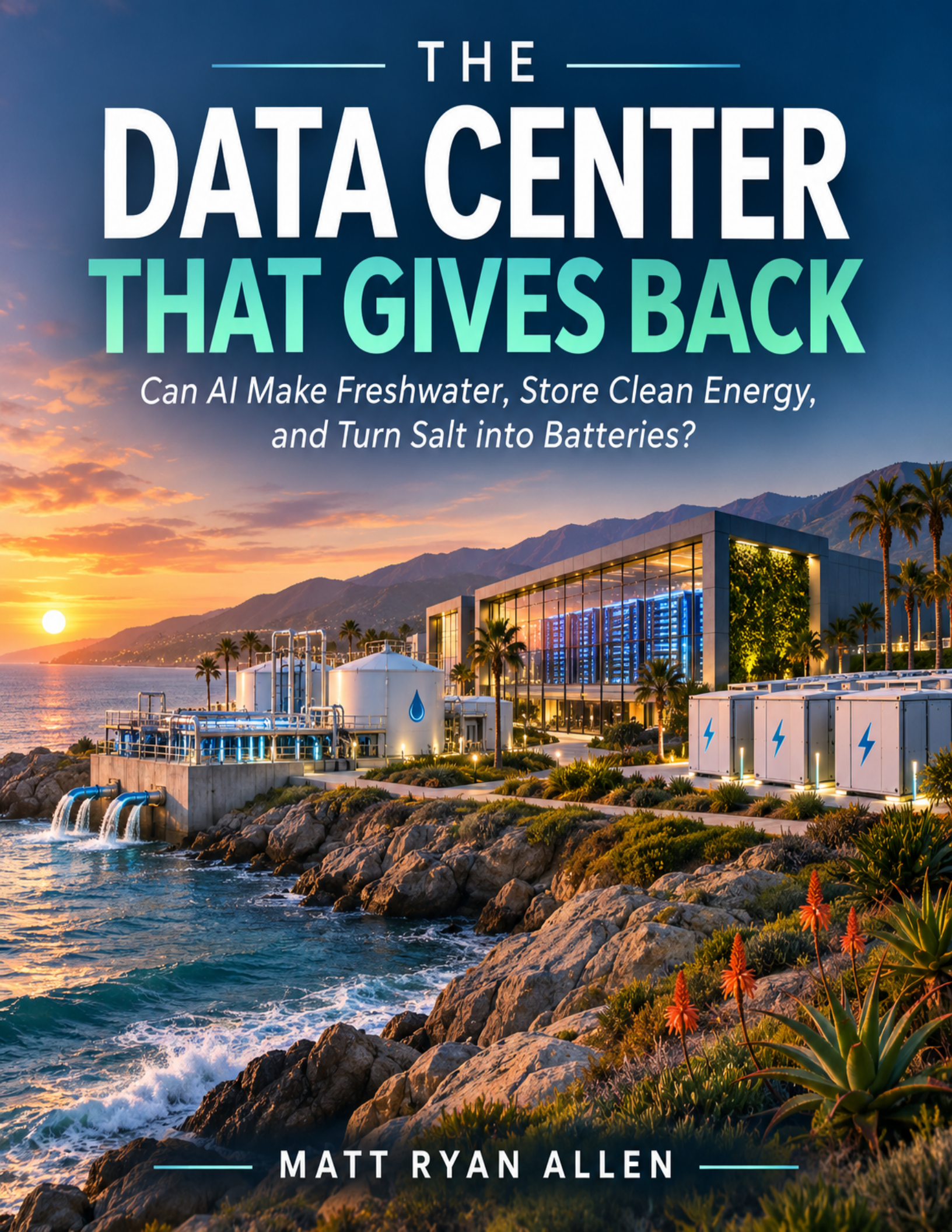
THE DATA CENTER THAT GIVES BACK

Can AI Make Freshwater, Store Clean Energy, and Turn Salt into Batteries?



MATT RYAN ALLEN

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Can AI Make Freshwater, Store Clean Energy,
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A short, optimistic investigation of a very big infrastructure idea.

