01.

Power & Water

Business Case: **Unlocking capacity without building new works**

Power & Water - Soneco® Enhanced Electrocoagulation

Water companies are under pressure to improve environmental performance, manage higher incoming flow and rising nutrient levels, and progress toward net-zero, all within tight budgets that demand doing more with less. Smaller and rural sites feel this pressure most. They rarely receive large capital upgrades, yet still need to meet permits, often on sites with limited space or funding for traditional upgrades.

Industrial operators face similar pressures. High-strength effluent, metals, and suspended solids can impact local networks, increase trade effluent charges, and require costly chemical treatment.

Across both sectors there is a need for simple, modular, low-disruption solutions that improve compliance and create headroom without major capital works.

Soneco® provides a compact, flexible treatment step that integrates alongside existing processes, offering a practical route to improved performance and additional capacity where larger upgrades may be delayed or impractical.

AT A GLANCE

Soneco® Advantages

- **No Chemicals / No pH Dosing**
- **Modular / No Civils**
- **Auto-Follows Load**
- **Three Deployment Modes**
- **Independent Utility Evidence**
- **Predictable Low OpEx**
- **Carbon + Sludge Reduction**
- **Operator-Friendly**

02.

Power & Water

Soneco®: **Electricity instead of chemicals**

Soneco® is an enhanced electrocoagulation process that generates coagulant on site using metal plates rather than delivered chemicals. Targeted ultrasound prevents passivation and maintains high efficiency. Because the process maintains stable pH, there is no requirement for pH correction, chemical bunding, or tanker deliveries.

The system is modular, skid-mounted, and sized to fit constrained sites. It integrates directly with SCADA and offers automated dosing control based on incoming load.

Deployment Modes: **Three ways to unlock capacity:**

At-source pre-treatment (trade effluent)

Industrial clients or large trade effluent producers can treat high-strength streams before discharge, reducing P-load and hydraulic load entering the works. This unlocks significant capacity in constrained networks and reduces trade effluent charges.

Treat-and-discharge off-works (decentralised treatment)

For new developments or industrial facilities, a Soneco® plant can treat effluent to discharge standard, avoiding the need to connect to a constrained wastewater system.

Load-shedding at the works (partial flow diversion)

A Soneco® unit intercepts and treats a portion of incoming flow, returning a low-P stream. Sites typically gain 20–30% additional effective capacity without new tanks or dosing systems. Units can also be deployed temporarily during outages.

03.

Operational Flexibility

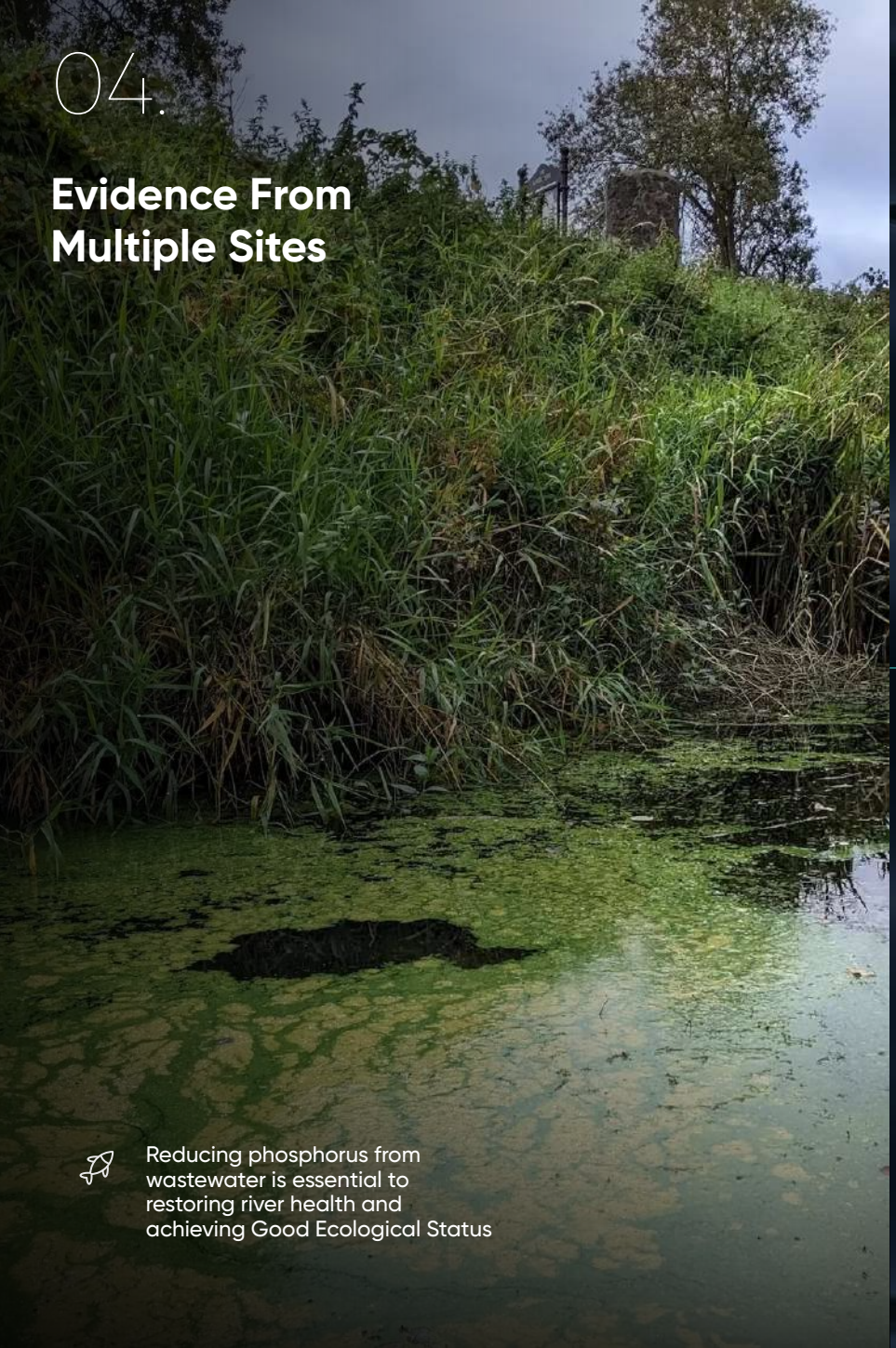
Soneco® offers flexibility rarely achievable with chemical dosing or conventional upgrades:

