

# Risk based asset management strategies

## Challenge and objective

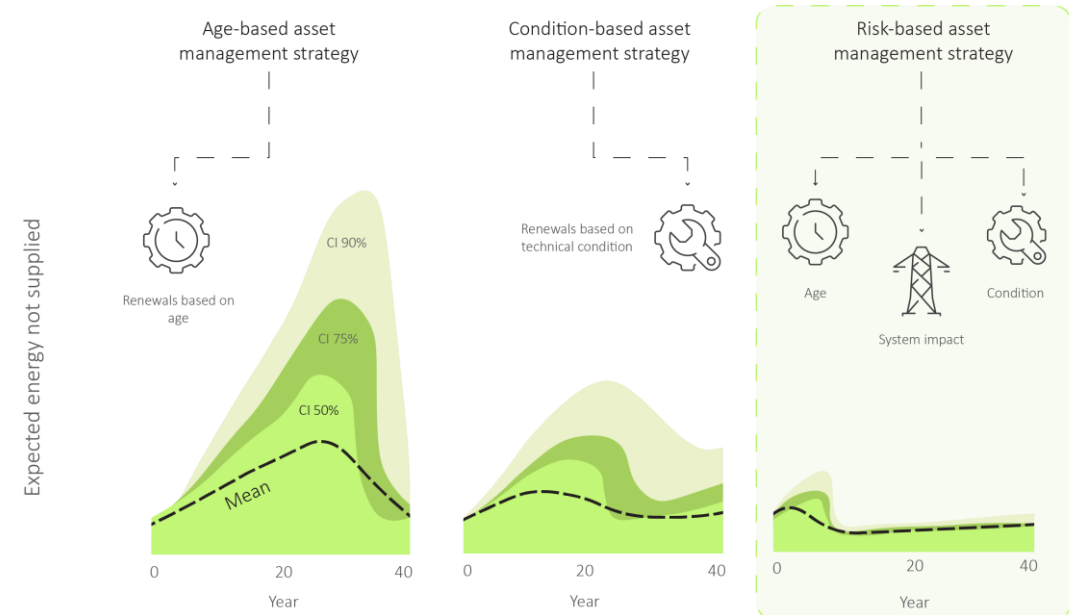
- Component degradation is a major risk to reliability of supply.
- This risk can be mitigated by risk-based asset management strategies.
- New methods are needed to 1) Assess the combined influence of degradation and asset management on reliability of supply 2) Provide decision support and evaluate the effectiveness of different asset management policies.
- The objective is to develop methods for simulating the effect of asset management strategies on reliability of supply.

## What have we learned?

- Risk based asset management strategies which consider both the structural importance and technical condition of individual components, can achieve acceptable reliability of supply at a lower cost than purely condition based strategies.
- Common methods for power system reliability analysis do not fully capture the risk of high impact, low probability events such as double outage of transformers. Therefore, reliability analysis should be combined with condition-based criteria.
- The impact on reliability of supply from individual components can be ranked and offers practical risk-based decision support for prioritizing asset management actions.
- Findings are based on two different case studies are performed [1, 2]: The first considers reinvestment and replacement of power transformers on a long-term planning scale of several decades. The latter considers inspection and maintenance of circuit breakers on an intermediate time scale of a few years.

## Implications and recommendations

- Risk-based asset management strategies can give considerable lifecycle savings on reinvestment and maintenance costs while keeping the reliability of supply at a satisfactory level.
- Risk-based strategies should also consider the vulnerabilities with respect to long outage durations after component failures and poor technical condition of critical components.
- There is a great deal of uncertainty about how fast each component will degrade. Therefore, it is important to include this uncertainty in the risk prognoses.
- The risk prognosis is most useful for time horizons where the role and importance of the components in the system remain the same (typically up to around 5 years).



[1] I. Bjerkebak, I. B. Sperstad, H. Toftaker, and G. Kjolle, "Simulating the Long Term Effect of Asset Management Strategies on Reliability of Supply," 2024, *TechRxiv*. doi: [10.36227/techrxiv.172107759.95745501/v1](https://doi.org/10.36227/techrxiv.172107759.95745501/v1).

[2] S. Perkin, "VulPro Work Package 4 - Landsnet Case Study," report, Landsnet, 2024.