Strategic Perspective Needed in T&D Asset Management

Jonathan Rich, Pallav Sudarshan, and Leonard Bertrand

At an increasing pace, power system outages are destroying billions of dollars in value every year. The United States endures more blackouts than any other developed nation, with the number of incidents and hours of outage increasing steadily for the past few decades.

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It is forecasted that 7,000 miles of new transmission will be needed to meet the Clean Air Plan and $2.1 trillion by 2035 will be required to improve grid technologies and infrastructure. The Department of Energy reports costs of $150 billion per year to American business resulting from power outages. While it may be easy to grasp this idea that there is some value to keeping the lights on, how many utilities explicitly think about and, more importantly, quantify that value in decisions around asset management?

Asset management does not exist within an organization just because there is a job function defined around it. It is a business capability that is required within the fabric of a wide spectrum of stakeholders, from planners in the office to linemen in the field. Many challenges and pitfalls present themselves in managing transmission and distribution (T&D) assets that result from the highly complex industry and organizations in which T&D lives. These challenges and pitfalls create the potential for significant value losses and can only be addressed by taking a strategic perspective to asset management.

A strategic framework is important when thinking about outages and investments in infrastructure. When large transmission outages happen, investments are redirected to correct what caused it. For example, at many utilities you will see cases where numerous outages caused by trees lead to significant investments in vegetation programs. This reactive approach to managing investment in infrastructure leads to overinvestment in one area and starvation in other critical areas, especially with constrained budgets.

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There is a better way to plan long-term to avoid moving the problem from one place to another. However, this is not the most straightforward of problems and therefore does not have a simple solution. There are many complexities—underinvestment in aging infrastructure, increasingly overloaded systems, accumulating backlogs of work, resource constraints, a workforce on the verge of retiring, rapidly changing technologies, and evolving regulation, to name a few.

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 DOI 10.1002/gas.21903

Add organizational complexities to deal with on a day-to-day basis to the mix, without the needed tools to address the problems. It is no wonder we keep hearing about headaches of managing these assets. Thinking strategically about asset management by considering both work process improvements and decision-making processes should be part of the solution.

T&D executives express challenges related to asset management within their organizations, many of which distract from the core value of keeping the customers' lights on at the least cost. How do you maintain the reliability of the grid and maximize shareholder/ratepayer value? Maintaining reliability and maximizing shareholder value appear to be conflicting forces. As shareholder money is being spent to keep the lights on, there is little immediate sense of a return on investment.

On one hand, utilities don't want to overspend shareholder money for the sake of reliability; on the other, they don't want to position the company for long-term consequences that could harm the shareholders even more. Understanding the value of investments and looking at them from a strategic framework shed light on this question.

NEED FOR A STRATEGIC, VALUE-BASED APPROACH TO ASSET MANAGEMENT

Asset management strategies are a challenge.

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There are many forces within an organization that make asset management difficult: traditions and habits, existing practices or processes that do not work well, and the lack of interdepartmental coordination. These forces increase the cost of doing business, lead to lost opportunities, and are inefficient and ineffective. Most critically, these forces lead to an unintentional lack of strategic alignment.

Complicating matters, corporate strategic objectives are often not well-understood and communicated, and are frequently lacking in actionability. This lack of clarity makes it tough for everyone in the organization to act in accordance with the strategic objectives, even if they want to and are trying to do so. Everyone can have the best intentions, but without a clear understanding of the direction and how to get there, those intentions won't be realized. Having a clear understanding of value, where trade-offs are explicitly understood between the major sources of cost and value such as reliability, customer needs, compliance, and doing work at the lowest cost, is a key to overcoming the challenge of an asset management strategy.

While it may be clear that asset management is desirable for the organization, the natural question that comes up is, "Why should asset management be strategic?" Let us imagine a utility has an equipment replacement strategy in place today with a sense of how many replacements the utility should be doing every year and some data on conditions that help the utility select the next replacements. It may budget those replacements across all the different equipment types that the utility manages based on some criteria.

