

Buying an Industrial Evaporator? Ask Vendors these Five Questions

Before investing in an industrial evaporator for your water treatment applications, lower your risks by asking any vendor the following five questions that cover key topics such as brine disposal, scale prevention, and cost of ownership.



Industrial Evaporator - Photo © Evelyn Simak (cc-by-sa/2.0)

1. Can you prove evaporator performance through a pilot at my site and provide a performance guarantee that covers changing in water chemistry?

Before investing in a full-scale plant, a small investment in a site pilot will pay off in a matter of months. For unique chemistries, pilots enable you to optimize costs, develop lessons learned, and ensure you have the correct treatment train. This

prevents costly changes after full scale installation start-ups. Ask a vendor how they pilot test, and if they can pilot at your site. Nothing beats operating on live water chemistry that changes along with your operations.

It is easy for vendors to make a process work behind closed doors or for a short period of time. Ask the vendor to show you how the process runs with variability in inlet conditions, prove that the machine is not scaling over time, and show you a mass balance of all inputs and outputs. Pilots are also an excellent means to test delivery, technical trust, and safety performance of your vendor.



SaltMaker Evaporator Crystallizer Pilot

Another tool to protect your investment is a well-written performance guarantee. It will provide a minimum capacity on which you can base your investment decision. Beware the commonly used simple form that has plagued many in the past, which references guarantees to a single chemistry data set. Your chemistry will change, and when it does, these guarantees can become invalid. Ensure your performance guarantee accepts wide swings in water chemistry.

At Saltworks, we operate a fleet of mobile and stationary pilots. We also write performance guarantees that remain valid over your broad range of operating conditions.

2. How can I lower the total cost of ownership of my evaporator plant?

Ensure that you have reviewed opportunities for system optimization that will reduce either your capital or operating expenses. By this, we mean pre-concentration with lower cost technologies before an evaporator, and consideration of incremental cost-value trade-offs of increasing brine concentration. Our experts can help you with this. For example, if your TDS is below 80,000 mg/L with a flow rate above 200 m³/day,



ask about pre-concentration technologies. Modern membrane concentrators, such as [Xtreme RO](#), can concentrate up to 130,000 mg/L, saving evaporator capacity and energy costs. However, if your flows are less than 200 m³/day, it may not make sense to have two process plants. Instead, it may be worth investing in a slightly larger evaporator.

In addition, understand any chemical pre-treatment clearly, and the costs per unit inlet. Some will throw a lot of chemicals at the inlet via extensive softening to make it easier on their evaporator. Since the chemical costs are included in your operating costs and not their sale price, they can make their evaporator appear lower cost, when in fact its total cost of ownership

could be much higher than originally anticipated. We like to break down costs per unit inlet (\$/m³) for four categories: capital, energy, chemicals, and labor.

At Saltworks, we will work with clients to understand their goals, and cost drivers. We will then run an analysis to project out a cost-optimized treatment train that can inform total cost of ownership.

3. How do you prevent corrosion and scaling?

Corrosion and scaling are endemic challenges that face evaporator operators. They start by suppressing capacity and increasing energy consumption, but can then lead to much downtime and maintenance. Designing for scale and corrosion is essential from day zero, so ask your vendor what they do to prevent these culprits.



Scaling in a pipe

Our answer to corrosion is to not build everything from titanium or exotic steels – there are alternatives. Saltworks' [SaltMaker](#) provides such alternatives through smart engineering with fiber-reinforced plastics. Our answer to scale is avoid extensive chemical softening of the feed that adds operating costs. The SaltMaker provides a non-chemical pre-treatment option through non-scaling design and built-in self-cleaning. We design for an evaporator plant to clean itself as it operates, rather than to suffer decaying performance and then complete an annual shutdown that requires significant manual labor for scale removal. Instead, we recommend you clean as you treat. Read [our article about how to minimize scale](#) to prepare yourself for this conversation.

4. What volume reduction can I expect and how do I manage the discharge or reject?

Dealing with discharged reject brine or solids is an important topic and you should [evaluate all your brine disposal options](#) before undertaking an industrial wastewater evaporator project. Explore the change in volume from your input and output streams, then make sure you build a plan to deal with the discharge that conforms with any environmental regulations. Also, evaluate the cost of any brine disposal options and compare them to the costs of further treatment with a crystallizer to produce solids.



Crystallizers offer the option of producing zero liquid discharge solids rather than concentrated wastewater, which may be better suited to your project needs. In other cases, it may be preferable to transport or handle a liquid slurry that can be pumped, rather than solids. Hybrid evaporator-crystallizer technologies offer the advantage of adaptability to produce brine or solids in a single plant, and can be upgraded to suit

future treatment needs. One example of this kind of technology is the SaltMaker Evaporator Crystallizer, which can reliably operate as an evaporator or crystallizer with built-in solids management.

Ask the vendor for their recommendations and insights for reject disposal. At Saltworks, we have helped clients source low cost disposal options and proven safe disposal during pilots. If you pilot, ensure you see your rejects disposed via the same mechanism intended for full-scale. Too often people wait until their full-scale plants are almost built before considering residual disposal. Start with the final disposal in mind, as it could govern your economics.

5. Can you provide clear maintenance, operation, and operating cost expectations, and can I visit a reference installation and speak to one of your existing customers?

Know what you are getting into before you invest in an industrial evaporator. Running evaporators requires energy, people, attention, and chemicals. It also requires more management than membrane system assets. Ask vendors to paint the complete installation and operating cost picture for you, and question it deeply. There is nothing better than visiting an existing installation and talking to operators to secure the full picture.

Coupling site visits with full cost of ownership review analyses, as well as a pilot, will set help set your project up for success.

Considering an Industrial Evaporator? We can help.

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