November 2026

A NOTE BEFORE WE BEGIN

An idea worth testing

This is a concept book, not an investment prospectus, engineering design, permitting determination, or claim that the described integrated campus is commercially operating. It combines established technologies, reported industry benchmarks, illustrative arithmetic, and research-stage possibilities.

The underlying ambition is simple: imagine data centers that are better neighbors because they produce measurable services for the communities that host them. The freshwater math is a hypothetical scenario. Battery materials recovered from desalination brine remain an open economic question. Every promising result should be independently verified before anyone breaks ground.

This book uses an imagined town-hall scene and a speculative 2032 dialogue as storytelling devices; those scenes are fiction. All citations and key starting points for further research appear at the end.

THE BIG IDEA

> **What if the most controversial building in town also helped deliver the most useful water?**

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The Building Nobody Wants

Picture a town meeting in a coastal California city. Somebody puts a slick artist's rendering on a screen: a giant, windowless AI data center. The building looks like an airport terminal that has given up on passengers. It wants a lot of electricity. It may want a lot of water. It promises investment, tax revenue, and technological progress. It does not promise a particularly exciting number of permanent jobs.

The room is unimpressed. One resident asks about the power grid. Another asks about water. A third asks why the town should sacrifice industrial land and infrastructure for a business that mostly serves companies somewhere else. The developer has an answer for each question, but not an answer to the biggest one: What's in it for us?

That is the question at the center of this book. Not whether AI is good or bad. Not whether the next generation of computing will arrive. It is arriving. The more interesting question is whether the physical infrastructure behind it has to behave like a burden, or whether we can design it to act like a useful neighbor.

Here is the provocation: what if a data center became a place where the town obtained fresh water, the grid gained energy storage, valuable minerals were recovered, and nearby industries got access to otherwise wasted heat? What if the building that everybody worried about became the building everybody wanted to work with?

That's the pitch. It sounds almost suspiciously optimistic. It should. Big ideas deserve enthusiastic introductions and ruthless arithmetic. We're going to do both.

A change of question

The traditional data center is optimized around one product: computation. Everything else - power, cooling, space, permits - is treated as an input or a headache. A regenerative campus starts from a different drawing. Computing is the anchor tenant, but the land also hosts water infrastructure, battery storage, heat users, and possibly chemical processing.

This does not mean every waste stream can be transformed into a profitable product. Sometimes the best waste is the waste you never create. Sometimes a pipe between two businesses is more valuable than a futuristic chemistry experiment. Sometimes the easiest environmental gain is an efficient cooling system and a cleaner electricity supply.

But once you begin thinking of a data center as one part of a local industrial ecosystem, the design possibilities multiply. The project may become more useful to local government. It may attract different financing partners. It may even be easier to explain to people who are not particularly interested in the future of artificial intelligence.

The question changes from "May we build this?" to "What public problems can this investment help solve?" That's a much better opening line.

THE TAKEAWAY

> **To win public trust, measure the public benefits.**

The Ocean Next Door

Southern California is blessed with an enormous amount of seawater and challenged by an uneven supply of freshwater. The ocean seems to offer a simple deal: take out the salt, and enjoy a new supply of drinking water. If it were quite that easy, every coastal city would already have an enormous desalination plant.

Modern seawater reverse osmosis is impressive engineering. Powerful pumps push salty water against a specially designed membrane. Water molecules pass through; much of the salt stays behind. The result is a freshwater stream and a concentrated brine stream. The freshwater still needs treatment and integration into the drinking-water system. The brine needs environmentally responsible management.

The catch is cost. Moving water through membranes against high osmotic pressure takes electricity. Building intakes, pretreatment systems, pipelines, and discharge facilities takes capital. Environmental review takes time, and for good reason: marine ecosystems are not an accounting footnote.

The U.S. Congressional Research Service reports typical seawater reverse-osmosis energy intensity in the broad range of roughly three to seven kilowatt-hours per cubic meter of product water. Efficient facilities may be toward the lower end. An actual plant's delivered-water cost depends on far more than power alone. [1]

Now add an AI campus

The idea is not that the servers magically desalinate the sea. They don't. It is that the data center is already a large industrial project that needs power, cooling, industrial land, dependable operation, financing, and political acceptance. A desalination plant needs several of those same things. Shared planning, electrical systems, construction logistics, water infrastructure, or industrial land may reduce duplication at a carefully chosen site.

