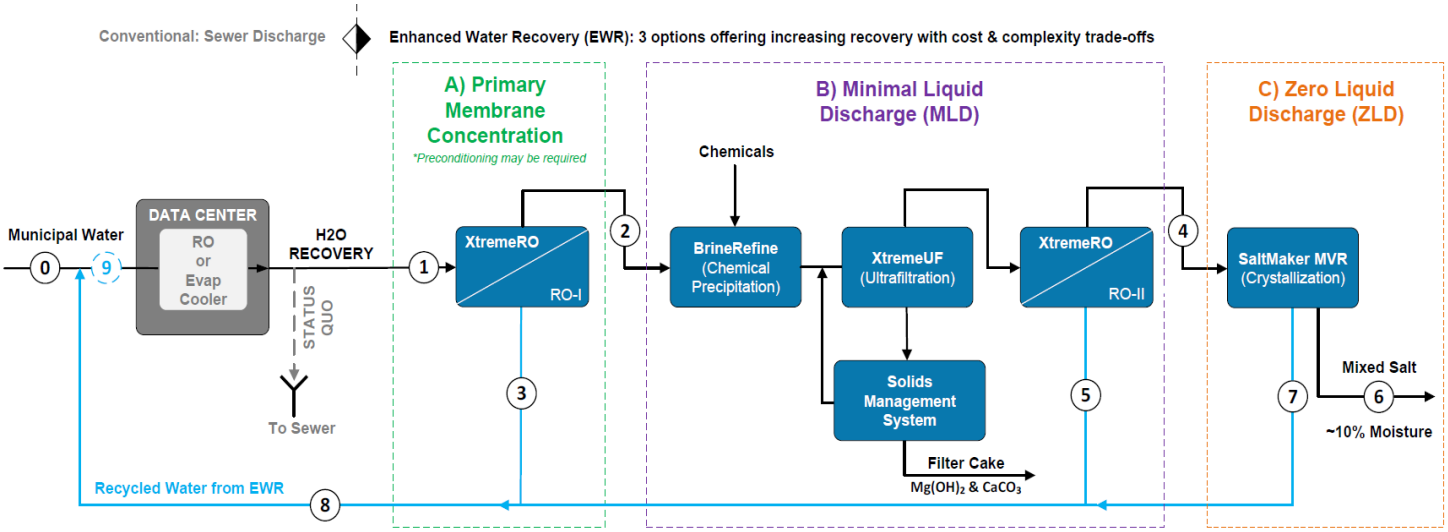
Data Center Water Recovery Solutions

Cost and Energy Efficient Minimal and Zero Liquid Discharge

- Optimize water and energy balance for cost effective and sustainable operations.
- Recover water from evaporative cooling blowdown and reverse osmosis brine.
- Evaluate incremental water recovery processes by assessing costs, energy consumption, and risks.
- Leverage energy load balancing to recover water during low-demand periods when energy availability is higher.



Indicative Analysis: see page 2 for details and contact us to secure one specific to your data center.

EWR: High Level Performance Summary					
Option	**Make-Up Water Reduction**	**Blended Energy (kWh/m3)**	**Blended Cost ($USD/m3)***	**Blended Cost ($USD/kgal)***	**Notes**
A) Primary Membrane Concentration	32.0%	4.0	$0.75 - $1.50	$2.84 - $5.68	Note A
B) Minimal Liquid Discharge	39.6%	4.8	$1.50 - $3.50	$5.68 - $13.25	Note B
C) Zero Liquid Discharge	40.1%	5.4	$2.75 - $5.00	$10.41 - $18.93	Note C

*Blended cost is indicative and includes CapEx (15 yr, 12%) and OpEx.

Saltworks specializes in the design and delivery of high recovery water systems. Our modular and intelligently automated systems are off-site constructed, pre-commissioned, and ready for rapid install and start-up.

Treating evaporative cooling blowdown or reverse osmosis (RO) brine necessitates advanced expertise to address the presence of organics and scaling ions. Our engineers will work with your team to assess processing options, completing mass balance and economic analysis of alternatives.

