Managing Water as Mission-Critical Infrastructure: A Case Study

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Presentation Flow

01

Challenge

Intel's water challenge and why it matters

02

Management Approach

Integrated water circularity management

03

Case Study

Applying the approach at Intel

04

Value

Measured and strategic impact

Intel’s New Approach to Water Management

This session covers how Intel continues to build on an already best-in-class foundation — finding new, innovative ways to reduce water consumption, increase reuse, reduce risk and lower cost.

High Performing

The Ocotillo campus (Chandler, AZ) earned AWS Platinum certification in 2023 — the first U.S. semiconductor site to reach this tier.

Strong Reuse

An on-site water reclamation facility treats up to 9.1 million gallons daily — demonstrating Intel’s commitment to reuse.

The Next Step

The next step moves beyond hard water treatment technology — toward changing how water itself is managed, day to day.

Intel's Water Challenge

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Water systems are interconnected, locally variable, and central to growth, sustainability, and resilience.

No Standard Circularity System

Each site had built its own water management approach.

Local Conditions Vary

Source water, regulations & infrastructure differ by site.

Rising Reuse Needs

More water must be reused to support growth.

Constrained Bandwidth

Focus, tools & operations were stretched thin.

Fragmented Visibility

Data was reviewed in silos, not site-wide.

Bottom line: fabs have the data and tools, but no repeatable way to turn understanding into daily decisions.

Water Circularity Management: Manage Water as You Manage Production

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We stopped managing water as a background utility and started to manage it as mission-critical infrastructure – with consistent visibility and insights into the total site water picture.

TRADITIONAL UTILITY VIEW	INTEGRATED WATER CIRCULARITY MANAGEMENT
Monitored	Managed
System-by-system	Site-integrated
Reactive	Predictive & controlled
Project-based	Ongoing operating practice
Local optimization	Holistic circularity

How It Works

Management system, operating envelopes & decision rules

Integrated water circularity management converted technical understanding into a repeatable management system.

FROM SYSTEM UNDERSTANDING TO OPERATING PRACTICE

Define the common basis for water circularity decisions

Translate flows, chemistry, capacity, and compliance into boundaries

Test future changes through WIF and gap analysis

Track KPIs across circularity, consumption, risk & cost

Manage change with projected site-level impacts

Aligned with SEMI F98 reuse-water guidance

Tracking Risk & Performance

Seeing what is invisible at the unit level

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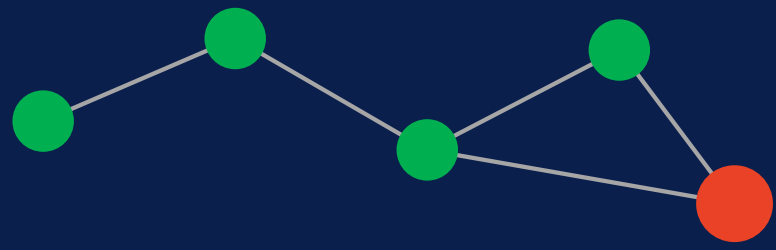
A system can operate inside its local limits while site-level risk rises.

UNIT-LEVEL VIEW

Treatment unit

All local indicators green — no obvious issue.

SITE-LEVEL CIRCULARITY VIEW



Constraint emerges downstream — visible only after system-level analysis.

Identify risks → **Prioritize risks** → **Assess conditions** → **Mitigate risks** → **Monitor & act**

