Learning summary

- Traditional quality metrics often ignore hidden resource waste from unstable processes
- Quality tools such as root-cause analysis can be used to address resource waste in processes
- Water and energy waste can then be integrated into quality management systems

A new quality metric?

As organisations face rising resource constraints, quality professionals need to ask if water and energy waste belong in their core metrics, says **Robert Kurek** CQP MCQI

During a routine management review, a manufacturing site identified that its water and energy costs had increased by more than 15% year on year. No quality alerts had been raised, customer complaints remained stable and defect rates were unchanged. From a traditional quality perspective, the operation appeared to be under control. Yet a closer look revealed that additional rinse cycles had been introduced to compensate for process variation and equipment was routinely run at higher temperatures to guarantee output. The organisation had solved quality symptoms, but at the cost of significant, unmeasured resource waste from water and power.

This type of scenario is becoming increasingly common and raises a fundamental question for the quality profession: if waste caused by unstable processes is a quality failure, why are water and energy losses still treated as operating costs rather than quality losses?

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Why quality needs a new lens

Cost of Poor Quality (CoPQ) is a powerful framework for translating quality performance into financial language. By quantifying losses such as scrap, rework, warranty claims and customer complaints, quality professionals have demonstrated the impact of ineffective processes to justify investment in improvement.

However, rising energy costs, increasing pressure on water resources and growing expectations around sustainable performance have exposed a significant gap in how operational losses are defined and managed.

Large volumes of wasted water and energy remain mostly invisible within traditional quality metrics. In many organisations, these losses are monitored – if at all – by finance or sustainability teams, not through the quality management system. As a result, many organisations never trigger root-cause analysis, corrective action or systematic improvement to address waste.

This separation raises an important challenge for the quality profession: if waste is a quality failure, why are water and energy losses excluded from quality metrics?

Defining the Cost of Poor Sustainability

If quality metrics reflect the realities facing organisations, they must evolve to capture losses that extend beyond traditional defect-related costs. One way to do this is by introducing a complementary concept to CoPQ: the Cost of Poor Sustainability (CoPS).

For the purposes of quality management, CoPS can be defined as: the financial, operational and reputational cost of wasted water, energy and environmental resources resulting from poor process quality.

This definition is intentionally pragmatic. It does not frame sustainability losses as ethical failures or regulatory obligations. Instead, they are direct outcomes of ineffective process design, uncontrolled variation and insufficient risk management – which all fall squarely within the remit of quality professionals.

Two sides of the same problem

While CoPQ and CoPS address different manifestations of loss, they share common root causes. CoPQ makes visible the cost of producing outputs that don't meet requirements; CoPS highlights the cost of inefficient inputs while trying to meet the same requirements.

Viewed together, the relationship is clear: processes that are incapable or unstable generate defects and resource waste. The losses are rarely intentional; they arise from decisions made to compensate for uncertainty, rather than from robust process control.

CoPS already exists in most organisations, but it is typically buried in overheads and utility bills rather than recognised as a quality signal. Examples include:

- excessive water consumption driven by unstable upstream processes;
- energy spikes linked to equipment variation, poor calibration or uncontrolled start-up conditions;
- resource losses caused by weak maintenance planning or unclear process ownership.

By naming and defining these losses as Cost of Poor Sustainability, a bridge is created between sustainability objectives and the quality management system. This allows established quality tools to be applied, delivering immediate operational and financial benefit.

Where quality failures create sustainability losses

Sustainability losses often arise from the conditions that generate poor quality outcomes: process instability, inadequate control and incomplete risk assessment. From a quality perspective, this makes water and energy waste understandable and preventable.

Process variation and resource waste

Process variation sits at the core of CoPQ and CoPS. When processes operate outside statistical control, organisations often respond by adding safety margins rather than addressing root causes. These margins frequently take the form of overprocessing, directly increasing water and energy consumption.

Typical examples include additional rinse cycles to compensate for inconsistent cleaning performance, extended run times to ensure output meets specification, or higher temperatures to offset equipment variability. While these actions may reduce ➤

the immediate risk of defects, they mask underlying issues and create a continuous drain on resources.

Applying Statistical Process Control to resource consumption makes losses visible. Metrics such as kilowatt-hours per unit produced or litres of water per cycle are monitored in the same way as dimensional characteristics or performance outputs. Once variation is reduced and processes stabilised, resource usage often decreases naturally.

A fundamental quality principle applies equally here: variation is the enemy of quality and sustainability.

Design and risk-management gaps

Another significant source of sustainability loss is during the design of products and processes. Environmental impacts are frequently excluded unless driven by regulatory or customer requirements, although tools such as Process Failure Mode and Effects Analysis (PFMEA) are well established for identifying quality and safety risks.

As a result, potential failure modes related to resource use often go unrecognised and unprioritised, despite their potential long-term cost and operational impact.

One practical way forward is to expand PFMEA severity criteria to include environmental impact. This requires a broader interpretation of failure effects. By considering whether a failure mode leads to excessive water or energy consumption, alongside traditional quality, safety and delivery impacts, organisations can integrate sustainability risks into existing decision-making processes.