- Automatically follows influent load
- Easy on/off switching for resilience or maintenance
- Can run during low-cost / low-carbon energy periods
- Operates in parallel with existing treatment for reserve capacity
- Remote alarms and monitoring (Wessex resolved ~90% remotely)
- United Utilities operators reported Soneco® was easier to run than legacy EC systems

This flexibility minimises cost and carbon while providing a controllable relief valve during peak loads, storm events, maintenance shutdowns, or biological strain.

04.

Evidence From Multiple Sites



Reducing phosphorus from wastewater is essential to restoring river health and achieving Good Ecological Status

CASE STUDY

United Utilities: **Performance Validation**

United Utilities (UU) conducted a multi-phase evaluation of alternative phosphorus-removal technologies as part of its Alt-P programme, funded under Ofwat's innovation framework.

The programme assessed four electrocoagulation systems side-by-side under identical feed conditions, using UU-owned Phosphax instruments to generate a continuous, independent dataset across several trial phases.

The Soneco® lane delivered stable, repeatable phosphorus reduction across varying feed quality, conductivity, and site conditions. The filtered orthophosphate signal - the performance metric preferred by United Utilities - showed that Soneco® delivered competitive and reliable results compared with chemical dosing controls and the other technologies under review.

This dataset is one of the strongest pieces of independent evidence available for EC performance in UK utilities: long-running, instrument-grade, and generated entirely by the utility.