There is also the possibility of harvesting server heat. Nearly all the electricity a server consumes eventually becomes heat. Data centers spend substantial effort moving that heat away so their electronics keep functioning. A process that can use low-temperature heat is therefore interesting. So are heat pumps that raise temperatures, although they consume additional electricity.

A warning, because this is where many enthusiastic proposals turn into magic tricks: ordinary reverse osmosis runs principally on electricity, not waste heat. You cannot simply connect a hot-water pipe to a reverse-osmosis unit and announce that energy costs have disappeared. Thermal desalination and membrane distillation may use heat, but have their own technical and economic trade-offs.

A real local reference

South Coast Water District's Doheny Ocean Desalination Project in Orange County was designed around a roughly five-million-gallon-per-day freshwater supply. A March 2025 district staff report listed a total capital budget of $170 million. In 2026 the state's project records continued to document the project's review and approvals. [2][3]

We are not proposing that anybody bolt a data center onto Doheny. The project's value here is as a reality check: this is the scale, infrastructure, capital intensity, and public process involved in getting a real California water facility off the drawing board.

The ocean may be a vast reservoir of water, but it is not a free reservoir of drinking water. The trick is deciding whether a combined project can deliver water more reliably and efficiently than separate projects could.

THE TAKEAWAY

> **Shared infrastructure can help, but desalination still requires energy and environmental review.**

A Billion-Gallon Thought Experiment

Now for the fun part: let's put numbers on the back of our proverbial napkin. We will deliberately use a hypothetical campus, not pretend that the following numbers describe an approved facility.

Start with a data center rated at 100 megawatts of IT computing capacity. Suppose the servers average 90 percent utilization over the year. The IT equipment then consumes about 788 million kilowatt-hours per year. Total site electricity will be higher after cooling, power conversion, and other overheads. For water, suppose direct on-site consumption averages 0.45 liters per kilowatt-hour of IT energy. The resulting direct water consumption is about 354.8 million liters, or 93.7 million U.S. gallons, annually.

Now place beside it a desalination plant rated at five million gallons per day. Allow for maintenance and interruptions by assuming 90 percent operating availability. Annual freshwater output is roughly 1.64 billion gallons. Subtract 93.7 million gallons of data-center direct consumption and you're left with around 1.55 billion gallons. That's around 4,750 acre-feet.

More than seventeen times

In this particular simplified scenario, the water plant produces about 17.5 times the data center's direct water consumption. This is a legitimate result of the stated assumptions, not evidence of a real plant. A dry-cooled data center might consume far less water. A different cooling strategy or climate might consume more. Water treatment and chemical processing might require additional water. Other utility or community obligations can change the final balance.

The figure also makes no claim about a full water footprint. Electricity generation may consume water somewhere else. Seawater intake and brine discharge may affect the marine environment. Freshwater production and total environmental benefit are not the same measurement.

How much power for the desalination plant?

At an illustrative four kilowatt-hours per cubic meter, producing 1.64 billion gallons uses roughly 25 million kilowatt-hours per year, equivalent to an average electrical load of about 2.8 megawatts. A different desalination efficiency or uptime changes the answer. This power must be purchased or generated. It is additional to the data center's power requirement.

That's the surprising discovery: the extra energy requirement can be modest relative to a giant compute campus, even though it is substantial in its own right. From a power-system perspective, a 100-megawatt data center with a multi-megawatt desalination plant is still a major development. But the freshwater production is not a rounding error.

What the number does - and doesn't - buy us

The arithmetic proves a narrow and useful thing: pairing these facilities can produce a direct on-site freshwater surplus. It does not prove that the water is cheap, that the shoreline is appropriate, that utility customers will buy it, or that a city should grant the permits. Those are separate questions.

There is another subtlety. A data center designed to avoid water consumption entirely may give us a better environmental outcome than one consuming lots of water and compensating with new desalination. A water-positive label should never reward unnecessary demand. Always compare against the best credible alternative, not merely against a poorly designed facility.

