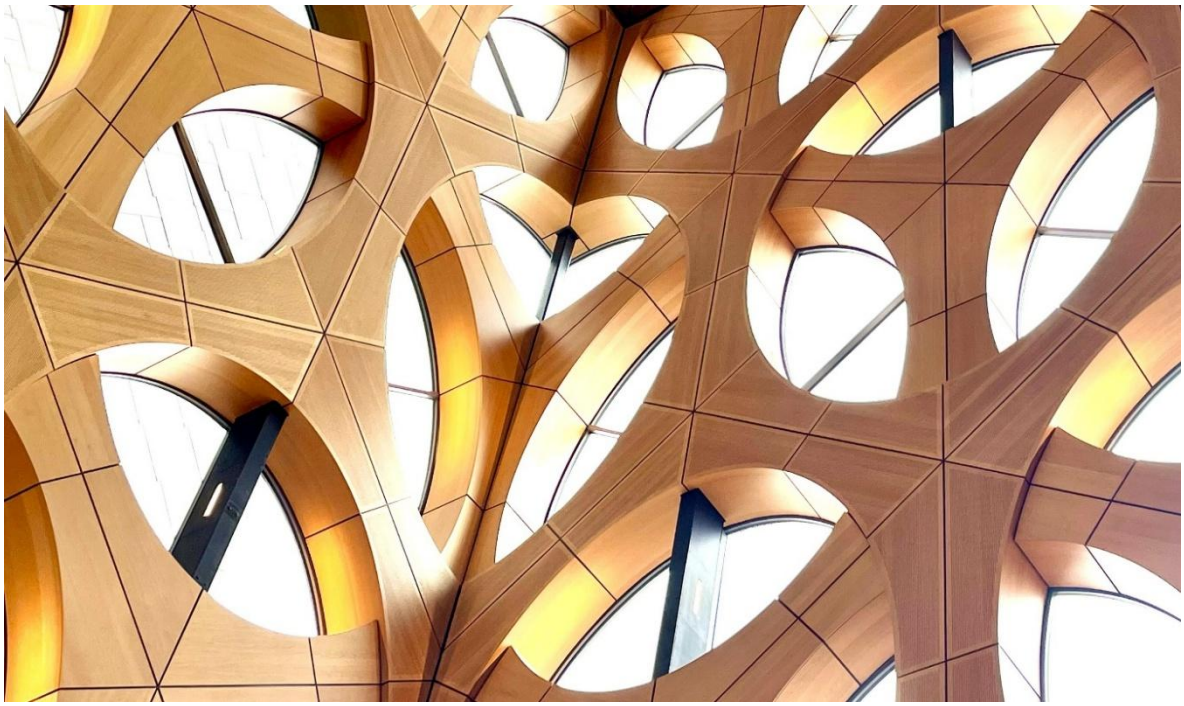
AklysTransform

Resilient or Robust? The Asset Management Choice for European Utilities and Grid Operators

Designing robust asset management systems under ISO 55001 for European utilities, and the continuing role of resilience.



***Esmé Fantozzi**, October, 2026*

Asset management systems need both resilience and robustness. The real question is not which to pursue, but where each should prevail.

For European utilities and transmission operators the question is anything but theoretical. Climate extremes are no longer rare events. Prolonged droughts, intense heatwaves, flash floods, wildfires and highly variable renewable output sit increasingly inside the usual operating envelope. The likelihood and impact of these events keep rising in risk matrices. Aging networks and constrained capital make design choices ever more consequential.

The core concept is straightforward: design the asset management system so that it holds performance through conditions that used to be rare but have now increased frequency. Reserve classical recovery capacity for events that remain rare. ISO 55001 provides a relevant decision-making framework for decisions of this nature. AI can help you improve performance, but decision choices belong to the executive team.

RESILIENCE AND ROBUSTNESS

Resilience describes a system's capacity to absorb disruption, adapt or reconfigure, and recover (or even transform) so that essential function is restored or improved.

Robustness is the ability of a system to maintain performance within acceptable bounds under stress, disturbance, or uncertainty without needing to change its structure or operating mode.

PLAN FOR THE RANGE, NOT THE AVERAGE

Most asset-management and maintenance processes are still tuned to the mean: average load, average temperature, average demand. Robustness asks a different question: can the system and its supporting processes deliver acceptable performance across the bulk of the probability distribution, roughly within ±1 or ±2 standard deviations of expected conditions, without structural change or the need for emergency recovery?