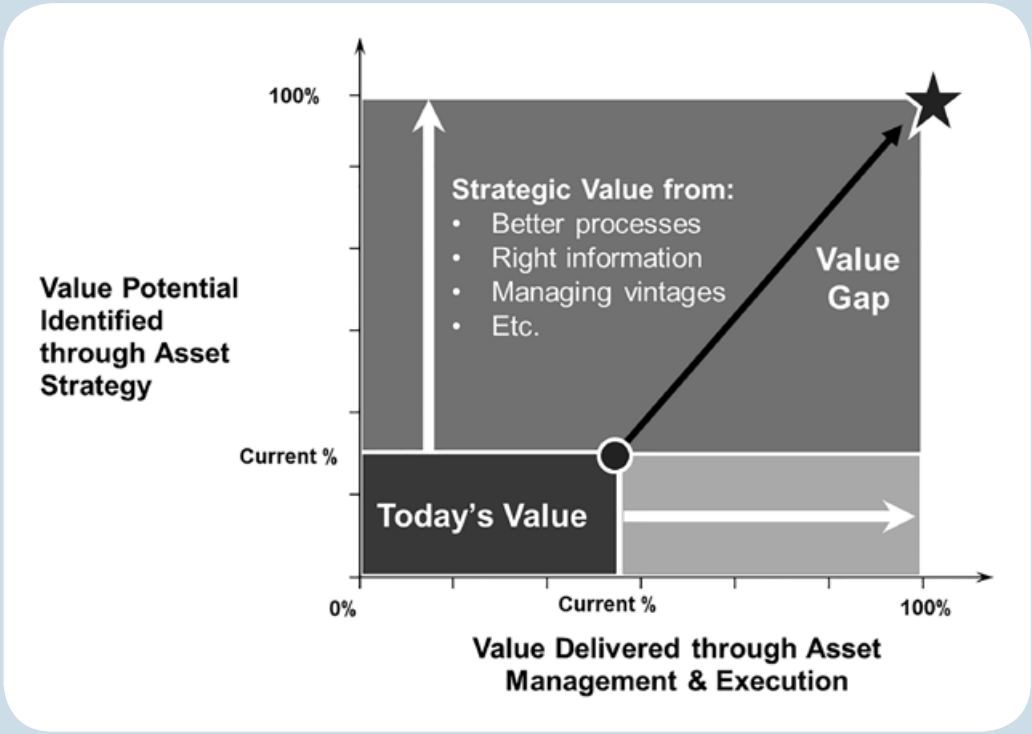
But that isn't enough. Can this plan be executed, and are there opportunities for additional value creation? Avenues exist to create more value through better asset management and execution by replacing equipment at the right time, but there also are implications of considering the impact of multiple vintages or processes that could affect costs.

This is where thinking about assets with a strategic frame can create significant value. Better asset strategies take into account the value of managing vintages and how to get there through processes for technology selection, leading to lower replacement and maintenance costs. The procedure should take into account processes for bundling work, considering the information needs, and identifying different decision criteria that could feed a replacement plan.

The value gap (**Exhibit 1**) that typically exists is the result of a lack of realizing the full potential on both execution and on having an asset strategy, but the main source of value potential comes from an asset strategy because this first ensures that the right problems are being addressed. Once a strategy has been determined, good asset management and execution should exist to best deliver that value potential. Knowing what the strategy is will provide the guidance to the teams on the ground that will be executing and ultimately delivering that value.

A strategy provides the path to steady state (**Exhibit 2**), and getting there requires more than just a replacement plan. When we talk about a strategy, we can think of it as a means to arrive at a vision for success. This idea can be visualized as a mountain that we want to climb through execution to reach some desired destination. Different visions for success have implications for how to execute and arrive at the desired destination. Because

Exhibit 1. Why Should Asset Management Be Strategic?



of all the challenges and complexities, there is a tendency for T&D companies to postpone work and accumulate a backlog.

Many companies we have encountered are looking for a plan to make the backlog go away. Removing it would be part of a vision for success. Other elements in a vision for success may include minimizing total infrastructure cost while maintaining higher reliability, most of the work being anticipated, or having the planned outages required to do the work.

