

E Q U A R I U S R I S K A N A L Y T I C S
W H I T E P A P E R

Water Risk Pricing Powered by AI

The Command Center for Enterprise Water Risk Intelligence

Pricing water as a financial risk — and an alpha return opportunity

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waterAlpha® · waterBeta® · waterVaR™ · brandAlpha™

SECTION 1

Executive Summary

Water is the only commodity with no global financial market. Every day, corporations commit hundreds of millions of dollars to capital decisions — siting factories, qualifying suppliers, renewing credit facilities, setting brand strategy — with no systematic way to price water risk into those decisions. The result is misallocated capital, unhedged exposure, and a growing gap between physical reality and balance-sheet valuations.

Equarius Risk Analytics closes that gap. The Equarius Command Center is a persistent, always-on intelligence platform that prices water risk into three simultaneous corporate decisions: where to build (New Sites), whom to depend on (Suppliers & Utilities), and what is already owned (Operating Facilities). It delivers this through a single AI-powered engine built on waterAlpha®, a peer-reviewed regression framework validated across 3,421 companies and 7,200 company-years, with stock-return coefficients of 2–6%.

The pattern is not new. Supply-chain control towers that ingest risk signals, apply AI inference, and deliver real-time decision intelligence have already been validated as a durable investment category. Project44 raised \$912 million at a \$2.7 billion valuation. FourKites built its Intelligent Control Tower into a company serving more than 1,600 global brands. Equarius applies the same architecture — persistent data, continuous inference, autonomous alerting — to water risk, a category with a total addressable market of \$5–10 billion.

Two buyer archetypes share the same underlying engine: the Risk Buyer (CRO, CFO, Treasurer, credit teams) who needs to know what their water-exposed assets are worth, and the Alpha Buyer (quantitative analysts, smart-beta managers, index providers) who wants water as a priced factor in portfolio construction. Five revenue paths flow from this bifurcation: Command Center flagship, brand value-at-risk, factor and alpha licensing, credit-risk data API, and index provider partnership.

The engine is not theoretical. waterAlpha® data underlies indexes on NASDAQ, Nikkei 225, and STOXX. AWS, Kurita Water Industries, and Asahi Group are active proof-point deployments. The first Command Center commercial contracts are already in progress.

SECTION 2

Capital Committed Blind to Water Risk

Corporate capital allocation is broken in a specific, measurable way: three classes of decisions — where to build, whom to source from, and what is currently owned — are made without pricing the water risk embedded in each.

The Siting Decision

More than 40% of global semiconductor fabrication capacity is located in high water-stress zones (Robeco, 2026). A new fab requires 5–10 million gallons of ultrapure water per day. Water stress ratings, basin-level withdrawal limits, and climate-forward stress trajectories are rarely incorporated into IRR models. CFOs discover the problem when regulators curtail permits — after the capital is deployed.

The Supplier Decision

\$105 billion in Chilean copper and lithium extraction is concentrated in the Atacama and Antofagasta regions, where water overextraction has already triggered legal actions and production curtailments (S&P Global, 2026). A CPG company sourcing from that region has no systematic way to score counterparty water risk — the way it would score credit risk — before extending a supply agreement.

The Operating Facility Decision

For companies already running plants, the question is not where to build but what the current footprint is worth under a water-constrained scenario. Earnings volatility from water disruption, permit costs, and regulatory compliance is material — and uncaptured in standard earnings models. Equarius research shows a 2–6% stock-return coefficient for water stress across 3,421 companies from 2013 to 2022, with R² values ranging from 0.07 to 0.32 depending on sector and benchmark. That coefficient is a validated, useful input — not a standalone score — but it confirms that markets price water risk imperfectly and inconsistently.

The common thread across all three decisions is the absence of a persistent, always-on intelligence layer — the kind of layer that supply-chain professionals now take for granted for shipment visibility and logistics exceptions. Decision-makers are flying blind not because the data does not exist, but because no platform has assembled, scored, and delivered it continuously.

40%+ Semiconductor fabs in high water-stress zones (Robeco 2026)	\$105B Chilean copper & lithium exposed to water curtailment (S&P Global 2026)	2–6% waterAlpha® stock-return coefficient (Adriaens et al. 2026)
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SECTION 3

waterAlpha®: The Research Foundation

The Equarius Command Center is not a data aggregator. It is built on a proprietary, peer-reviewed analytical framework — waterAlpha® — that translates physical water stress signals into financial coefficients.