When days above 35 °C move from a handful per decade to dozens per summer, they cease to be outliers. They become part of the new normal, and the acceptable performance envelope must widen. Designing an Asset Management System (AMS) to hold the performance of the assets it manages inside that widened - but still statistically bounded - range it may become cheaper than accepting frequent excursions outside it and facing the recurring cost of rapid recovery.

Using Florence, Italy as an example makes the shift concrete. In 2000 the city recorded 13 summer days above 35 °C. In 2026 it recorded 57, exceeding the previous intense-heat benchmark of 48 days set in 2003. In 2026, Florence also experienced its hottest summer (June–August) since 1950, its hottest September, as well as 99 days above 30 °C. Applied work on the Southern Apennine water supply system in Italy already uses formal *robustness* metrics for investment appraisal under uncertainty for exactly this reason.[i]

WHY RECOVERY-FIRST IS EXPENSIVE

Many water and electricity networks are beyond design life and rehabilitation has not kept pace with need. Capital is constrained. A resilience strategy that accepts higher failure rates and then pays for rapid recovery or emergency reinforcement quickly becomes costly.

Robust design reduces both the frequency and the severity of those recoveries. In practice this means redundancy where it matters most, conservative design envelopes, and proactive condition-based interventions that keep assets inside acceptable performance bands.

ISO55001 AS A USEFUL DECISION FRAMEWORK

ISO 55001 already requires evidence-based, risk-informed decision-making. The 2024 revision, together with its supporting documents on data and people, places stronger emphasis on life-cycle value, risk and performance. Framing asset management around “hold within the expected range rather than recover after leaving it” provides a practical lens for setting asset-management objectives, criticality criteria and performance indicators.

The same framing also addresses the double materiality of climate-related risk. Climate is already amplifying risk to the operator’s assets and service, while the operator must simultaneously reduce its own environmental footprint. ISO 55001’s whole-life-cycle risk perspective covers both sides.

AI: AMPLIFIER OF THE AVERAGE, OR INSTRUMENT OF DISCERNMENT

AI can reinforce either the problem or the solution, depending on how it is applied.

Used poorly, most current systems optimise around historical means and patterns that dominate the training data. In doing so they amplify the average: they improve efficiency under the conditions that have been most common, while remaining relatively silent on the wider envelope that now constitutes normal operations. The result is greater exposure. Decisions become sharper around the mean and more brittle once conditions move even modestly away from it.

Used well, AI can be deployed as a set of reasoning agents that support the design choice itself. These agents can test performance across a probability distribution, identify where assets and processes already hold inside the widened envelope, and flag where they do not. AI can surface the points at which a robust response (hold performance without structural change) remains feasible, and the points at which classical resilience (absorb, recover or transform) is still required. In this role AI does not replace executive judgement; it makes the boundary between the two strategies more visible and more evidence-based.

The technology is therefore neither a strategy nor a neutral tool. It either entrenches optimisation around the average or helps the organisation decide, with greater precision, where robustness should lead and where resilience must remain.

THE PRACTICAL RULE

If a condition now falls inside the widened range of normal, design to hold through it. If it remains a rare event outside that range, plan to absorb and recover.

Test the rule against your own system. Review asset-management objectives, criticality criteria and performance indicators and identify which still assume the average summer of 20 years ago. These are the first candidates for redesign.

WHERE TO TAKE IT FROM HERE

If you are working out which parts of your asset management system should be designed for robustness and which still need classical recovery capacity, AklysTransform would be glad to contribute to the conversation.

ABOUT THE AUTHOR

Esmé Fantozzi founded AklysTransform, a consultancy that turns energy-transition and sustainability strategy into results in operations and capital allocation. She spent more than 25 years in global leadership roles at major energy companies and joint ventures across Europe, the United States, the Middle East and Asia, where she led operational and asset-management excellence, digital transformation, and strategies that delivered long-term field results. She holds a Master of Engineering in Supply Chain and Logistics from MIT and a Laurea in Physics from the University of Padua and serves as an independent board director at the biotech company, Enifer.



Acknowledgements

Ed de Vroedt of OHROS Consulting Group for the sparring partnership on our ISO 55001 work.

[i] Arena, C., Cannarozzo, M. and Gullotti, G. (2025) 'Insights into Robustness as a Criterion to Support Cost-Benefit Analysis of Supply-Enhancing Investments under Uncertainty. Part II – Investment Evaluation and Robustness Appraisal', Water Resources Management, 39, pp. 7709–7725. Available at: https://doi.org/10.1007/s11269-025-04314-3