Still, imagine presenting the town hall with a verifiable promise: here is how much computing the campus provides, here is how much water it consumes, here is how much potable water it delivers to the water district, and here is the independent meter that makes those claims auditable. The conversation changes immediately.

THE TAKEAWAY

> **Water-positive on site is plausible; net environmental benefit needs a broader assessment.**

The Salt Plot Twist

Our hypothetical plant has separated freshwater from seawater. What remains is concentrated brine. Which brings us to the wonderfully cinematic question: could the salt become batteries?

It sounds like a perfect industrial romance. California needs water. AI needs electricity. Batteries help manage electricity. The sea is full of sodium. Put them together and everybody lives happily ever after. Cue the uplifting music.

The chemistry is slightly less cooperative.

Sodium-ion batteries are real rechargeable batteries. Their sodium ions shuttle between electrodes when the battery charges and discharges. They are not powered by sprinkling table salt into a battery box. Manufacturers need engineered cathode and anode materials, electrolytes, separators, highly controlled manufacturing, and stringent quality testing. Sodium can enter the supply chain as compounds such as sodium carbonate, but that compound is not the battery itself.

Salt is a starting material, not a finished product

Desalination brine is a complex salty mixture. It contains sodium and chloride, but also magnesium, calcium, sulfates, and other substances. Extracting one high-purity chemical from that mixture means separation, purification, processing, and usually additional energy and chemical inputs.

You may hear the phrase "zero liquid discharge." Sounds like a dream. It can also be expensive and energy intensive, especially for seawater-derived brine. There may be solid residues to dispose of even when liquid discharge is reduced. There is no universal rule that every drop of brine should be dried into salt.

The economic enemy is cheap soda ash

Here's a fact that ruins a lot of otherwise beautiful PowerPoint slides: the United States already produces large volumes of soda ash, much of it from naturally occurring trona resources. The USGS placed the average 2025 U.S. soda ash production value at approximately $159 per metric ton. This is a commodity benchmark, not a battery-grade delivered price; even so, it shows how inexpensive competing bulk material can be. [4]

If your futuristic brine-processing factory requires expensive electricity, specialty equipment, complicated permitting, and elaborate purification to recover material that a mining company can sell cheaply, the battery plant may prefer the mine.

That doesn't kill the idea. It means the right experiment is not "Can sodium be recovered?" Chemistry says yes, in various ways. The right experiment is "Can we recover the right material, at the right quality and total cost, with a real buyer willing to sign a contract?"

And the battery does not eat the salt forever

Rechargeable sodium-ion batteries circulate sodium ions during use. A battery is an energy-storage device, not a continuous brine disposal service. Manufacturing new batteries may consume sodium feedstocks, but operating a stationary battery does not steadily vacuum salt out of the ocean.

That distinction matters. Otherwise, our campus could develop an excellent battery-storage business while barely denting its brine-management challenge. Both outcomes can be useful; they are not the same thing.

So yes, keep the salt-to-battery dream. Just put it in the research-and-development wing, not in the revenue column of the first project's financing spreadsheet.

THE TAKEAWAY

> **Brine contains sodium, but battery-grade chemical recovery must beat commodity economics.**

The Battery That Lives Next Door

There is a far easier way to put sodium-ion batteries into this campus: buy them from a qualified manufacturer and install them for stationary energy storage. They do not have to be made from the very salt that came out of the adjacent desalination plant for the project to make sense.

The campus would have enormous electrical demand. A battery storage system cannot run a 100-megawatt data center for days unless it is extraordinarily large. But it may help manage shorter peaks, coordinate with on-site renewables, provide backup or resilience functions where appropriate, and participate in grid services under the applicable market and interconnection rules.

Think of it as a warehouse for electricity rather than an electricity factory. The battery stores energy that was generated somewhere. Put one megawatt-hour in and you get less than one megawatt-hour out after losses. No free lunches, even at the ocean.

Why sodium-ion?

Sodium is abundant, and sodium-ion chemistries can reduce dependence on certain materials used in lithium-ion batteries. Performance differs by chemistry: energy density, temperature behavior, life, cost, and safety all depend on the particular design and manufacturer. For a stationary battery, weight and volume may matter less than they do in an electric car.