Continuous loop — findings feed back into risk identification

Applying Integrated Water Circularity Management

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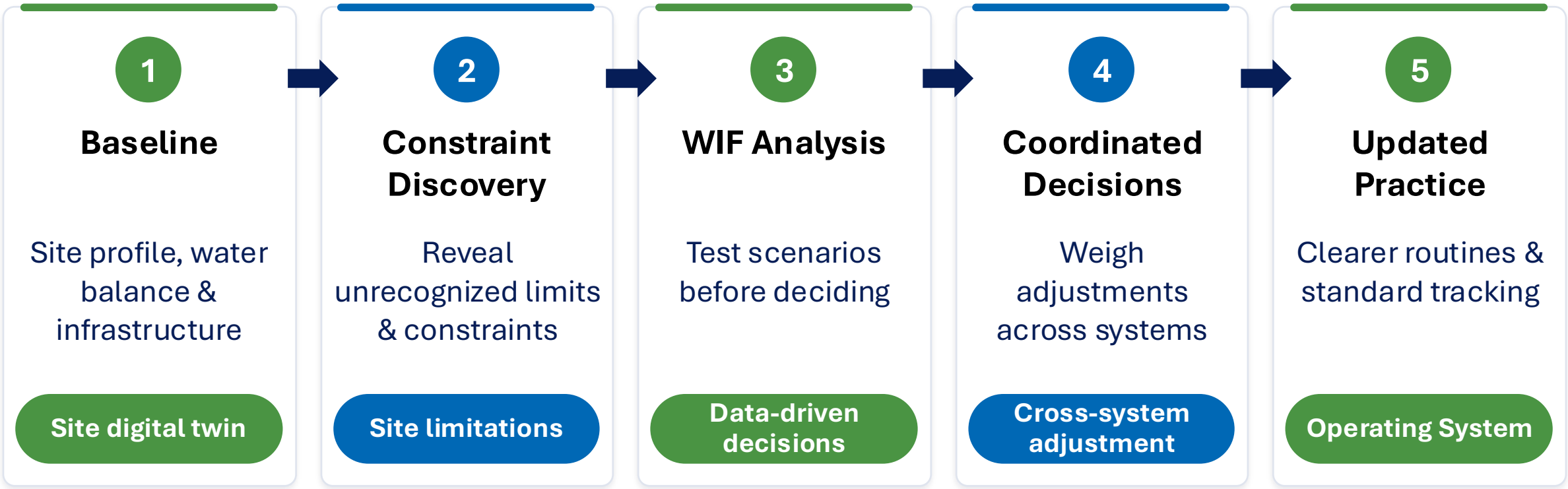
Moving from isolated water-system decisions toward coordinated, site-level management.



Results:

The Full Value of Integrated Water Circularity Management

Impact beyond cost: operational control, risk reduction, accounting clarity, and scalability.

~23% **Freshwater withdrawal reduction achieved in less than a year. No capital investment.**

Operational control
Fewer unplanned responses

Compliance stability
Reduce the risk of permit exceedances and ITP

Clear water accounting
One data source, sitewide

Integration value
Coordinated across systems

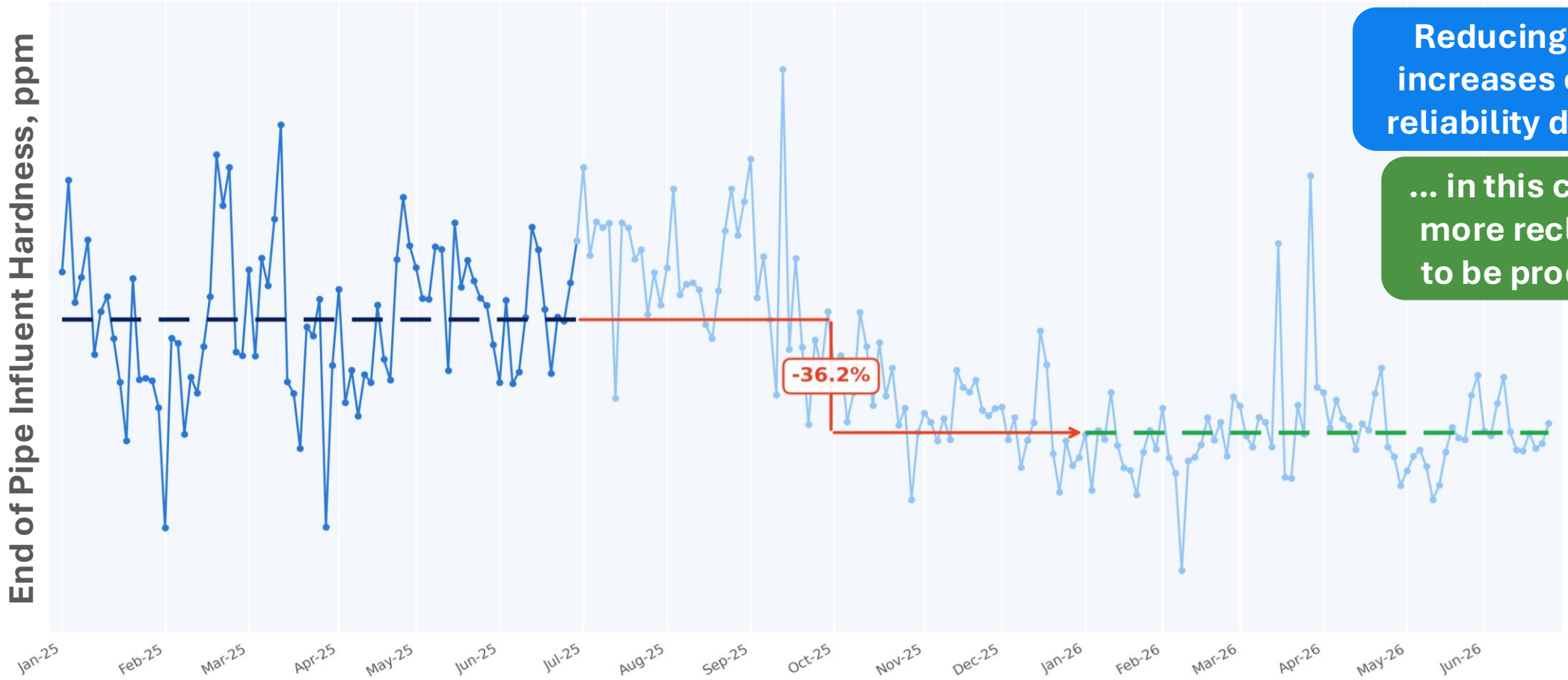
Standard methodology
One approach, every factory