An underlying goal with a strategy is to solve the problem to get to the success vision one time. Achieving this goal gets a utility to steady state with level resource requirements and predictable costs year to year. This destination is where the confidence exists that the backlog will not re-emerge and work will be planned with long-term visibility to that plan. Getting there takes more than just a replacement plan, however, because utilities need to find ways to both make sure the right plan is defined and the context for delivering that plan is established. To set up this context, the decisions to be made need to be defined and a quality approach needs to be followed to decide on the path to the top of the mountain.

Strategic asset management is first based on continually making quality decisions. There are six key principles to help come up with the best, most-defensible decisions:

1. *Appropriate Frame*: The right questions need to be asked to make sure the frame is not too narrow and all decisions on the table are considered. Is the decision about just figuring out how and when to replace equipment, or is it about how to best manage a portfolio of investments?
2. *Creative, Doable Alternatives*: The spectrum of nonincremental ideas needs to be considered to ensure that the option that creates the most value is included in the pool of alternatives. Have we thought about more than just the alternative to "replace equipment faster" and considered options like investing in data acquisition to identify the worst equipment to replace first?
3. *Meaningful, Reliable Information*: Decision-making should be fed with the best available knowledge that can be obtained within the desired time frame for making a decision. Do we have quality data and subject-matter

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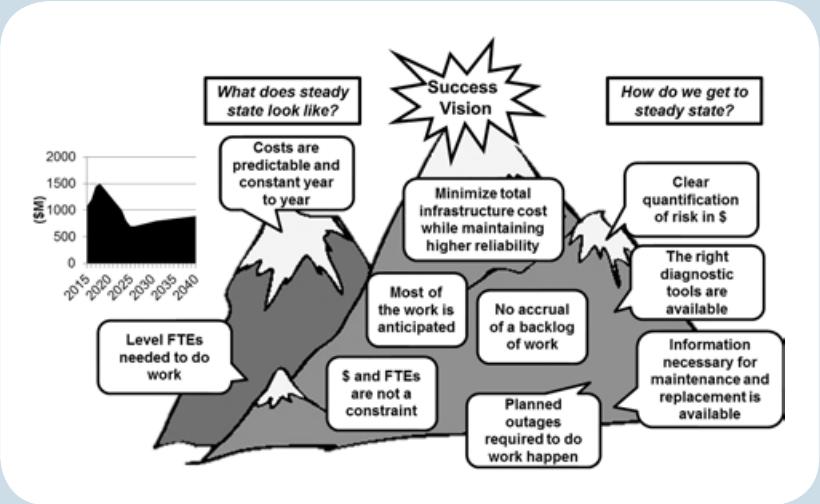
Exhibit 2. Steady State



experts that can provide accurate replacement costs for equipment and likelihoods of equipment failure?

4. *Clear Value and Trade-offs*: All sources of value that a decision impacts, including the easily quantifiable and "hard-to-quantify" values, must be considered with trade-offs defined. How do we compare the creation of $1.00 of value to the shareholder to the value of avoiding a customer outage?
5. *Logically Correct Reasoning*: The decision reached should be based on solid, well-vetted logic that is consistent with the ability to replicate the analysis that leads to a decision, including all perspectives. Would all stakeholders in the decision agree that the logic is sound?
6. *Commitment to Action*: A decision based on a great, well-thought-out plan driven by asking the right questions, good data, and the right reasoning has no value if it sits in a presentation and doesn't find its way into the real world. Does buy-in to the decision and a commitment to carry it out exist from the executive level all the way down to the field crews?

The ability to follow the above elements will enable a quality decision that provides direction and alignment to point all within the organization toward the vision for success.