For quality professionals, this represents an evolution of established risk-based thinking, applying familiar tools to challenges that are increasingly central to organisational performance.

Treating water and energy waste as nonconformities

If water and energy losses are understood as outcomes of poor process quality, how should they be managed? From a quality management perspective, the answer is clear: as nonconformities.

In many organisations, excessive resource consumption is tolerated as an operational overhead rather than challenged as a failure to meet defined requirements. Utility usage may be tracked by finance or sustainability teams, but it is rarely governed through the quality management system.

Reframing these losses as nonconformities brings them into the scope of established quality processes, managed using familiar quality mechanisms:

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Variation is the enemy of quality and sustainability

- **Root-cause analysis** to identify underlying drivers of excessive consumption.
- **Corrective actions** focused on process improvement rather than short-term containment.
- **Effectiveness verification** to ensure reductions are sustained over time.

This approach aligns closely with the intent of ISO 9001, particularly Clause 9 (performance evaluation) and Clause 10 (improvement). Treating water and energy waste as nonconformities strengthens the scope of quality management, ensuring all forms of waste are addressed with the same level of discipline and rigour.

Evolving role of the quality professional

While assurance, compliance and defect prevention remain essential, there is a growing expectation that quality functions will contribute directly to operational resilience, cost control and sustainable performance.

Quality professionals are trained to view organisations as interconnected systems. This perspective is increasingly valuable as water and energy constraints expose the dependencies between process design, operational stability and resource consumption. By applying systems thinking, quality professionals can identify where variability in one area creates waste or risk elsewhere and drive improvements that deliver quality and sustainability benefits.

A defining capability of the quality professional is the ability to turn data into insight. Monitoring water and energy usage through a quality lens enables early detection of abnormal trends, supports evidence-based decision-making, and strengthens the link between improvement activity and financial outcomes.

Rather than relying on high-level sustainability targets, quality professionals can help organisations focus on actionable and measurable process-level indicators.

Water and energy performance often sits across multiple functions, and quality professionals are well placed to act as integrators. By embedding CoPS thinking into management review, corrective action systems and risk registers, quality professionals can help organisations move from aspiration to execution.

Perhaps most importantly, quality professionals have an opportunity to influence how quality is defined in future. The effective quality professional will not abandon traditional tools. Instead, they will apply them broadly, demonstrating that robust quality management is fundamental not only to product conformity, but also to efficient, responsible and resilient operations.

Business benefits of adopting CoPS

Adopting CoPS is not about adding new reporting layers or expanding the scope of quality management unnecessarily. It is about making existing losses visible and addressing them with the same discipline applied to traditional quality failures. When used effectively, CoPS delivers tangible financial, operational and strategic business benefits.

Improved cost control and financial performance

Water and energy waste represent direct, recurring costs. By identifying these losses as CoPS, organisations can move beyond high-level utility monitoring and focus on process-level drivers of consumption. Reducing variation and overprocessing often leads to immediate savings without capital investment, improving margins and increasing the return on existing assets. In many cases, the financial impact of CoPS reduction rivals or exceeds that of traditional CoPQ initiatives, particularly in energy- or water-intensive operations.

Greater process stability and capability

Processes that consume resources inefficiently are often unstable by nature. Addressing CoPS typically requires improved process control, clearer operating parameters and more effective maintenance strategies. This enhances overall process capability, reliability and predictability, so organisations experience fewer disruptions, lower defect rates and improved consistency in output.

Reduced risk and stronger governance

Treating water and energy waste as quality failures strengthens organisational governance. CoPS-related risks are visible within management review, risk registers and corrective action systems, reducing exposure to supply constraints, regulatory pressure and reputational damage. This approach also improves readiness for future standards and reporting expectations.

Enhanced cross-functional alignment

CoPS gives a common language that connects quality, operations, finance and sustainability functions. By framing resource waste as a quality issue, organisations avoid siloed initiatives and ensure that improvement efforts are aligned with broader business objectives.

This alignment reinforces quality professionals as facilitators of continual improvement, enabling more effective collaboration across the organisation.

Challenge to quality community

The quality profession faces an important moment. The principles that underpin quality management remain as relevant as ever. What is changing is the context in which those principles are applied.

Water and energy constraints are no longer distant environmental concerns. They are operational realities that affect cost, resilience and reputation. Yet, in many organisations, resource waste is addressed through parallel initiatives rather than integrated into core management systems. This raises questions for the quality community.

- Should water and energy waste be recognised as quality failures, not operational inefficiencies?
- Should excessive resource consumption trigger the same corrective action processes as defects or customer complaints?
- Is it time to expand established models such as CoPQ to include CoPS as a standard quality metric?

For quality professionals, these questions represent a challenge and an opportunity. As the quality landscape evolves, the question is not whether sustainability belongs in quality management, but whether quality management can afford to exclude it.

FURTHER LEARNING

Read: The (many) Rs of sustainability: bit.ly/4rnHqT2

Watch: Water efficiency: why is it important for a sustainable organisation? bit.ly/465XJve

Listen: The new language of quality and sustainability: bit.ly/4qIPHzP