That makes sodium-ion an interesting candidate, especially if manufacturing scales and field performance justify its economics. But it should compete openly with lithium iron phosphate, flow batteries, thermal storage, and other alternatives. The greenest technology may be the one with the strongest verified lifetime performance at that site.

The seawater-battery research frontier

A March 2026 paper in Nature Reviews Clean Technology explored seawater batteries that combine energy storage with desalination, resource recovery, and potential carbon sequestration. The authors described component functions demonstrated independently or in partially integrated configurations, not an already proven all-in-one coastal megaplant. [5]

This is a genuine research frontier. Some seawater-battery architectures use a sodium-containing electrolyte and reversible sodium reactions. The idea of pairing electrochemical storage with salt

removal is fascinating because the same ion transport may help perform more than one job.

Yet one must assess energy efficiency, materials durability, membrane fouling, corrosion, cycle life, actual freshwater quality, and price. A clever laboratory demonstration is not the same as a bankable infrastructure contract.

Here is the sensible sequence: first make the campus good at computing, water production, and grid storage using commercial technologies. Then create a modular pilot to test sodium recovery or electrochemical seawater batteries. Give the experimental unit measurable targets and permission to fail without endangering the town's water supply.

That doesn't sound as sexy as inventing the future in one giant leap. It is how you keep a giant leap from becoming a giant lawsuit.

THE TAKEAWAY

> **Deploy proven storage now; pilot experimental seawater batteries separately.**

Follow the Heat

Every data center is a heater with an expensive hobby. It takes electrical energy, performs useful computations, and rejects heat. The heat is not a side effect of a broken machine; it is the ordinary physical end state of running electronics.

The interesting part is deciding whether anybody nearby can use that heat. Greenhouses need temperature control. Some industrial processes need warm water. Buildings with district heating systems can use thermal networks, especially in colder climates. Certain desalination processes can use heat as part of their separation mechanism.

But heat has a quality problem. A bucket of lukewarm water is not the same as a bucket of steam. Heat at too low a temperature may be technically available but commercially disappointing. Heat pumps can raise its temperature, but use electricity to do so. Pipes lose heat as it travels. A greenhouse may want more heat in winter and less on a hot summer afternoon, while the data center produces heat year-round.

The world already has examples

Data-center waste heat recovery is not speculative in the abstract. In Finland, Microsoft's data-center plans with energy company Fortum incorporated a district-heating concept serving communities around Espoo. That geography is nearly ideal for heat reuse: cold weather and district-heating networks. Southern California is not Espoo. We should copy the engineering logic, not pretend the climates are the same.

For a California campus, industrial heat users or some kinds of agricultural facilities may be better customers than ordinary homes. A thermal-storage tank could help smooth mismatched supply and demand. But any such benefit needs a customer who is physically close, operationally compatible, and willing to buy heat under contract.

What I would not do

I would not tell a water utility that the recovered heat makes reverse osmosis free. I would not show a rendering of a vast greenhouse unless I knew who would grow crops inside it and what temperature they need. I would not assume an elegant energy diagram is equivalent to an energy balance.

Instead, I would commission a heat-grade study: how many megawatts of recoverable heat, at what temperatures, from which loops, throughout the year? What heat exchangers and heat pumps are necessary? What customer can use it, at what price, for how many hours? How far away is that customer? What happens when the computer hall is partly idle?

The punch line is that useful heat reuse is a matchmaking business. You want the right neighbor, not merely a poetic one.

THE TAKEAWAY

> **Waste heat is valuable only when a suitable customer can actually use it.**

The Other Water Idea: Recycle It

We have spent a lot of time staring at the ocean. But a clever developer should also look inland, toward a less glamorous resource: treated wastewater.

Many communities already collect and treat wastewater. Advanced treatment can turn suitable reclaimed water into a supply for industry, landscape irrigation, groundwater replenishment, or potable reuse under the relevant rules and safeguards. The required treatment depends on source quality and intended use.

This can be a better pairing for a data center than seawater desalination. The facility may avoid a new seawater intake. Its feedwater may be less salty, reducing the pressure and energy required for membrane separation. It may sit closer to existing water and electrical infrastructure. And a nearby utility may already have a clear plan for the recovered water.