Management visibility
Clear, easy-to-read KPIs

Reliability Improvements

End-of-Pipe Influent Hardness Reduction

Average Jan–Jun 2025	Change from Baseline	Average Jan–Jun 2026
73.3 ppm	-36.2%	46.7 ppm



Reducing hardness increases equipment reliability downstream

... in this case, enabling more reclaimed water to be produced onsite

Infrastructure and Internal Reclaim Impact

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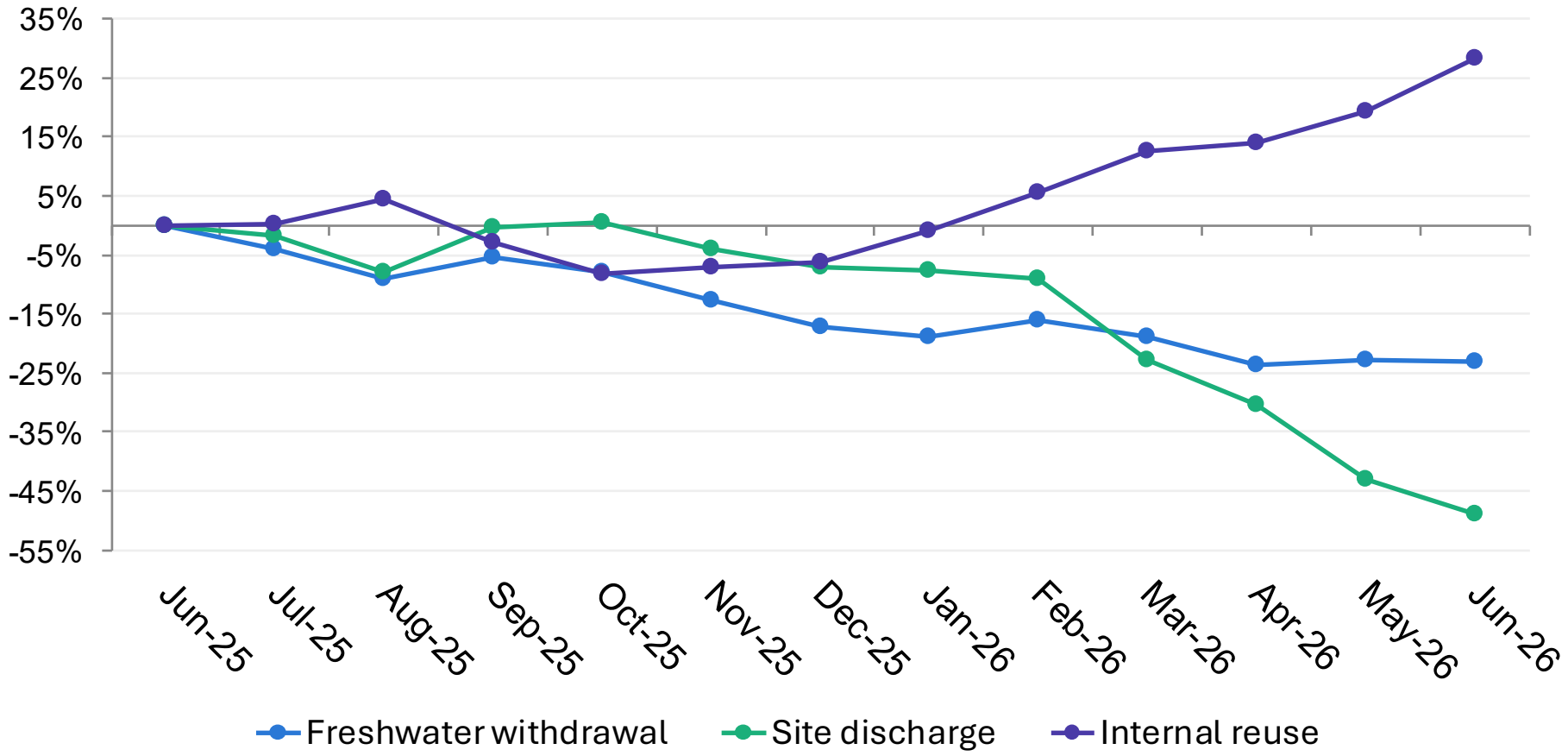
Freshwater Withdrawal	Site Discharge	Internal Reuse
−23%	−49%	+28%