The Model

waterAlpha® is a multifactor regression model trained across 3,421 publicly listed companies globally over 2013–2022, encompassing 7,200 company-years of data. The model ingests water withdrawal and consumption disclosures, basin-level physical stress data from the World Resources Institute Aqueduct framework, CDP water disclosures, and company financial time series. It outputs a stock-return coefficient — the beta of equity returns to water stress — for each company and sector.

The coefficient ranges from 2% to 6% in absolute value across sectors. Sign varies by benchmark and sector composition. R^2 values range from 0.07 to 0.32. These numbers are published transparently: waterAlpha® is a validated, useful input into capital decisions, not a standalone score or black box. Machine-learning imputation fills gaps in corporate water disclosure, allowing coverage of companies that do not yet report water data.

The IP Stack

- waterAlpha® — core water-stress return regression model
- waterBeta® — earnings-at-risk adjustment for individual companies
- brandAlpha™ — water-adjusted brand equity estimate for Interbrand Top 100
- waterVaR™ — value-at-risk methodology applied to water-exposed portfolios

This IP stack is the engine behind all five Equarius revenue paths. It is already generating commercial traction: indexes built on waterAlpha® data are live on NASDAQ, the Nikkei 225, and STOXX. Those partnerships validate the model's investibility, not just its academic credibility.

Signal Transparency

Equarius discloses the signal's range and limitations: R^2 0.07–0.32, coefficients ~2–6%, sign varies by benchmark. This is consistent with the academic standard for factor validity. The MSCI ESG Index business generated 76.4% adjusted EBITDA margin in FY2025 — built on factors whose individual predictive power is similarly modest in isolation but decisive in combination. waterAlpha® is designed to be integrated into existing risk frameworks, not to replace them.

SECTION 4

The Control Tower Pattern: A Validated Investment Category

The Equarius Command Center is not the first persistent intelligence platform to challenge an industry that was flying blind. The supply-chain sector pioneered the control-tower model, and its commercial outcomes define the analogue for water risk.

Project44: Decision Intelligence at Scale

"Decision Intelligence that orchestrates AI agents to detect, decide, and act in real time. Disruption is no longer an exception; it's the norm."

— Project44

Project44 built a Decision Intelligence Platform that processes 700 million logistics events daily, ingests 8 billion external risk signals per day, and has validated 3.7 trillion data points across its network. The platform serves 7 of the top 10 global CPG companies, 3 of the top 6 global retailers, and 7 of the top 10 automotive manufacturers. It raised \$912 million and reached a \$2.7 billion valuation.

Customer outcomes reported by Project44: \$16 million in costs avoided from a single port disruption event (Baltimore Bridge), \$12 million in annual savings from safety stock reduction, and 99% reduction in detention and demurrage fees. These results did not come from better data alone — they came from persistent intelligence delivered continuously, enabling decisions in near-real time.

FourKites: The Intelligent Control Tower

"We pioneered visibility. We lead orchestration. Break down supply chain silos and move from reactive tracking to autonomous operations."

— FourKites

FourKites describes its platform as the world's first Intelligent Control Tower — a network connecting 1.1 million carriers and suppliers across 200+ territories, processing 3.2 million daily shipments for 1,600+ global brands. Its AI agents — named Tracy, Sam, Alan, Polly, and Cassie — autonomously handle carrier outreach, document processing, rescheduling, proof-of-delivery collection, and customer alerts.

The platform reports that 85% of exceptions resolve themselves through autonomous AI action. Customer outcomes: 19% reduction in detention charges (Martin Brower), 90 minutes saved per customer response (Coca-Cola), 25 hours per week saved per operations team member (Atkore), 4% improvement in on-time delivery. FourKites reached approximately \$1 billion valuation in its 2021 funding round.

The Pattern Applied to Water Risk

Both companies share the same architectural logic: a persistent data network → continuous AI inference → real-time decision delivery → measurable financial outcomes for customers. Neither platform created new data. Both created the intelligence layer that transforms existing data into decisions.

Equarius applies this pattern to water risk. The data — water stress basins, corporate disclosures, permit filings, satellite imagery, financial time series — exists. The waterAlpha® engine already ingests and scores it. The Command Center delivers the continuous intelligence layer that converts those scores into siting approvals, supplier qualifications, earnings-at-risk estimates, and brand equity adjustments.

