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When a new transformer takes four years, performance becomes strategy

How intelligently are we managing the transformers we already own?

Transformer performance management and partial discharge management in an era of four year lead times.

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Strategic Asset Management

July 2026 | Amstelveen, Netherlands



For decades, transformers quietly performed their task in the background. Reliable, predictable and rarely discussed outside engineering circles. Today, they have become one of the most strategic assets in the global economy.

The International Energy Agency now identifies grid equipment as one of the greatest bottlenecks to the Energy Transition. Even the *Financial Times* has begun writing about transformers with the same urgency once reserved for oil, semiconductors and rare earth minerals. That alone should tell every boardroom something profound.

The world is electrifying faster than its infrastructure can keep pace.

Demand continues to accelerate. Networks are expanding. Existing assets are being pushed harder than ever before. Yet the very equipment upon which this transformation depends has become one of the scarcest industrial resources on earth.

The numbers are sobering.

The IEA reports that delivery times for large power transformers have stretched to as much as **four years**, almost twice what they were only a few years ago, while acquisition costs have risen by approximately **75 percent** since 2019. Manufacturers such as Hitachi Energy, Siemens Energy and GE Vernova have record-breaking order books, are investing billions in additional manufacturing capacity and still openly acknowledge that supply constraints are unlikely to disappear before the end of this decade.

Read that again.

Four years.

That single number fundamentally changes the economics of transformer management. It also changes the definition of resilience.

For decades, utilities managed transformer fleets assuming that replacement capacity would eventually become available. That assumption no longer exists.

A transformer that unexpectedly fails today is not simply an operational incident. It can become a strategic vulnerability affecting network reliability, investment programmes, customer confidence, regulatory performance and, ultimately, corporate reputation.

The industry's first response has naturally focused on procurement. Order earlier. Sign framework agreements. Expand manufacturing capacity.

Necessary? Absolutely. Sufficient? Not even close.

Because the greatest opportunity does not lie inside a factory, it already exists inside every utility, it is sitting in substations throughout the network.

The transformer fleet you already own has quietly become one of your most valuable strategic assets and that completely changes the conversation.

Every additional month of reliable operating life extracted from an existing transformer now creates value that simply did not exist a decade ago. Every prevented failure avoids years of uncertainty. Every intelligent maintenance decision strengthens operational continuity. Every investment based upon evidence instead of assumptions protects scarce capital.

Suddenly, performance is no longer measured only in technical indicators.

Performance becomes strategy.

This is precisely why our work increasingly revolves around two disciplines that can no longer be separated.

1. Transformer Performance Management and Partial Discharge Management.
2. Transformer performance begins with one deceptively simple question.

Do you actually know the true condition of every transformer in your fleet?

Not so much its age, neither its book value nor the date of its last inspection, but its actual health?

Health indices, dissolved gas analysis, loading history, thermal behaviour, insulation condition, fleet risk modelling and dynamic transformer rating convert disconnected technical measurements into executive decision intelligence.

They allow operators to confidently determine which assets can safely continue operating, which require intervention, which investments can be postponed and which transformers represent unacceptable business risk long before failure occurs.

This is when evidence replaces assumptions and risk becomes measurable. Also, and not a minor benefit, is that capital becomes smarter and that resilience becomes intentional.

Yet there is another dimension that has become even more important.

Every experienced transformer engineer understands the significance of partial discharge. It is often the earliest indication that insulation degradation has begun and that failure is no longer a theoretical possibility but a developing reality.

Historically, however, one important limitation remained.

Utilities could often determine **that** partial discharge existed.

Determining **exactly where** it originated inside the transformer—and doing so while the transformer remained in service—was considerably more challenging.

Today, that limitation is disappearing. As advisors, we have always remained technology agnostic. Our responsibility is not to promote vendors or products, but to identify those innovations that genuinely improve asset performance and create measurable value for our clients.

Occasionally, however, an innovation emerges that is so significant that remaining silent would be irresponsible. The industry has now reached exactly such a moment.

A new generation of technology is capable of detecting partial discharge **in real time while simultaneously pinpointing its exact physical location inside the transformer.**

More than simply an incremental improvement, this is a breakthrough.

For the first time, utilities can move beyond knowing that deterioration exists to understanding precisely where it is occurring, how rapidly it is developing and whether immediate intervention is required. Maintenance becomes targeted instead

of reactive. Risk becomes visible instead of hidden. Resources are deployed where they create the greatest value.

In a world where replacing a failed transformer can require four years, this changes far more than maintenance planning.

It changes resilience, as resilience has never been about surviving failure but about preventing failure before it becomes inevitable. And clearly, the boardroom implications are profound.

...“Transformer management is no longer an engineering discipline, but a capital allocation and enterprise risk management.”... (Ohros Group CEO)

By the way, it also provides ESG credibility, regulatory confidence and shareholder value, especially the taxpayer’s interest. Also in the citizens’ interest is the assurance of national infrastructure resilience, next the to vibrating perception of leadership.

The organizations that recognise this shift earliest will not simply experience fewer outages. They will operate with greater flexibility, stronger financial performance, more confident regulators and significantly greater strategic freedom while competitors continue reacting to events they could have anticipated.

The IEA has already explained why transformers matter.

The real question every executive team should now ask itself is no longer how quickly new transformers can be purchased. The real question is infinitely more valuable.

How intelligently are we managing the transformers we already own?

@ohrosconsultinggroup @optics11

APPENDIX

Sources

The following sources are cited or drawn upon in this article.

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