Freshwater vs. UPW Demand

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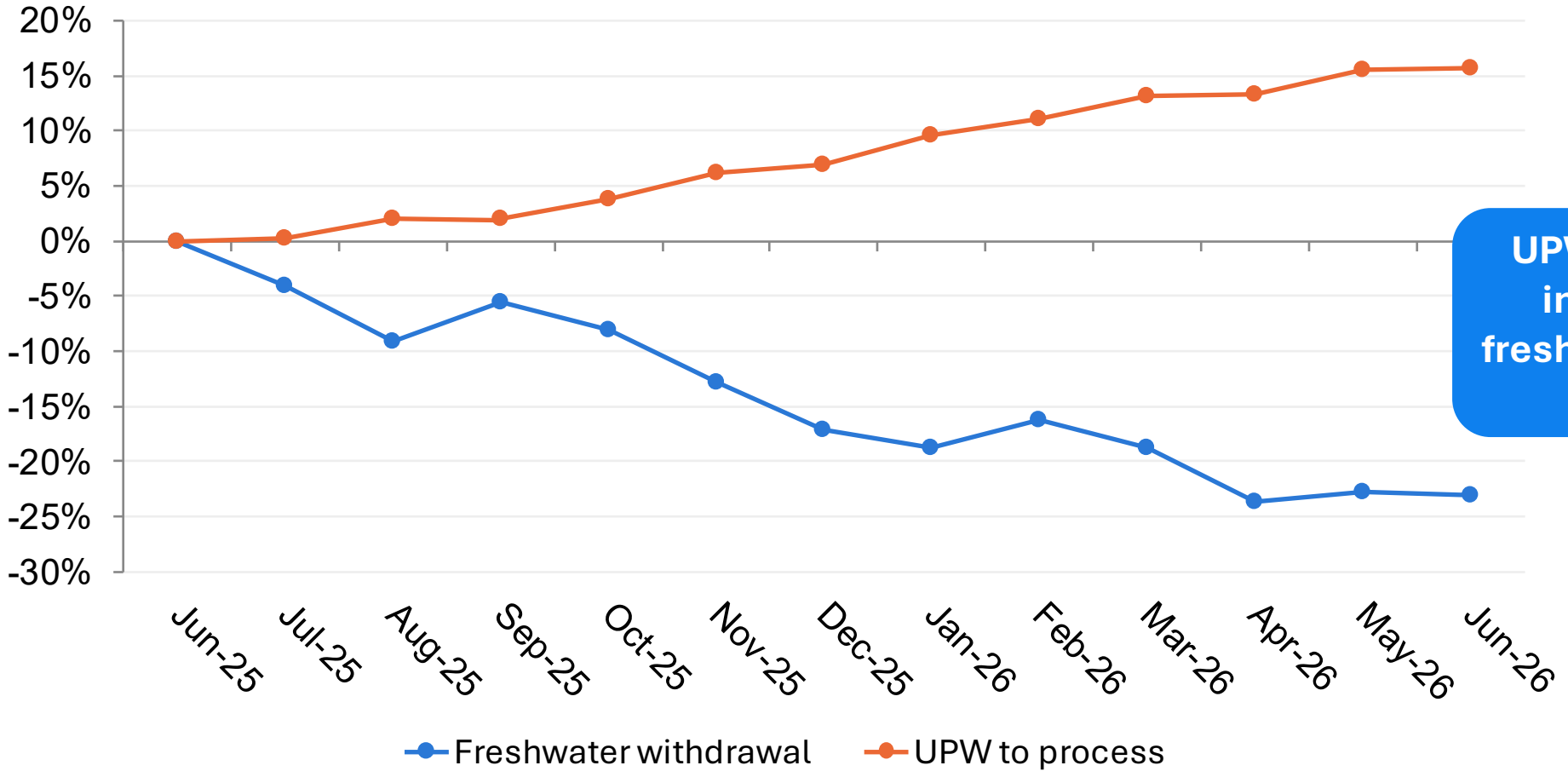
Freshwater Withdrawal	UPW to Process
−23%	+16%