The least cinematic option might be the strongest

Imagine the city has a wastewater treatment plant that discharges water rather than reusing it. A new partnership finances advanced treatment, while the data center buys reclaimed water for its compatible industrial needs. The community gets a dependable reuse program. There is no need to convert each molecule of salt into a battery before the plan works.

Of course, wastewater reuse is not effortless. Treatment plants are complicated. Potable reuse has stringent barriers, monitoring, and public acceptance questions. Chemicals, membranes, residuals, and energy all cost money. Reclaimed-water rights, conveyance, and reliability also have to be sorted out.

But if the goal is water security, the metric should be new reliable water provided per dollar invested and per unit of environmental impact, not the number of futuristic elements in the illustration.

A useful design competition

I would ask engineering teams to design three campuses on comparable sites. First: a conventional data center with best-in-class low-water cooling, purchasing municipal water as needed. Second: the same campus with seawater desalination. Third: the same campus with advanced wastewater recycling and a municipal offtake agreement.

Each team would calculate true delivered-water cost, all electricity use, construction emissions, water footprints, resilience, marine or river impacts, permitting complexity, and long-term operating risk.

The winner might be a hybrid. It might be water recycling with a small desalination backup. It might be entirely separate water and computing facilities. The point is not to force a particular architecture. The point is to let the public benefit win a fair contest.

This is the quiet thesis behind the whole proposal: regeneration is a performance standard, not a collection of expensive gadgets.

THE TAKEAWAY

> **Wastewater recycling may outperform the more glamorous ocean option.**

Who Pays for This?

Now we get to the part that makes every dreamy architect uncomfortable: somebody has to write the checks.

An AI campus can have three broad product lines: computing, water, and grid services. A fourth - sodium chemicals - should be treated as speculative until a real commercial market is proven. These revenue lines have different customers, different financing terms, different risks, and different expectations about uptime.

Computing customers want reliability, security, and competitive cost. Water districts want long-term delivery, regulatory compliance, predictable pricing, and emergency procedures. Grid operators or utilities want performance within precisely defined markets. Chemical buyers want purity and competitive delivered prices. The fact that everybody shares a parking lot does not make their businesses interchangeable.

The sample water budget

Use the five-million-gallon-per-day plant from our earlier thought experiment. At 90 percent operation, it produces about 5,041 acre-feet per year. A simplified capital model with $170 million in construction costs, a 30-year recovery period at 7 percent, electricity consumption of four kWh per cubic meter at fifteen cents per kWh, and $600 per acre-foot in other operating costs lands around $4,050 per acre-foot. These are illustrative assumptions, not an engineer's bid, and they omit several possible site-specific costs.

Change the assumptions and the number changes. Cheaper financing, lower capital cost, and inexpensive power make the project more attractive. Expensive transmission upgrades, pipelines, complex coastal mitigation, or costly brine processing can make it worse.

Compare that with the idea of purchasing existing bulk water. Desalinated water may cost more, but reliability and drought resilience can have value that is not captured by a simple per-acre-foot price comparison. The right assessment looks at the water portfolio, not merely the cheapest source in one ordinary year.

Who should own what?

My preferred structure would separate operating risks. A specialist operates the data center. A licensed water operator runs the water facility. A qualified energy company manages batteries

and market participation. A chemicals company joins only if the sodium-recovery business proves itself. An infrastructure holding company may coordinate land and shared services, but each essential public obligation needs clear accountability.

The city or water district should receive enforceable, metered water-delivery rights rather than relying on a corporate sustainability pledge. The data-center tenant should not be allowed to interrupt potable-water operations just because computing revenues shift. Nor should a failed electrochemistry experiment threaten a water plant's finances.

The three contracts that matter most

First, a long-term computing agreement that supports the site. Second, a water purchase agreement with prices, volumes, quality requirements, and contingency plans. Third, interconnection and power arrangements that demonstrate the full campus can operate without making unfunded promises about the grid.

Only after those three exist would I seriously consider building a chemical recovery plant on the same property.

Optimism is wonderful. Signed contracts are better.

