CASE STUDY

HORTICULTURE IRRIGATION SUPPLY

INDUSTRY
HORTICULTURE
APPLICATION
IRRIGATION
WATER SOURCE
WELL WATER
YEAR INSTALLED
2016

INTRODUCTION

Agriculture is an important market for Mexico, with the industry employing 16% of the national workforce. Unfortunately, it also presents a huge, unsustainable demand on water sources. In Mexico, agriculture is responsible for 77% of the total water withdrawn.[1] 38% of countrywide withdrawl is from groundwater aquifers, many of which are over-exploited and located where annual rainfall is insufficient to replace extraction.[2] Water scarcity is causing increased salinity variability as well as increasing water prices[3], both of which are unfavorable for crop growers. What's worse is that for many crops, high salinity in irrigation water can cause significant reductions in yield.

[1] Mexico UN – water brief; http://www.unwater.org/fileadmin/user_upload/unwater_new/docs/Publications/MEX_pagebypage.pdf
[2] Richard Rhode, Tony Burton, Geo-Mexico excerpt, http://www.mexconnect.com/articles/3576-water-consumption-in-mexico
[3] Mexico Water Report; http://www.lgaconsulting.com/water/IE-MexicoWaterReport-2011Winter-WaterReuseInMexico.html

THE CHALLENGE

A leading Mexican tomato grower was purchasing tomato seedlings from a third party and growing their own greenhouse crops. They needed an optimal, improved feed water quality to grow their own seedlings, rather than purchasing them locally. Tomato seedlings are known to have high sensitivities to salinity, therefore the grower needed a solution to treat their irrigation water to allow for in-house growing.

VOLTEA'S CAPDI SOLUTION

Voltea provided an IS-12 CapDI System as it requires minimal pre-treatment and can cope with silica levels up to 150 ppm. Additionally, the fully automated cleaning and remote monitoring capabilities minimize user intervention and maintenance, allowing the customer to focus on their core business.

CapDI ***tunably*** removed sodium and bicarbonates without having to remove all of the more beneficial minerals in the grower's irrigation water. By implementing a tunable TDS removal solution, they saved on OpEx by reducing the use of fertilizers and allowing water reuse on-site. This Voltea customer now successfully grows their own seedlings in-house without having to purchase from a third party, thus increasing profitability

PROVEN RESULTS

Of high importance to the grower was the ability to target a series of different sodium levels as required by different crops. CapDI's tunable salt removal capability perfectly achieves this by automatically accounting for any variations in feed water quality and flow rate to give a consistent output quality. Table 1 on the following page shows a series of targeted water conductivities and their corresponding sodium and bicarbonate concentrations.

ABOUT VOLTEA

Voltea's award-winning tunable desalination technology, CapDI© (Membrane Capacitive Deionization), desalinates brackish water at a lower economic and environmental cost than any other available technology. CapDI is a simple and innovative way to remove dissolved salts from water.

Voltea's CapDI technology is scalable and helps consumers and industry reduce water usage and save money.

Voltea's IS-12 CapDI System consistently produced the quality and quantity of water required to meet our customer's demands.

85% water recovery was maintained by Voltea's fully automated Cleaning-In-Place (CIP) features that automatically clean if the CapDI System measures a rise in differential pressure. This water was treated to a suitable reuse quality, therefore reducing the overall amount of fresh deep well water consumed. The high water recovery also allows a smaller volume of waste that would require treatment before discharge, resulting in a reduced impact to the aquifer.

Voltea's CapDI System is continuing to help this facility with the production of crops at a reduced environmental impact, which in the long term will assist in greater productivity and reduced operating expense.

OPERATIONAL DATA

Table 1

Constituents	Unit	Feed Water	Sample 1	Sample 2	Sample 3
Target Conductivity	µS/cm	1,300	300	400	800
pH		7.2	6	6.3	6.6
Chloride (Cl^-)	ppm	104	18	32	78
Sulfates (SO_4^{2-})	ppm	211	10	38	77
Bicarbonate (HCO_3^-)	ppm	353	61	85	146
Potassium (K^+)	ppm	37	< 8	8	12
Sodium (Na^+)	ppm	89	21	32	51
Calcium (Ca^{2+})	ppm	124	16	24	64
Magnesium (Mg^{2+})	ppm	190	5	10	22
Silica (SiO_2)	ppm	72	72	72	72

From the short term testing performance in Table 1, the customer was able to select a long term operational setting with which to operate the CapDI System based on the crop to be irrigated and its sodium requirements.

Table 2

Summary Period	Period 1	Period 2	Period 3	Period 4
Target Conductivity (µS/cm)	**500**	**300**	**700**	**700**
Average Output Conductivity (µS/cm)	**489**	**302**	**670**	**679**
Average Feed Conductivity (µS/cm)	1,324	1,433	1,433	1,380
Volume Produced (m^3)	1,173	448	984	864

Table 2 shows actual CapDI System data over a five month period at the customer's site. The tunability benefit can be observed while the targeted water quality was met as changes in irrigation water use demanded different sodium levels corresponding to the overall water conductivity. The removal of only the excess sodium allows the crops to benefit from the nutrients and salts remaining in the water.

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