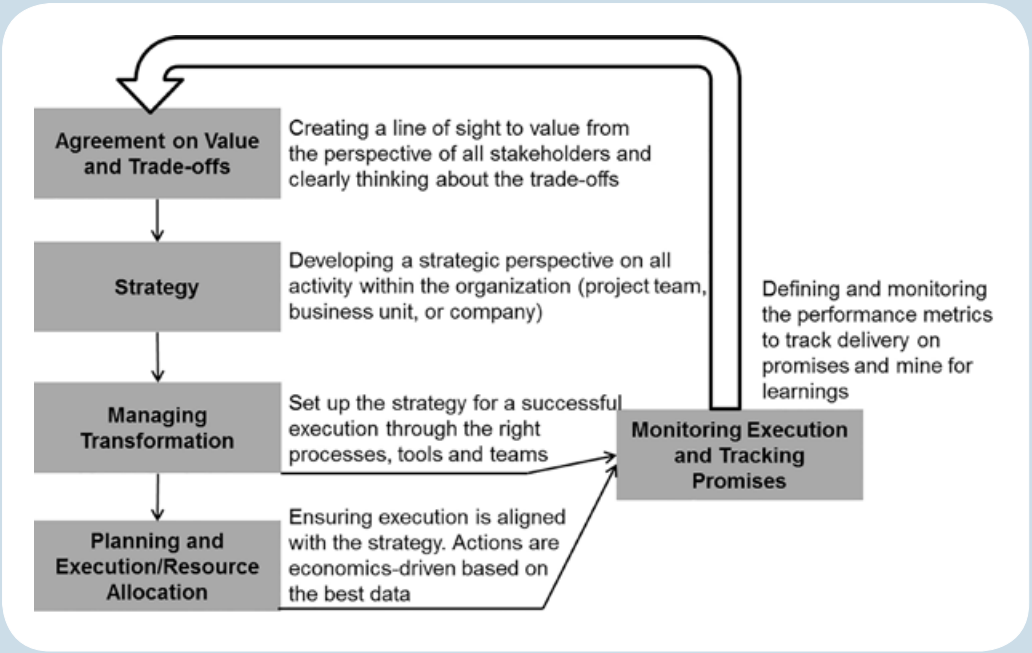
To reach the vision for success and abide by the six elements of making a quality decision, an overall value-creation framework is needed (**Exhibit 3**). This framework must start by agreeing on the value measures and trade-offs that provide a clear line of sight to value for all the key stakeholders. The development of a strategy that creates the most value potential can follow and should be set up for successful execution by managing the transformation of the strategic decisions to the realization of the value identified. The allocation of resources as part of execution will continue on an ongoing basis but should remain aligned with the strategy to ensure the success vision is reached. This progress can be monitored and tracked as time progresses to determine the course corrections needed in execution.

In developing an asset management strategy, it is important to establish the clear line of sight to value where all significant sources of value and risk are considered and quantified and everyone in the organization can translate actions into value created. The strategy sets the stage for all the value-creation activities to follow. When looking at allocating limited resources to the highest-value investments, a utility must first be able to define what constitutes "high value." To capture the total economic value of an investment, utilities should consider both the total ongoing cost and the reliability value. If these sources of value are ignored, the utility could end up with a system that is less reliable than desired.

An example can be found when looking at an investment in visual displays for dispatchers in

  / DOI 10.1002/gas

Exhibit 3. Value-Creation Framework for Strategic Asset Management



the Control Center. At first glance, the question may be asked as to why displays are needed that will cost a fortune—the dispatchers have all the real-time information needed to make decisions right at their fingertips. However, if all significant sources of value are considered, a full picture emerges beyond just the efficiencies dispatchers may be able to achieve.

We see the benefits that displays have on helping dispatchers reduce their response time during events in the avoided unplanned customer outage cost. The ability to better visualize the outage plan and find areas for potential coordination among assets can reduce the planned outage costs. In this frame, it is important that capital and operations and maintenance investments are compared side-by-side with shareholder value and economic value impacts. Resource-allocation efforts move away from advocacy and gaming toward quality decisions. A language is in place to discuss the value of investments, and all investments can be evaluated and fairly compared across the business units.

A value-based approach provides the line of sight to value and tells us how close we are to the success vision, allowing utilities to be more efficient and productive in getting there.

ADDRESSING THE CHALLENGES AND PITFALLS IN ASSET MANAGEMENT

In pursuing an asset management strategy, there are many pitfalls as a result of the complex organizations and T&D industry in which asset management must live. Each of these pitfalls has a significant consequence if not addressed but can be avoided by taking a strategic, value-based approach. Ultimately, this will help move organizations toward their vision for success. See **Exhibit 4**.

Companies are faced with more challenges every day. This won't go away anytime soon.