CASE STUDY

Scottish Water Horizons: **OpEx & ROI**

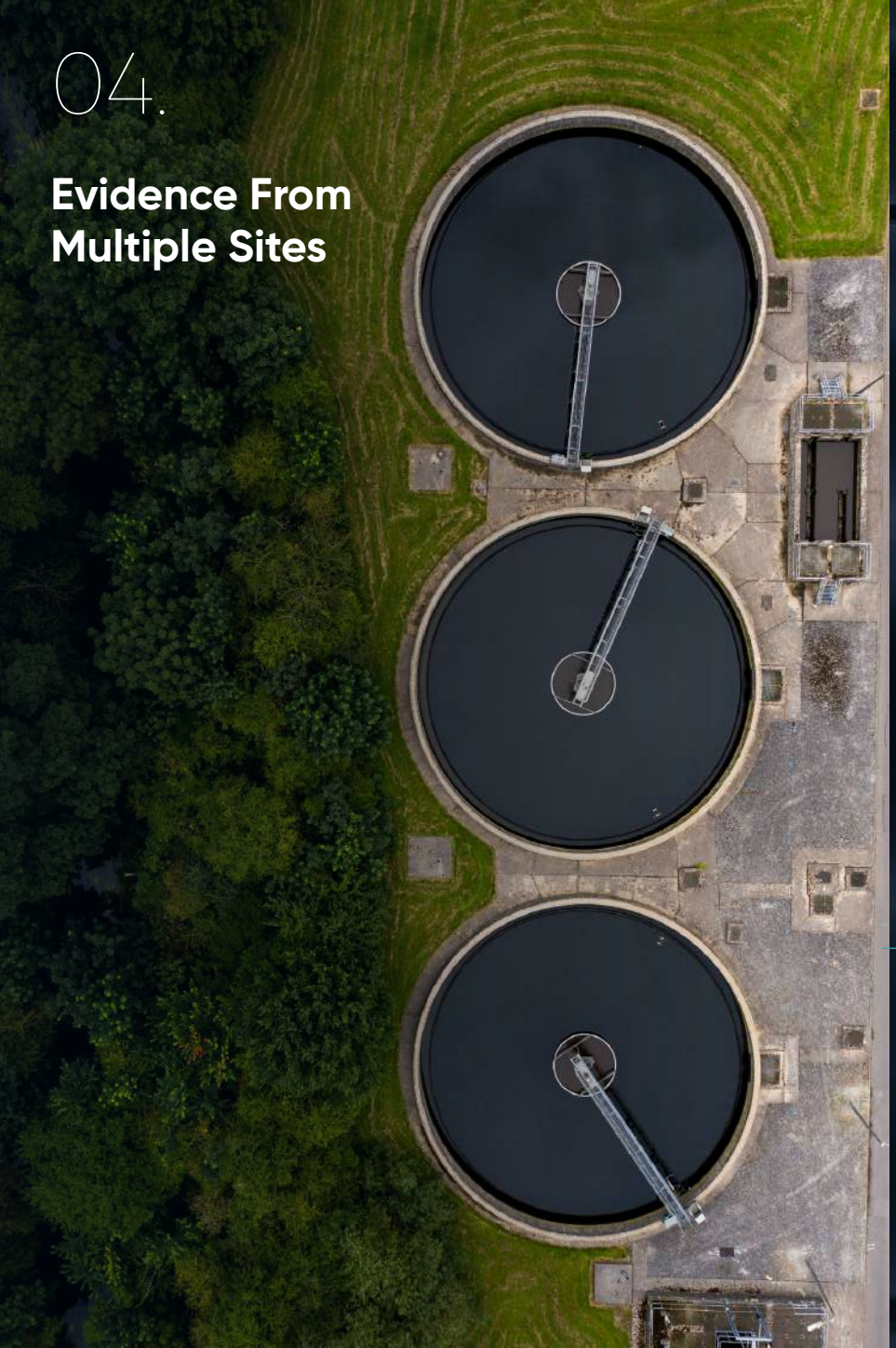
Scottish Water Horizons undertook a structured assessment of Soneco® across three different wastewater streams: screened crude, post-primary, and final effluent.

- **SRP reduced to <1 mg/L across streams**
- **Total P reduced to ~0.2 mg/LLowest SRP achieved: 0.05 mg/L**
- **Power cost: £0.02–£0.50/m³ depending on influent strength**
- **12-week trial cost: ~£65**
- **No pH correction required**
- **Significant COD reduction (beyond settlement alone)**

This trial created the clearest normalised OpEx dataset for Soneco® to date. With chemical consumption eliminated and pH stabilised, power becomes the primary, predictable operating cost, allowing utilities to estimate both steady-state and peak-load operating costs with confidence.

04.

Evidence From Multiple Sites



CASE STUDY

Wessex Water: Capacity Creation, Carbon Reduction and Operational Simplicity

Wessex Water needed to meet a ≤1 mg/L P permit with <4 mg/L Fe residual at a small rural works with several physical constraints: narrow access, flood risk, and no space for chemical storage or bunding. Traditional phosphorus-removal upgrades were not feasible without significant civil works.

At sites like this, traditional ferric or alum dosing would require tanks, bunding, dosing lines, and supporting civil works - infrastructure that is rarely prioritised for small rural sites. Soneco® avoids this by generating coagulant on site, providing the required performance without new chemical storage or construction.

RESULTS

- ≤1 mg/L P achieved consistently
- ~90% of alarms resolved remotely
- No chemical deliveries (plates changed ~every 40 days)
- −82% embodied carbon / −51% operational carbon (independent assessment)
- Simplified operator routine with full SCADA visibility