\$2.7B Project44 valuation (Decision Intelligence Platform)	~\$1B FourKites valuation (Intelligent Control Tower, 2021)	85% FourKites exceptions that resolve autonomously via AI agents	76.4% MSCI ESG Index adjusted EBITDA margin (FY2025)
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SECTION 5

The Equarius Command Center Platform

The Command Center is a single scenario engine that continuously prices water risk across three corporate objects simultaneously. Unlike point-in-time climate assessments or annual reporting tools, it is persistent — always on, always current, always actionable.

One Engine · Three Objects

Every enterprise faces water risk through three lenses, and the Command Center addresses all three from a shared analytical core:

- **New Sites** — Capital investment decisions for greenfield facilities. The engine scores candidate locations against basin-level water stress, regulatory trajectory, infrastructure access, and competitive water demand. It surfaces the water risk embedded in IRR assumptions before capital is committed.
- **Suppliers & Utilities** — Counterparty water risk scoring for supply chains and utility dependencies. The live Counterparty Water Risk Estimator scores any supplier or utility against water stress exposure, disclosure quality, and operational concentration risk. It functions like a credit score for water — continuously updated, not point-in-time.
- **Corporate Facilities** — Operating asset risk for existing facilities. The engine translates physical water stress at each facility location into earnings-at-risk estimates, waterBeta® adjustments, and scenario-modeled downside cases. This gives treasury and finance teams a financially expressed view of operational water exposure.

Always On

Unlike consultants who deliver assessments or vendors who provide annual data refreshes, the Command Center operates continuously. Basin stress scores update as satellite imagery, permit databases, and hydrological models refresh. Counterparty scores update as companies file new disclosures, regulatory actions are published, or basin conditions change. Users receive alerts when a supplier's water risk score crosses a threshold — the same pattern as FourKites' AI agents, which proactively notify customers 'weeks before problems arrive.'

Brand Value-at-Risk

A fourth module — available as a standalone product and through the waterAlpha® Brand Dashboard at tgao.me/waterbeta-dashboard/ — scores any of the Interbrand Top 100 global brands for water-embedded brand equity discount. Users adjust scenario levers (earnings pressure, financing pressure, brand trust coefficient) to surface waterBeta® EaR adjustments, brand trust coefficients, and water-adjusted brand equity estimates in real time. This module serves both Risk Buyers (brand finance teams) and Alpha Buyers (ESG factor investors).

SECTION 6

Platform Architecture: Already Built, Already Running

The Command Center is not a roadmap. It is an operational system with four layers of deployed capability:

Layer A — Intelligence Engine

The waterAlpha® regression model is trained, validated, and running. Machine-learning imputation extends coverage to companies that do not yet report water data. The model outputs stock-return coefficients, earnings-at-risk estimates, and counterparty risk scores. The 7,200 company-year dataset is the training foundation; it updates continuously as new disclosures become available.

Layer B — Live Core: Counterparty Water Risk Estimator

The live Counterparty Water Risk Estimator ingests real-time data feeds — WRI Aqueduct, CDP Water, permit registries, satellite-derived water stress indicators — and scores any corporate counterparty on demand. This is the layer analogous to Project44's 8-billion-daily-signals risk ingestion: not a data warehouse, but a continuous inference engine.

Layer C — Derivative Applications

Layered on the core engine are three derivative applications: the Brand Value dashboard (waterBeta® and brand trust), the Portfolio Screener (waterVaR™ applied to multi-company exposures), and the Site Assessment module (basin-level siting risk with regulatory trajectory). These are the commercial-facing products, each priced and packaged for distinct buyer types.

Layer D — Market Validation

The platform has already generated external market validation: waterAlpha® data underlies active indexes on NASDAQ, the Nikkei 225, and STOXX. AWS, Kurita Water Industries, and Asahi Group are documented proof-point deployments. These are not pilot programs — they are evidence that institutional buyers have evaluated and integrated Equarius data into investable products.

This architecture mirrors the network-effect dynamic that FourKites describes as 'Connect Once, Access Everything' — where each new data connection and each new customer adds intelligence to the system for all participants. As Equarius adds company disclosures, basin coverage, and sector depth, the model improves for all customers simultaneously.

