



Ultrapure Water Production for a Sugar Mill in Guatemala

QUA's FEDI® Technology
Performance and Reliability for
Critical Processes



QUA®
An Aquatech Company

Client: Sugar mill in Guatemala

Plant Capacity: 681,000 tons of sugar, 51,700 m³ of alcohol, 1,263 GWh of energy

Background and Challenges

Founded in 1983, this Guatemalan sugar mill is one of the most important in the region, with an annual capacity of 681,000 tons of sugar, 51,700 m³ of alcohol, and 1,263 GWh of energy. Since 1990, the plant has had a cogeneration unit that uses sugarcane and high-pressure boilers to produce steam and extract juice, along with an R&D laboratory where it develops more efficient seed varieties. Through artificial intelligence and satellite monitoring, it optimizes harvest predictions and maximizes productivity.

Its production not only supplies the local market but is also exported to the Americas, Europe, Asia, and Africa. This level of operation requires large volumes of high-purity water to feed mills, boilers, and heaters, ensuring the highest quality steam for juice extraction.

In the first stage of the project, the plant needed to produce 100 gpm of water with a resistivity of 10–16 M Ω -cm and silica content <10 ppb. However, the existing EDI technology could not meet these parameters due to the high silica content, which reduced flow rates and caused production delays.

The Solution: QUA's FEDI®

To overcome this challenge, the plant implemented QUA's Fractional Electrodeionization (FEDI®) technology, an evolution of conventional EDI that optimizes energy consumption and increases tolerance to feedwater hardness.

The FEDI® model is a state-of-the-art system designed to produce ultrapure water. It operates with a single voltage for easy handling and is CE-certified in compliance with EU Low Voltage Directive 2014/35/EU.

The system supplied for the sugar mill included:

- Green sand filter
- Multimedia filter and granular activated carbon (GAC) filter
- Double-pass reverse osmosis
- FEDI-SV-45X module

This compact, high-performance configuration allowed the plant to make the most of available space, reduce chemical handling, and guarantee water quality of up to 18 M Ω -cm, the maximum capacity of the FEDI® technology.

Scheme Offered



- **Consistent ultrapure water quality:** up to 16 M Ω -cm resistivity in operation, meeting project requirements, with silica <10 ppb.
- **Greater tolerance to feedwater hardness,** reducing scaling risk.
- **Stable, continuous 24/7 operation,** preventing unplanned shutdowns.
- **Reduced chemical use and handling,** improving safety and environmental impact.
- **Compact design,** ideal for limited spaces.
- **Optimized energy consumption** with dual voltage operation.
- **Less auxiliary infrastructure:** only three connections and reduced piping and instrumentation requirements.

Results

With the installation of the FEDI® system, the sugar mill consistently achieved the design parameters, continuously producing 100 gpm of ultrapure water with a resistivity of 10–16 M Ω -cm and silica content below 10 ppb.

The plant eliminated the operational limitations that had caused flow drops and production delays, ensuring a reliable water supply for steam generation. Additionally, it reduced chemical consumption and installation footprint, reinforcing the company's sustainability goals and improving overall operational efficiency.