UPW use by the fab increased while freshwater withdrawal decreased!

Global Site Leading KPI's

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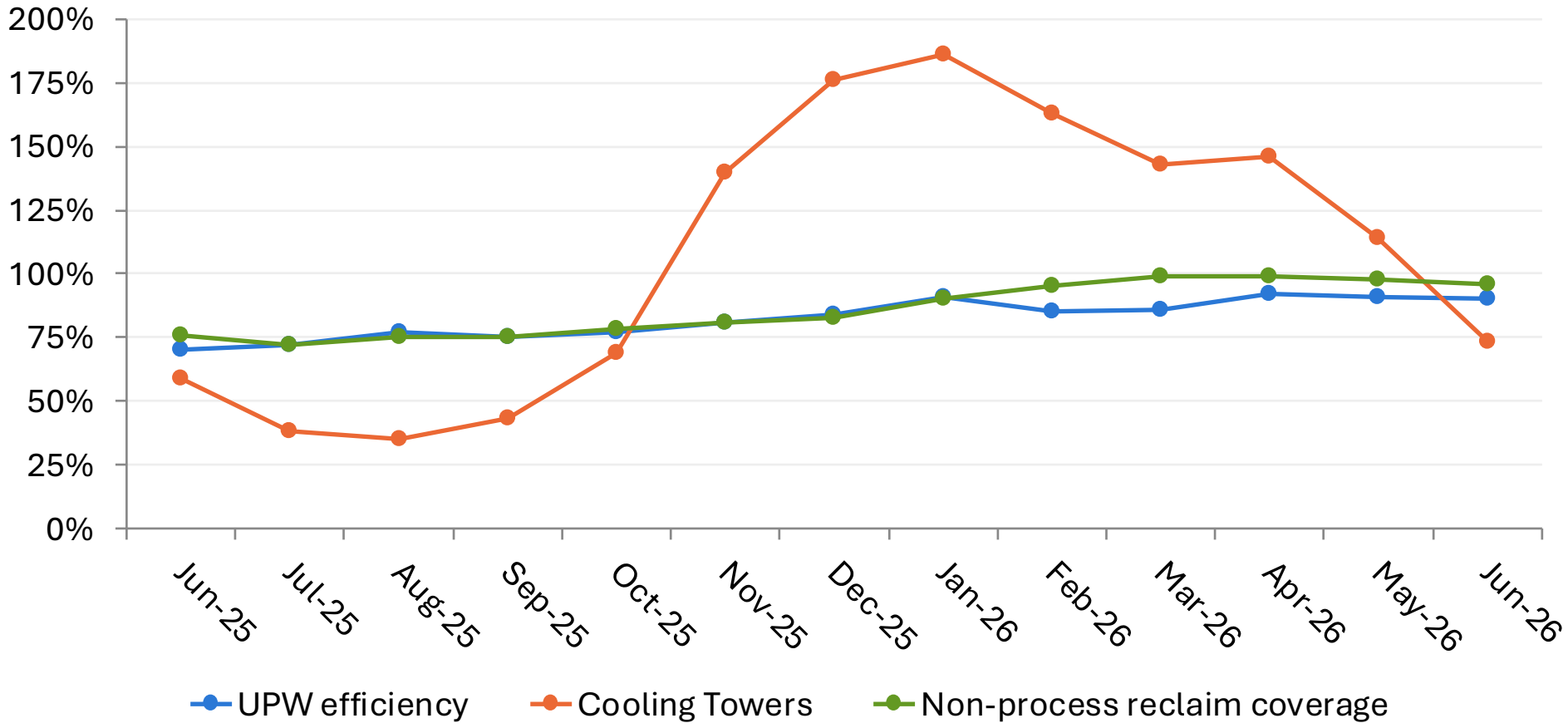
UPW Efficiency
+29%
70% → 90%

