Risk-spend efficiency: Moving beyond “Where is my risk?” to “What should I do about it?”

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July 12, 2022

Over the past few years, E Source has gotten extremely good at predicting the location of outage risks for electric utilities—both across the system and at a granular level.

I’ve worked at the forefront of this effort and am equal parts delighted and amazed by how far we’ve come in helping utilities understand precisely where, and to what degree, outage risk exists across hundreds, and often thousands, of miles of power lines.

I had thought that pioneering these data science and data-driven approaches to outage risk prediction would be our crowning achievement. But I was only half right.

Helping utilities answer the question, Where is my risk? is absolutely critical, but only in service to answering a more important follow-up question: Given that risk, what should I *do* about it?

Welcome to the world of risk-spend efficiency

Risk-spend efficiency is a progressive concept gaining traction in the utility sector. It aims to improve, or reduce, the cost-per-unit benefit of capital and operational maintenance investments by using risk- and cost-based analytics to guide management decisions and actions.

This predictive approach, rooted in data, enables utilities to optimize high-ticket operations and maintenance (O&M) expenses such as vegetation, storm, and wildfire management and strategic capital investments.

Knowing instead of guessing could mean the difference between prosperity and hardship for an industry reckoning with:

- The competing demands of electrification growth
- An aging infrastructure
- More-frequent and more-severe weather events
- Equity issues
- Downward cost pressures

Acting on risk: Moving from guessing to knowing

So how did we get to *knowing*? It wasn't easy. In fact, it took years.

First, we had to tackle the risk side of the risk-spend efficiency question. That effort focused on using past outage event data to quantify the probability of outage events given variables such as infrastructure age, composition, maintenance history, and environmental and climatic conditions, among others. Then, using this data, we continued to innovate, building and refining models capable of predicting both the probability and the frequency of outage events anywhere on the grid, right down to the subcircuit level.

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Keep in mind that data scientists aren't just data jockeys; we're scientists guided by the scientific method. We use scientific processes and analytical inferences to understand the data.

And I can tell you from personal experience that our understanding of data has improved greatly over time in a way that's analogous, ironically, to how machine learning learns as it goes.

I say this because AI is often misunderstood as a *deus ex machina*, a great black box that descends from the heavens and solves all problems. It's not.

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As a result of the incremental and exponential improvements that have ensued, E Source can now harness powerful methods and data sources to pinpoint and rank-order risk—that is, predict accurate risk scores—across the power grid.

Amazing? Yes. Useful? Yes. Enough? No.

More than scoring risk

Thankfully, we've kept going when others might've stopped. We've taken the next step, applying what we've learned in our pursuit of precision risk prediction to tackle the "spend" side of risk-spend efficiency. Namely, we've costed out the risk.

So how does that work?

Because we can tap into various datasets germane to mitigation costs, including a utility's own maintenance-cost records, we can model both the costs and the benefits of management actions.

When utilities are armed with the financial and reliability impacts of mitigation efforts—from vegetation management programs to major capital investments such as undergrounding power lines—they can make better decisions that help them react nimbly to budget changes or drive top-line growth. In other words, the same methodology that propelled our risk-prediction capabilities has also informed our cost calculations.

Then, we put the two together to provide utilities with a new cost-benefit decision support tool, aka risk-spend efficiency.

Making the (use) case for risk-spend efficiency

So how are utilities using risk-spend efficiency to advance their interests and those of their customers?

While we're still in the early days of unlocking, unleashing, and evolving this approach to data-based decision-making, utilities are already reaping noteworthy benefits.

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For example, the ability to marry outage risk with financial impacts and reliability improvements has led to many successes in vegetation management. One of our clients logged its best year ever for the fewest tree-related outage interruptions, winning a top industry award in the process.

The same goes for storm-outage mitigation, where outage-forecasting models are giving utilities more time to prepare, respond, and recover from outage events—again helping them optimize expensive storm-response decisions.

The risk-spend efficiency approach is also showing it can work across functions and silos to support capital investment planning.

For instance, several utilities have employed the approach to evaluate the costs and benefits of capital improvement strategies, such as undergrounding or rebuilding segments of power lines, to help develop capital improvement plans. This solution has factored in avoided O&M costs—such as the reduction in tree trimming and storm-related outages—over various timelines to boost each utility's capital case.

Risk-spend efficiency: A catalyst for the Sustainable Utility

Essential to life as we know it, utilities literally power the world. But they're already expensive to own and operate, and now they require more investment to meet a myriad of mounting existential challenges.

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