SECTION 7

Customer Engagement: Land, Expand, Compound

Equarius's go-to-market motion is modeled after the control-tower playbook: a high-value initial engagement that demonstrates ROI, followed by systematic expansion across the customer's enterprise, followed by compound revenue from adjacent products and data licensing.

Two Buyer Archetypes

The same underlying engine serves two fundamentally different buyers, which is the structural basis for multiple revenue paths from a single platform investment:

- **Risk Buyer** — CRO, CFO, Treasurer, credit teams. This buyer is asking: 'What is our water-exposed asset worth under stress, and what are we not pricing into our capital decisions?' The Command Center flagship, Brand Value-at-Risk, and Credit-Risk Data API all serve this archetype. Entry point: a single-object Command Center deployment for one geography or one commodity exposure.
- **Alpha Buyer** — Quantitative analysts, factor managers, smart-beta portfolio managers, index providers. This buyer is asking: 'Is water a priced factor I can systematically exploit, and can I get it in a form I can integrate into my models?' Factor & Alpha Licensing and Index Provider Partnership serve this archetype. Entry point: a data API or research subscription providing waterAlpha® coefficients and sector scores.

Land — Months 0–3

Convert AWS, Kurita, and Asahi proof-point deployments into referenceable case studies. Close first commercial Command Center contracts with two or three S&P 500 issuers in water-intensive sectors (semiconductors, mining, food & beverage). Deliver measurable outcomes — a siting recommendation, a supplier risk score that avoids a procurement decision, a waterBeta® EaR estimate that changes a treasury hedge position.

Expand — Months 3–12

Grow the number of monitored facilities, suppliers, and sites per existing customer. Add a second sector (e.g., from semiconductors to specialty chemicals). Introduce the Brand Value module to brand finance teams at existing customers. Initiate first Factor & Alpha Licensing conversations with quant managers at institutions already using waterAlpha® index products.

Compound — Months 12–24

Launch the Credit-Risk Data API as a standalone product for bank credit teams and rating agency analysts. Expand index provider partnerships to additional exchanges. Pursue strategic partnership conversations with Moody's, MSCI, or S&P Global (precedent: Moody's acquisition of Four Twenty Seven for climate risk data in 2019).

Revenue Path Summary

- Path 1: Command Center Flagship — ~\$300K/year per S&P 500 issuer. SaaS subscription for full three-object access.
- Path 2: Brand Value-at-Risk — Standalone module for brand finance and ESG teams. Lower ASP, higher volume.
- Path 3: Factor & Alpha Licensing — Data API for quant strategies. Per-seat or AUM-based pricing.
- Path 4: Credit-Risk Data API — Financial institution licensing. Per-query or annual enterprise license.
- Path 5: Index Provider Partnership — Recurring licensing fees from index administrators. Already validated by NASDAQ/Nikkei/STOXX.

SECTION 8

Market Sizing and Competitive Positioning

Total Addressable Market

The water risk intelligence market encompasses corporate risk managers, institutional asset managers, index providers, credit analysts, and regulatory compliance teams globally. Equarius estimates the TAM at \$5–10 billion — anchored by the ESG data and analytics market (Sustainalytics, MSCI ESG, Moody's ESG), the physical climate risk data market (Jupiter Intelligence, Climate X, Four Twenty Seven), and the supply-chain intelligence market (Project44, FourKites).

Serviceable Addressable Market (SAM): \$600 million to \$1 billion, defined as water-intensive S&P 500 and STOXX 600 issuers plus institutional asset managers with ESG mandates. Serviceable Obtainable Market (SOM): \$75–200 million, defined as approximately 250 S&P 500 issuers in highest-exposure sectors at ~\$300K average contract value.

\$5–10B Total Addressable Market	\$600M–1B Serviceable Addressable Market	\$75–200M Serviceable Obtainable Market (250 issuers × ~\$300K)
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Competitive Landscape

Existing alternatives fall into four categories, each with a structural limitation that the Command Center addresses:

- Annual ESG rating vendors (MSCI ESG, Sustainalytics) — provide point-in-time scores, not continuous intelligence. No scenario modeling. No facility-level granularity. No siting or supplier application.
- Physical climate risk platforms (Jupiter Intelligence, \$97M raised; Climate X, \$24.9M raised) — model physical hazard exposure (flood, heat, drought) but do not translate physical risk into financial coefficients. No stock-return model. No brand equity or EaR outputs.
- Consultants (Deloitte, McKinsey water practice) — high-cost, project-based engagements. No persistent platform. No real-time data. No SaaS economics.
- Water data vendors (WRI Aqueduct, CDP) — provide raw data without scoring, application, or financial translation. Equarius ingests these as inputs.

