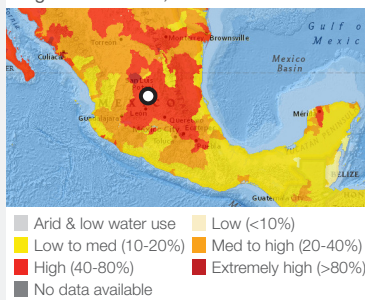
\$9 100 000

estimated unit cost of water

> 500 ¢/m³

Water Stress

Lagos De Moreno, Mexico



Water Stress Map:
F. Gassert, P. Reig, T. Shiao, M. Luck and M. Landis, 2015. "Aqueduct Global Maps 2.1."

Confidence level
● Low ● Medium ● High

Water Scarcity Impact Key
● Main ● Minor

Credits
We wish to acknowledge the input of Peter Stokes of Veolia, GEA and Jim Knill of Nestlé in the preparation of this case study.

Project Overview

The Lagos de Moreno plant, located in the water scarce area of central Mexico's Jalisco State, is the first of Nestlé's milk powder factories that has been running entirely on water extracted from milk (so called "Proyecto Cero Agua"; Zero Water Project).

Fresh cow milk contains around 88% water, some of which can be captured and reused back in the process without any negative impact on the product. The project achieved a reduction in water abstraction from the initial 2 000 m³ per day to 0 m³ per day by treating the condensate to a potable level and re-using it in the manufacturing process. Residual wastewater is treated and utilised for cooling and cleaning.

The project was driven by the need to protect the future license to operate and by anticipating the future increases in water costs. The project was justified on the long-term rather than short term business case and contributes to meeting Nestlé's commitment for reducing its overall direct water withdrawals by 40% by 2015.

Key Elements

- Capturing and reusing embedded water in milk and using it for all factory water needs (such as cleaning evaporating machines, cooling towers, rinsing and irrigation).
- Installation of Reverse Osmosis (RO), Membrane Bioreactor (MBR), Carbon Filtration and UV plants.
- The interventions were fully funded by Nestlé and took four years to complete.
- The project was commissioned in October 2014 and had a capital cost of \$9 100 000.

Key Outcomes

- The first Nestlé milk powder factory to be independent of external water sources in the world.
- Water withdrawals were reduced by 730 000 m³ per year. This is equivalent to an Olympic size swimming pool per day.
- 50% reduction of the factory water consumption from 6.39 m³ per tonne to 3.2 m³ per tonne between 2010 and 2015.



Lagos De Moreno, Mexico

Intervention Features

- Condensate recovery and reuse
- Industrial water metering
- Wastewater recycling in the food industry

Project Levers

Over a period of four years (2010 -2014), the following steps were implemented:

(1) Process Optimisation & Water Reduction Target Program

20% reduction in water withdrawals was achieved from the initial 2 000m³/d to 1 600m³/d through process optimisation and a water reduction target programme. This included implementation of the best practices gathered across Nestlé factories such as operators water awareness to implement recycling of vacuum pump water, equipment, Clean-In-Place optimisation times, and moving to dry cleaning in certain areas.

(2) Condensate Recovery and Reuse

Water withdrawals were reduced further from 1 600m³/d to 560m³/d by treating condensate to a potable level and reusing it back in the manufacturing process. The plant processes 1 400m³ of milk per day. Water captured during the evaporation and drying processes is reused following its treatment by Reverse Osmosis (RO), Carbon Filtration, UV and Chlorination. Some proportion of the water is lost due to evaporation (175m³/d).

(3) Wastewater Recovery and Reuse

The final step which reduced the factory's water withdrawal to zero involved capturing and reusing residual wastewater in cooling towers and other services within the factory. Approximately 500m³/d is sent to a wastewater treatment plant that consists of Reverse Osmosis and a Membrane Bio Reactor. The factory disposes 50m³/d of treated effluent into the river.

Outcomes and Challenges

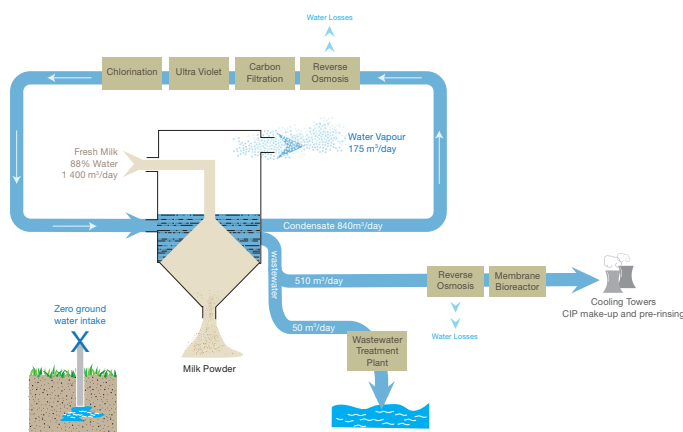
It is recognised that Nestlé's major water risk is with its supply chain which is dependent on water. However, this project is the first of Nestlé's milk powder factories that succeeded in being completely free of external water resources. Nestlé is planning to implement similar interventions across twelve other milk powder manufacturing facilities in South Africa, Pakistan, India, Brazil, China and USA. Five projects are expected to be completed by 2016.

The project was fully funded by Nestlé. The business case was based on addressing water as a long-term business risk and creating a shared value in the local community, as it can not be justified on a traditional short-term Return On Investment basis.

At the time of the plant's commissioning in 2014, the operating cost of producing recycled water was higher (\$2.44 per m³) than the cost of purchasing water from the local municipality (\$1.7 per m³). However, the reduced water use has overall lowered the water related bills. The plant is also protected against any water tariff increases or reductions in water allocation due to water scarcity.

The public reaction on the project has been very positive. Whereas in the past, Nestlé was struggling to engage productively with regulators, since the opening, the project has won the respect of local stakeholders and acts as a successful example of integrating industry needs with environmental limitations in the region.

Nestlé has a strong commitment to water and environmental stewardship in Mexico, and this project is part of a broader corporate strategy to commit to this goals in Mexico and globally.



Above: Process flow diagram of Nestlé plant (© Arup)