THE TAKEAWAY

> **Independent contracts and operators matter more than a clever master plan.**

A City Council Meeting in 2032

Let's take a quick trip into an imagined future. None of the following is a prediction or a description of a real facility. Consider it a short scene in a movie about infrastructure.

The meeting room is full again. The developer stands at the lectern, this time with a much less glamorous slide. No sunsets. No vaguely glowing buildings. Just six numbers.

A councilmember says, "Your data center uses water." "Yes," says the developer. "Here's the maximum contract allowance, the expected annual consumption, and the actual meter reading from the pilot."

"You say you produce fresh water." "The independent water operator delivers it to the district, and we are penalized if we miss our guaranteed volumes."

"You say you turn salt into batteries." The developer smiles. "No. Not yet. We recover a small quantity of chemical feedstock in a pilot. A battery manufacturer is testing it. We have not booked a dollar of commercial profit from that process."

That answer gets more attention than the rendering did.

"And the electricity?" "Here is our contracted capacity, our projected hourly load, our backup plan, and the upgrades we are paying for. Here is the grid study. Here is the separate accounting for carbon and water used to generate electricity."

The next speaker is the city's water engineer. She does not endorse everything. She asks pointed questions about brine disposal and the project budget. But she confirms the measurements and the contractual terms. It is the first moment in the meeting when the proposal feels less like marketing and more like municipal infrastructure.

One resident finally asks the question everybody was waiting to ask. "So you want us to let you build a huge computer building because you're going to give us water?"

"Not give," says the developer. "Sell at an agreed price. And invest in an additional supply your utility has identified as useful. We'd like the city to judge us on measured delivery, not our adjectives."

There is a little laughter. Somebody in the back says, "Finally, a developer who understands the difference."

What changed?

Not the technology. The civic bargain.

The future of AI infrastructure will be argued over in towns, utility meetings, coastal commissions, public hearings, and financing committees. A regenerative campus earns trust only when its benefits can be independently verified and its harms are honestly counted.

In this imagined meeting, the developer does not ask the community to fall in love with AI. The developer gives the community something more useful: facts, contracts, and a way to say no if the project does not perform.

That's not a small change. It may be the difference between a clever idea and a project with a permit.

THE TAKEAWAY

> **Trust is built by audited measurements, not renderings.**

How to Build the First One

If somebody handed me a team, a little seed funding, and permission to explore this concept tomorrow, I would not begin by buying oceanfront land or ordering experimental batteries. I would begin with a disciplined search for a credible pilot.

Step one: find a site that is already industrial. Prefer existing or disturbed industrial locations with reliable high-capacity electricity access, practical water-pipe connections, and a plausible utility customer. A beautiful beach is a bad reason to choose a site. Established industrial water infrastructure is a good reason.

Step two: make water valuable before making it futuristic. Ask water districts what supply they need, under what quality standards, at what delivered price, and for how many years. Test recycled water against desalination. If a district will not consider signing a supply agreement, do not quietly assume its future enthusiasm.

Step three: measure the complete water and energy story. Account for cooling water, upstream electricity-related water consumption, desalination power, intake impacts, brine management, and greenhouse-gas emissions. Use a transparent reference case for comparison. Ask an independent engineer to review it.

Step four: create the heat map. Not a thermal picture of the ocean, although that would look great on a slide. A practical map of available heat quality, annual hours, distance to nearby users, and the economics of heat pumps or thermal storage. Add a heat customer only if the numbers justify the pipe.

Step five: use ordinary batteries first. Design battery storage based on actual load shapes, power prices, interconnection rules, and resilience needs. Sodium-ion should have the chance to win, but not by decree. Compare lifetime delivered value with established alternatives.

Step six: put sodium recovery in a shipping-container-sized laboratory. Test real brine, not idealized salt water. Measure separation costs, product purity, energy demand, chemical consumption, and residual waste. Obtain independent laboratory results and a battery-material buyer's specification. Then ask that buyer what they'll pay.

Step seven: publish the scorecard. Every year, report actual freshwater delivered, on-site freshwater consumed, lifecycle or supply-chain impacts as appropriate, power used, operating costs, battery performance, waste streams, and independently checked environmental results.