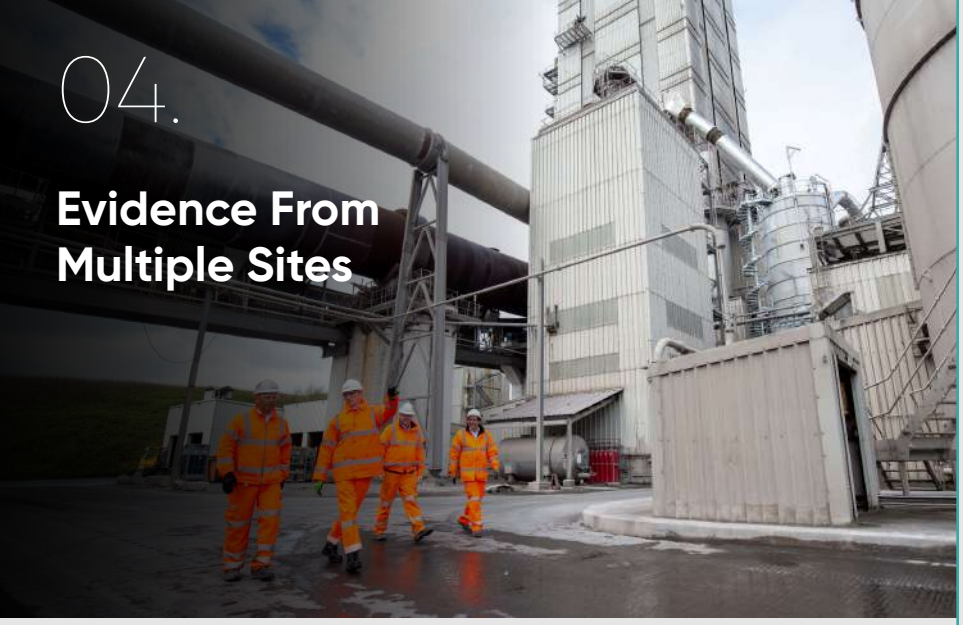
In operational terms, the site is a low maintenance, remotely managed process that offers predictable running costs and reduces the burden on local operators - important for rural locations with limited staffing.

This allowed clear comparison of dose requirements, energy use, and phosphorus removal efficiency across a range of influent strengths.

Engineering Assurance & Procurement Confidence

A new treatment step must demonstrate predictable behaviour - technically, operationally, and commercially. Power & Water provides this through a Process Calculation Summary that goes beyond basic sizing. It sets out the dose envelope, expected plate life, power profile, reactor configuration, OpEx, and SCADA requirements in the same analytical format utilities use to assess chemical dosing or filtration upgrades. This enables engineers to interrogate assumptions, test sensitivities, and compare Soneco® directly with established options.

All the assurance considerations built into the summary are backed by independent utility datasets, giving procurement teams confidence that projected performance and OpEx reflect real-world behaviour.



04.

Evidence From Multiple Sites

CASE STUDY

Industrial Application: **Hanson Cement**

Industrial sites often deal with highly variable, high-strength wastewater and increasing pressure to reduce chemical use and improve water efficiency.

Hanson Cement needed a treatment step that could manage this variability while enabling internal effluent reuse and supporting its sustainability commitments. The site's reuse objectives placed additional demands on effluent clarity, stability, and metals removal.

A bespoke DB1i at-source unit was installed to treat a key process stream prior to reuse. Over an 18-month operating period, the system demonstrated stable, repeatable performance across a broad operating envelope:

RESULTS

Power & Water

- TSS reduction: 92%
- Turbidity reduction: 96%
- Iron removal: 86%
- Metals and suspended solids generally >95% removal
- pH remained stable with no correction chemicals
- Treated effluent reused continuously within site processes
- Sludge quality suitable for reuse, supporting circular-economy objectives
- Automated control-maintained dose efficiency despite fluctuations in load

Beyond compliance and reuse, the trial showed that Soneco® could smooth out the high variability typical of heavy industrial wastewater, producing a consistent, low-solids effluent suitable for internal recycling. This reduces abstraction requirements, lowers disposal costs, and offers a replicable model for other cement, aggregates, or manufacturing sites with similar solids, metals, or reuse drivers.

Carbon & Sludge Reduction

Independent modelling by Mott MacDonald shows meaningful carbon reductions at both construction and operational stages, driven by Soneco's compact footprint, lower embodied materials, and efficient power use.

Operators report noticeably drier, more consistent sludge, linked to stable pH and reliable floc formation, which simplifies handling and can reduce transport volumes.

Although municipal dryness values are still being compiled, electrocoagulation is known to reduce up to 80% of sludge volume compared with conventional liquid chemicals, depending on the contaminants and applications.

05.

Summary

Soneco® is a proven, adaptable treatment step that enables utilities and industrial operators to do more with less – improving compliance, creating headroom, and reducing operational burden without major capital works. Independent datasets from United Utilities and Scottish Water Horizons demonstrate predictable performance and OpEx, while deployments at Wessex Water and Hanson Cement show stable operation across environments ranging from constrained rural works to high-strength industrial streams.