

Gearbox decisions can run to hundreds of thousands of pounds. The right answer depends on who is asking © Atharra

# The engineer nobody employs

**Words:** Ian Urquhart, Managing Director, Atharra

## For most of onshore wind's history, the engineering decisions on a wind farm sat with whoever held the risk. As full-scope contracts fall away and revenues tighten, those decisions are landing with owners.

The recommendation arrives on page 14 of a quarterly service report. Condition monitoring on turbine 7 has shown a rising signature on the gearbox high-speed shaft bearing for eight months, and a borescope inspection has confirmed spalling on the outer race. The service provider recommends a full gearbox exchange in next summer's low-wind season. The quote is attached. Under the new partial-scope contract, the owner pays.

In many cases a quote like this is approved with little challenge. Nobody doubts the bearing is damaged, and nobody on the owner's side has the time or the specialist knowledge to ask whether an up tower bearing replacement, or another year of monitoring, would do the job. The difference between those options can run to hundreds of thousands of pounds.

For most owners, this used to be someone else's decision. Then the market changed.

### How the risk moved

Maintenance still usually comes with a new turbine, and manufacturers work hard to tie owners into long-term agreements. For most of the industry's history those agreements were full scope: they covered the major components and guaranteed availability. If a gearbox failed, the manufacturer replaced it at their cost.

The owner's operating expenditure was broadly fixed, and the engineering judgement sat with the people who held the risk. It suited both sides: a competitive service agreement helped sell the next turbine, and owners could finance wind farms against predictable costs.

That model began to break down around 2017. In Great Britain, the Renewables Obligation closed to new onshore wind on 13th May 2016, and the domestic new-build market fell away. With fewer new turbines to sell in mature markets, manufacturers had less reason to price service keenly to win the next order.

At the same time, the fleet was getting older. As turbines age, major component failures become more likely and more expensive, and a full-scope contract that guarantees availability on a 15-year-old machine is a much bigger risk than the same contract on a new one. Service became a business expected to earn its own margin. For one of the largest manufacturers, it accounted for about a fifth of 2025 revenue but more than half of operating profit.

Manufacturers have priced in the risk of ageing machines. Once turbines pass fifteen years, full-scope terms become more expensive, narrower or are not offered at all. Some owners renewed at prices that eat into the returns they were relying on.

Others signed partial-scope agreements whose exclusions and caps leave the most expensive components with the owner. And some are now in contract positions that are hard to leave, because the provider holds the data, the software access and the spares.

### Three pressures at once

The first is the risk itself. When the owner pays for a major component, the decision about that component moves too. A gearbox exchange is no longer covered by the contract. Once the crane, the labour and weeks of lost production are counted, it can run to around half a million pounds.

The maintenance history often stays behind: records of past failures, repairs and modifications, along with the reasoning behind them, sit in the provider's systems, so the owner can end up with the obligation and only part of the record needed to inform decisions.

The second is revenue. In Great Britain, Renewables Obligation support ends on 31st March 2027 for assets accredited on or before 25th June 2008, and owners elsewhere in Europe face the same step as early support schemes expire.

A wind farm earning merchant prices has less margin for a wrong call. Replacing a component too early wastes capital. Running it too long risks secondary damage and a much longer outage.

The third is people. In our experience, lower revenue means smaller teams, and engineering is an easy overhead to trim, just as the number of engineering decisions landing with the owner is rising.

A mixed portfolio might include five manufacturers, a dozen platforms and turbines from three different decades. Gearbox metallurgy, blade structures, converter electronics and control software are separate specialisms. No single person covers them all, and fewer owners can justify a team that does.

Put together, owners face more decisions, with more money riding on each and fewer people to make them.

### The choices on the table

Owners do have real options. They can renew with the manufacturer on the terms offered, move to an independent service provider or take on more themselves through partial-scope or maintenance-only contracts. Each is legitimate, and for many fleets the move away from full scope makes sound commercial sense.

None of them removes the engineering decision. They change who makes it and what that party stands to gain. A provider paid to carry out repairs is often the quickest and best-informed source of advice, and most handle that conflict professionally. But an exchange is usually more work than a repair, and a provider that recommends the cautious option is rarely blamed if it proves unnecessary, so commercial interest and caution tend to point the same way.



Ian Urquhart




Up tower repairs can avoid a full exchange, if someone asks the question

The contract shapes the answer before the engineering does. The owner's own engineers understand the commercial picture best, but are often spread across too many platforms to go deep on every finding.

### The right repair

What owners need is the right repair for that asset in that situation. Sometimes that is the cheapest option and sometimes it is the gold standard. It should come from someone who gains nothing from whichever option is chosen, and who is judged on how the turbine performs afterwards.

The following case study shows what that looks like. An owner had a main circuit breaker at 9,650 operations against a rated limit of 10,000, with no confirmed lead time on a replacement. The obvious response was to stop the turbine before the limit was reached and order a new breaker. That answer is safe for whoever gives it, but not necessarily for the asset or its commercial performance.

The engineering answer started with a photograph. It was enough to identify the breaker, and the documentation showed that its limit could be extended to 15,000 operations with maintenance.

That turned an imminent deadline into a planned task. Setting out what a failure would actually do, which on that design could escalate as far as loss of the turbine, made it clear that the maintenance should not wait.

The most useful finding came last. Every circuit breaker builds up operations through isolations and the occasional protection trip, but this one was approaching its limit far sooner than it should have, because the converter design operated it on every turbine start and stop.

A known retrofit removes that duty and leaves the circuit breaker with only its normal workload, so the problem does not come back a few years later. Instead of a forced stop with no end date, the owner had a planned maintenance task and a route to a permanent fix.

None of this needed new monitoring equipment. Detection has improved enormously and is rarely the weak link now. The weak link is the step after it: judging how serious a finding is, how quickly it will progress, what to do about it and when.

### What owners can do

There is no single right structure, but some principles apply whichever route an owner takes.

Separate the advice from the work. On any decision above a set value, get an engineering view from someone who will not carry out the repair, and who is as willing to challenge a cautious 'stop it' as an optimistic 'keep running'.

Define the decision maker and write it down. Many operations & maintenance (O&M) contracts are precise about scope and silent about decision rights. Before the next tender, set out who has the final say on major component interventions and what data and inspection reports the owner receives, in what format and how quickly. These are far easier to secure at tender than halfway through a contract.

Keep the history in one place. Engineering judgement improves with context: the maintenance record, earlier findings on the same turbine, how the same turbine model has behaved elsewhere in the fleet. When that history is scattered across provider portals and inboxes, every new finding starts from scratch.

Put a price on waiting. Every finding has a cost of delay, in lost production and in the risk of secondary damage, and lead times only add to it. Asking for that figure alongside the recommendation turns 'is it safe?' into 'what is the right option for this asset?', which is the question an owner needs answered.

On resourcing, large owners with uniform fleets can justify an in-house reliability team with enough breadth to cover their platforms. For mid-sized and mixed portfolios, more owners are retaining external engineering support that sits on their side, learns their assets and their appetite for risk and stays with the fleet, so that knowledge builds up instead of being lost after each engagement.

### Deciding on purpose

Every owner of an ageing wind farm is already making these engineering decisions. Some make them knowing what each option means for the asset. Others make them by default: when nobody is available to challenge a recommendation, the first quote that arrives becomes the decision.

As support schemes end, the owners who do best will be the ones with an engineer on their side when it matters.

atharra.com