The unifying element of all the potential pitfalls in asset management is that utilities can find better ways to address them by taking a strategic frame and by explicitly thinking about all the sources of value. We need to acknowledge that it is not an easy path, because it can be a new journey for many companies. The ever-evolving challenges in the industry provide the first hurdle to jump over. The industry is changing quickly, and companies are faced with more challenges every day. This won't go away anytime soon.

To help utilities get over these hurdles, though, utilities can begin to think long-term

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Exhibit 4. Challenges and Pitfalls

Common Pitfall	Consequence	Potential Elements of Strategic Solution
Mounting Backlog: Because of a period of underinvestment, a backlog of work emerges. Utilities tend to throw money and resources at addressing it without thinking strategically about preventing future backlogs.	The problem is postponed to the future, where the backlog can re-emerge, ultimately costing the utility more to address it and threatening reliability in the meantime.	• Overinvestment today to achieve a long-term steady state • Replacement based on an economic life cycle • Better management and selection of technologies • Setting processes efficiently getting work done
Limited Resources: Work is not done because of limited resources—FTEs, capital, planned outages, etc.—and many of these are hard constraints. Even in the face of these constraints, utilities typically do not look at different ways to do work.	The backlog of work continues to grow as a result of continued underinvestment, and significant effort is spent on trying to understand what work should be done in the face of constraints.	• Increased coordination among assets and programs • Up-to-date documentation • Pretesting of equipment before deployment to avoid rework • Specialized training
Prioritizing Investments: Decisions on which projects get funded are based on advocacy, instead of on questions like equipment criticality and impacts to system reliability.	Huge value potential is left on the table since there is no guarantee that investments are being made in the assets that most cheaply ensure reliability.	• Shared and explicit definition of value across the organization • Economic value that includes the cost to the utility and customer • Quantification of all sources of value and risk • Clearly defined processes to enable decision readiness
Perception of Risk: When risk is not understood, a strong motivational bias exists to be very conservative and replace equipment earlier than when economic. This bias is typically observed in organizations where people don't feel good about the perceived state of the system.	A sense in the organization that the right actions are not being taken is accompanied by overinvestment in system reliability.	• Risk should be quantified using Total Economic Value • Communicate clear trade-offs between investment and reliability • Use range estimates for uncertain variables in analysis
Field Execution: Decisions are often disconnected between the planning and field groups. Often, what is decided at the planning level breaks down by the time it reaches field execution.	Equipment in the field may be replaced too early, and it is not guaranteed the optimal equipment is being replaced. This can lead to an overinvestment in reliability for the sake of convenience.	• Both participating in the development of a strategy • Using the same decision criteria and value lens for any decisions • Consider enforcement mechanisms that unite the planning logic with field actions
Managing Information: With the ever-increasing availability of information, people have a tendency to overcollect information. This is typically accompanied by a feeling that a decision cannot be made without more information.	Unnecessary time and money is spent collecting information that may not impact the decision at hand, delaying decisions with "paralysis by analysis."	• Collect the information needed to execute on and track the progress of the strategy • Understand the value of various types of information, relative to the cost of acquiring it
Organizational Change: Many people in an organization believe they are on the right path for enabling a strategy as long as the budget is available to do the work; however, the strategy design may call for different work practices that require a shift from the current path.	Investment can be made toward a new strategy, but the value potential of the strategy is not realized because the organization is implementing along the current plan and does not receive the necessary organizational support.	• Education and training on the strategy to all key stakeholders • Strong management support • Continued communication and feedback to track progress • Clear processes in the strategy for leadership and governance

and strategically about how to arrive at some destination—a vision of success. This vision provides the direction needed to reach a place where many of the challenges are eliminated by operating in this great place called steady state. Adopting a value frame gives utilities the compass needed to figure out both where they are on the journey and how close they are to their destination. Decisions are made with a clear line of sight to value and to ensure that utilities move forward as efficiently and productively as possible.

This may all sound good in practice, but the real question remains to be asked, what's at stake? Why should this approach be considered? And to be consistent with taking a value-based approach, we've seen cases of utilities that moved from their view of an "optimized" replacement strategy rooted in good asset management and execution to asset strategies that provided a line of sight to value.

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