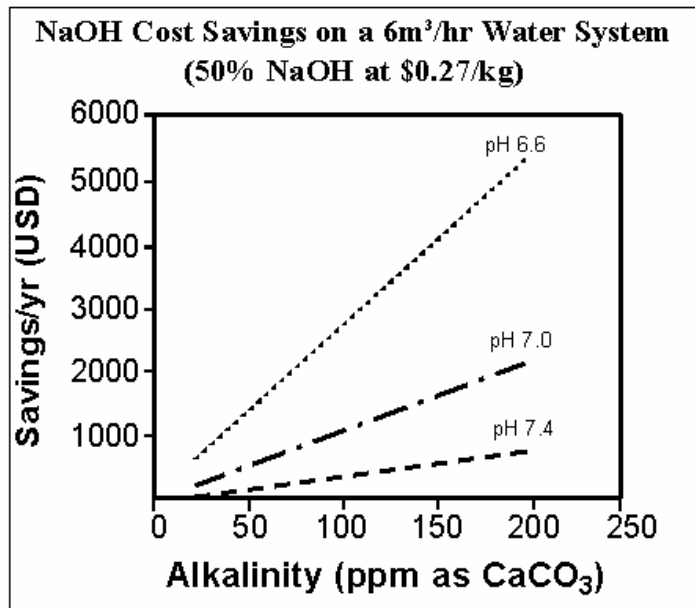


## Carbon Dioxide and Water

In a typical small flow water system, that contains an RO membrane and Ion Exchange Resin, Liqui-Cel® Membrane Contactors may be able to save the customer thousands of dollars a year in chemical regeneration costs.

Carbon Dioxide can be removed from the water using Liqui-Cel Membrane Contactors. When the CO<sub>2</sub> is removed, the load on the anion exchange equipment is reduced. This will reduce the frequency of anion exchange regeneration.

By reducing the frequency of regeneration, a reduction in NaOH costs can be realized. This is shown in the attached graph for a 6 m<sup>3</sup>/hr system. This graph shows the savings realized through NaOH costs as a function of alkalinity.



This data is based on a NaOH cost of \$0.27 USD/ kg (50%). It is shown for three pH levels using a single 4-inch Liqui-Cel Membrane Contactor. The largest savings are realized when the pH is below 7. This is because more CO<sub>2</sub> is available for removal. At higher pH more of the CO<sub>2</sub> is in an ionic form that is not easily removed using this technology. Air is blown through the inside of the hollow fiber membrane. The air source can be from a compressor, blower or drawn through the fibers from a vacuum source.

As an example, air can be blown through the contactor using a small blower. The electrical consumption of this size blower is about 0.5 kW. This translates to a yearly electrical consumption of about \$300.00 USD per year.

During regeneration, the resin must be rinsed with water. The savings in raw water and wastewater will typically be between \$750.00 and \$1000.00 USD per year. This savings can easily offset the yearly electrical consumption of a small blower.

If the regeneration is done by an outside source, the savings will be even more dramatic. The outside source must also pay transportation costs, labor and overhead. If the NaOH savings alone are reviewed, a small Liqui-Cel system can be paid off in 2-3 years! If the additional cost of labor, chemical storage, waste water treatment and ion exchange resin replacement are included, the savings are even greater.

If the pH of the water is lowered to prevent scaling of the RO membrane, these cost savings are significantly increased. The increased savings are due to the shift in equilibrium from HCO<sub>3</sub> to CO<sub>2</sub> at lower pH conditions. Under lower pH conditions, more CO<sub>2</sub> is available for removal.

The membrane contactors are a very clean, safe way to remove carbon dioxide from water. They will not allow bacteria or other airborne contaminants to come in contact with the water during operation.

If the membranes are placed downstream of an RO membrane, little to no maintenance should be required during their operation.

There are currently thousands of membrane contactors that have been in operation for >5 years without service issues. The Liqui-Cel Membrane Contactors are compact and can easily be installed on existing water systems.

To find out more about this cost savings, please contact your Membrana representative or call 704-587-8888. Also visit our web site [liqui-cel.com](http://liqui-cel.com).

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