Cooling Tower Efficiency*
+24%
59% → 73% (peak 186%)

Non-process reclaim
+26%
76% → 96%



* Design cooling tower blowdown vs. actual performance

Key Takeaway: Making Complexity Manageable

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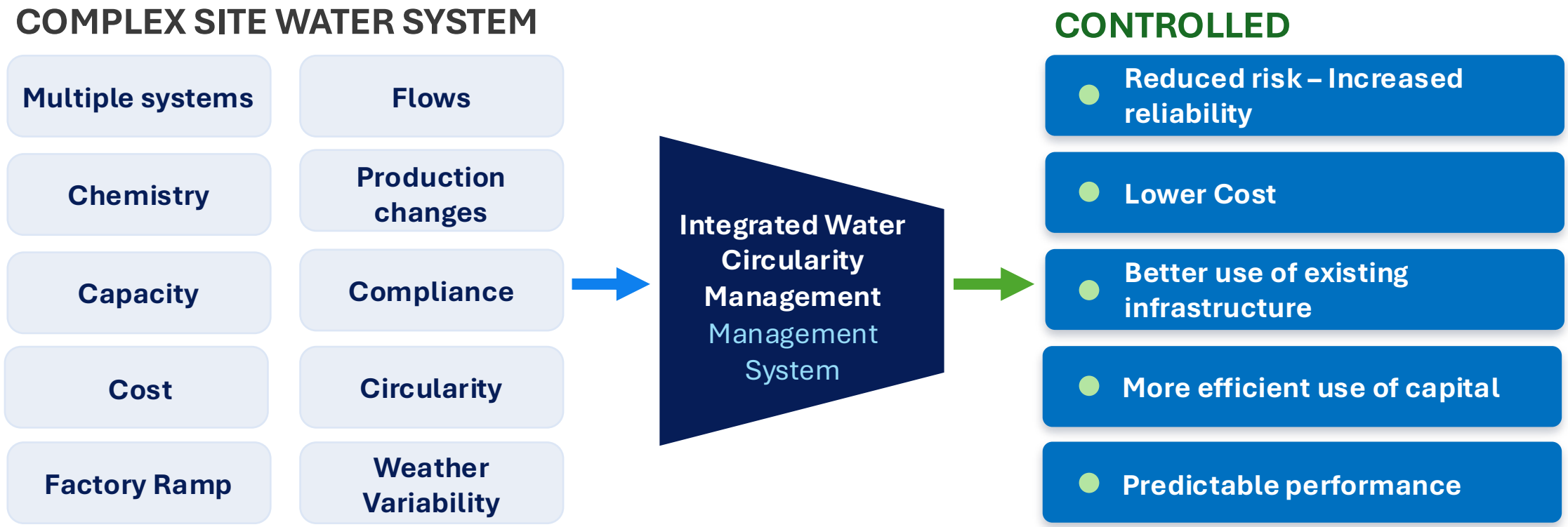
Advanced-fab water systems are too interconnected for isolated decisions — the right management system makes that complexity manageable.



The new approach turns reactive operations into controlled, predictable performance — doing more with existing infrastructure and choosing the right project to maximize the effect of limited capital.

Manage Water Like Production

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Site-wide management—not another treatment project—unlocked the gains.

FACILITY-LEVEL PROOF — YEAR ONE

-23%	-49%	+28%	$3.2M	No
Freshwater withdrawal reduction	Site discharge reduction	Internal reuse increase	Annualized savings	Production impacts reported

WHAT FACILITY TEAMS GAIN

One Sitewide Truth

Earlier Risk Signals

More From Existing Assets

Scenario-Tested Decisions

A Discipline That Scales

Facility takeaway: unite flows, chemistry, capacity, compliance, and cost—then test changes before committing capital.

Thank You

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