The Command Center's defensible moat is not the data — it is the IP stack (waterAlpha®, waterBeta®, waterVaR™, brandAlpha™) that transforms data into financially expressed decisions, combined with the network effect of cumulative company-year data that improves the model for all customers simultaneously.

SECTION 9

The Team

The Equarius team combines academic rigor in water risk quantification with commercial experience in enterprise SaaS, financial data, and engineering.

- Peter Adriaens, Founder & CEO — Professor of Environmental Engineering and Entrepreneurship at the University of Michigan. Principal researcher behind the waterAlpha® regression framework. Author of Adriaens et al. (2026), the peer-reviewed paper establishing the 2–6% stock-return coefficient. Led development of the waterAlpha® index products on NASDAQ, Nikkei, and STOXX.
- Iulia Mogosanu, Co-founder & COO — Leads platform operations, customer engagement, and go-to-market execution. Background in enterprise software commercialization and climate analytics.
- Tad Slawewski, Co-founder & CTO — Leads platform engineering, data infrastructure, and ML systems. Responsible for the machine-learning imputation layer that extends waterAlpha® coverage to non-disclosing companies.
- Tracy Gao, Lead Data Scientist — Leads quantitative model development, scenario modeling, and the live waterAlpha® Brand Dashboard. Developer of the waterBeta® EaR adjustment and brand trust coefficient.

The team's core credibility signal is that the product already exists and is already running. The waterAlpha® model is not a prototype — it is published research with live commercial deployments. The index partnerships are not letters of intent — they are active licensing relationships generating waterAlpha® data in real-time financial products.

SECTION 10

Why Now: The Convergence Window

Three forces are converging to open — and eventually close — the window for an independent water risk intelligence platform:

Regulatory Mandates Are Creating Demand

IFRS S2 (effective January 2023 for early adopters, 2024 for most large companies) requires climate-related financial disclosures including physical risk assessments at the asset level. The EU Corporate Sustainability Reporting Directive (CSRD, phased from 2024) covers 50,000 European companies and requires double-materiality assessments that explicitly include water stress. SEC climate disclosure rules (finalized March 2024) require material physical risk disclosure. These mandates are not voluntary — they are creating a compliance-driven demand signal for exactly the kind of facility-level, financially-expressed water risk data the Command Center delivers.

ESG AUM Is Seeking Investible Water Factors

Global ESG AUM exceeded \$40 trillion as of 2024. The fastest-growing segment is systematic, factor-based ESG investing — strategies that require quantifiable, back-testable, return-predictive factors. Water has been the missing factor: cited as material in hundreds of TCFD disclosures but never delivered as a priced, investible coefficient at scale. waterAlpha® is the first peer-reviewed, commercially licensed framework that meets this standard. The index partnerships with NASDAQ, Nikkei, and STOXX validate that institutional index providers agree.

Physical Water Stress Is Accelerating

The physical driver is also accelerating. The 2023 Global Water Monitor documented 2023 as the driest year on record for global river basins. The WRI projects that 25 countries — home to 25% of global GDP — will face 'extremely high' water stress by 2030. Corporate operational disruptions from water (Stellantis India plant shutdowns, TSMC water trucking in Taiwan, Codelco copper production curtailments in Chile) are appearing in earnings calls with increasing frequency. The gap between physical reality and balance-sheet valuation is widening.

The Window Will Close

Moody's acquired Four Twenty Seven (climate risk data) in 2019. MSCI acquired Real Capital Analytics (real estate) and Carbon Delta (climate scenario analysis). S&P Global acquired The Climate Service in 2022. The pattern is consistent: large financial data incumbents acquire validated, specialist climate risk platforms once commercial traction is demonstrated. The Equarius Command Center is at the stage where commercial traction is being established — before the acquisition window closes and before a well-capitalized incumbent replicates the IP stack.

Equarius Risk Analytics

The Command Center is the intelligence layer that enterprise capital allocation has been missing. Water risk is not a CSR concern — it is a financial factor with a measured, peer-reviewed coefficient, live commercial deployments, and a regulatory tailwind that is building toward mandatory disclosure. The platform is built. The data is running. The market is opening.

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