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Enhanced Water Recovery (EWR) Notes:

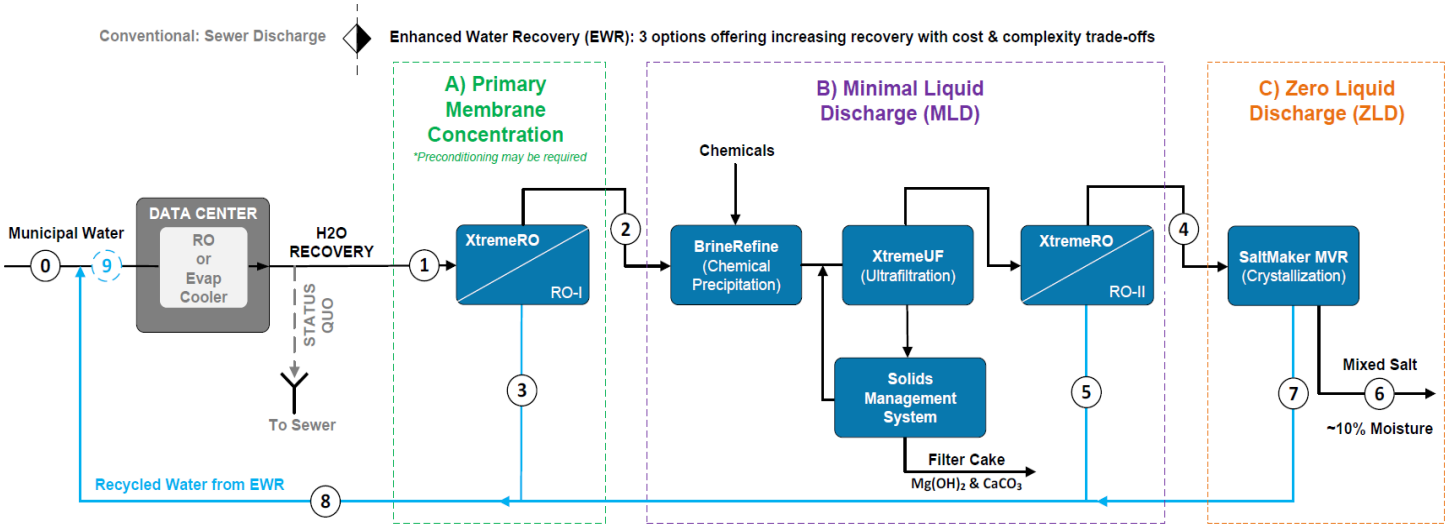
A) Robust preconditioning to protect RO-I may be required if evaporative cooling is upstream. Saltworks specializes in protecting and enabling RO systems in severe applications.

B) MLD is likely optimal for economics and ultra high water recovery; however, a high salinity, low volume brine will require discharge from site. Check sewer regulations and/or if trucking to a receiver if possible (i.e., blending at a WWTP or industrial site). Saltworks specializes in high recovery MLD membrane systems and can support brine discharge option assessments.

C) ZLD is the pinnacle of industrial desalination offering maximum water recovery and zero liquids discharged but carries the highest cost. Saltworks provides ZLD systems across industries. First we aim to help clients avoid ZLD through analysis, options, and strategies such as above.

Data Center Water Recovery Case Studies

The following high-level mass balance tables represent two capacity scenarios for data center water consumption and illustrate typical stream flows and recoveries for each successive stage in EWR. Statepoints are mapped to the illustrative block flow diagram below and form the basis of design for the EWR Performance Summary on pg.1.



Case 1: Medium Data Center Water Consumption		0 Municipal Water Intake Before EWR	1 DC Discharge	2 RO-I Brine	3 RO-I Permeate	4 RO-II Brine	5 RO-II Permeate	6 SaltMaker Salts	7 SaltMaker Distillate	8 Total Water Returned	9 Municipal Water Intake After EWR
Flow Rate	m3/day	5,000	2,000	400	1,600	25	380		24	1,997	3,003
	gpm	917	367	73	294	5	70		4	366	551
Total Dissolved Solids	mg/L	600	1,500	7,676	300	80,360	500		300	339	903
ZLD Solids (10% Moisture)	tonne/day							2.3			
Water Recovery	%				80.0%		98.7%		99.9%		
Make-Up Water Reduction	%				32.0%		39.6%		40.1%		

Case 2: Large Data Center Water Consumption		0 Municipal Water Intake Before EWR	1 DC Discharge	2 RO-I Brine	3 RO-I Permeate	4 RO-II Brine	5 RO-II Permeate	6 SaltMaker Salts	7 SaltMaker Distillate	8 Total Water Returned	9 Municipal Water Intake After EWR
Flow Rate	m3/day	12,500	5,000	1,000	4,000	63	949		61	4,993	7,507
	gpm	2,294	917	183	734	12	174		11	916	1,377
Total Dissolved Solids	mg/L	600	1,500	7,676	300	80,360	500		300	339	903
ZLD Solids (10% Moisture)	tonne/day							5.6			
Water Recovery	%				80.0%		98.7%		99.9%		
Make-Up Water Reduction	%				32.0%		39.6%		40.1%		

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