The first milestone isn't a ribbon cutting

It is a feasibility study in which all parties can still walk away. One qualified data-center developer. One water utility. One engineering firm. One power specialist. One independent environmental reviewer. One chemical-processing partner for an optional pilot.

The first study should have obvious pass-or-fail gates: can the grid support it? Can a municipality buy the water? Can environmental impacts be permitted and mitigated? Do shared facilities actually save money? Is there any real value in the brine beyond an attractive story?

If those questions are answered, a concept can become a serious venture. If they're not, the smart response is to redesign, not to decorate the pitch deck.

The goal isn't the most futuristic campus. It's the first one that actually works.

THE TAKEAWAY

> **The first win is a bankable feasibility study, not a construction announcement.**

The Bigger Idea

Somewhere along the way we began thinking of data centers as giant boxes that take things: land, electricity, water, tax incentives, and public patience. The data center that gives back is an attempt to reverse that mental picture.

Not every community needs seawater desalination. Not every data center should attempt chemistry. Not every battery should be sodium-ion. A cold city may value district heating; a dry inland community may value wastewater recycling; a coastal industrial district may value a new source of drinking water; a grid-constrained area may demand storage and flexible load.

What unites these examples is not a specific machine. It is an operating principle: whenever we build an enormous new piece of industrial infrastructure, ask whether it can deliver additional benefits to the place that hosts it.

There is something almost old-fashioned about that idea. Before every factory became an isolated profit center, many industrial communities built around shared energy systems, ports, rail, byproduct exchanges, and industrial services. Some of those arrangements were dirty and exploitative; we should not romanticize them. But the basic insight is useful: one industry's output can be another industry's input if the geography, chemistry, and timing line up.

AI gives that old insight a new urgency. Demand for computing is pushing investment into facilities measured not in megawatts alone but, increasingly, in very large fractions of a gigawatt. Communities will be asked to decide what they want in exchange. This is a rare opportunity to negotiate more intelligently.

Imagine the standard planning packet for a new AI campus. Alongside land use and power plans are a community water plan, an independent net-impact study, options for heat reuse, a battery and resilience analysis, a brine or waste management plan, and a transparent accounting of what benefits actually reach residents.

No environmental halo is awarded for creative naming. A project earns its reputation by performing.

The appealing twist is that economic discipline and environmental ambition do not need to be enemies. Shared industrial infrastructure may create real savings. Stable utility customers may make financing easier. A community that receives meaningful services may be more willing to participate in development. And a venture that can prove those benefits may have an advantage

over competitors selling only computation.

So can salt become batteries?

Yes, sodium compounds can be part of a sodium-ion battery supply chain. But the route from desalination brine to high-purity battery materials may not make business sense today. That shouldn't disappoint us. The real discovery is larger: the very act of asking the question opens a new way to design infrastructure.

The building that nobody wanted may never become everybody's favorite neighbor. That's asking too much of a building full of computers.

But it could become the building people can point to and say, "At least that thing helps solve a problem we actually have."

And for an industry that increasingly needs the public's permission to grow, that's a pretty powerful starting point.

THE TAKEAWAY

> **A regenerative campus is a measurable promise, not a marketing label.**

THE NUMBERS AT A GLANCE

One imaginary campus, real arithmetic

Item	Illustrative assumption / result
IT computing capacity	100 MW
Average IT utilization	90%
Direct cooling/site water intensity	0.45 L per IT kWh
Estimated direct data-center use	~93.7 million gal/year
Desalination nameplate	5 million gal/day
Desalination availability	90%
Freshwater production	1.6425 billion gal/year
Gross production minus direct DC use	~1.55 billion gal/year
Equivalent net volume	~4,750 acre-feet/year
RO energy (assumed)	4 kWh per cubic meter
RO electrical energy (approx.)	~24.9 GWh/year
5 MGD plant capital benchmark	$170 million (Doheny 2025 budget)

Important: direct water consumption is not a full water footprint. The final available municipal supply would be lower after treatment-plant water use, distribution losses, and other commitments. This is not a site-specific feasibility calculation.

SOURCES & FURTHER READING

Where the ideas came from

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A final invitation

If there is a next book, it should not be about a prettier rendering. It should be about the first independent engineering study that tells us what a real regenerative AI campus would cost - and what it would give back.