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The utility ecosystem

Building a “Total Cost of Energy” utility ecosystem

Same book, different pages

Power & Utilities (P&U) company executives continually work to balance Capital Expenditure (CAPEX) efficiencies, Operations & Maintenance (O&M) cost pressures, and energy system reliability. But even though everyone is reading the same book about managing materials and services costs, they may be on different pages: Operations is focusing on uptime and reliability, engineering is working on design specs, finance is worried about return on capital deployed, and procurement is concentrating on delivering lowest total cost of ownership, typically within O&M.

It's time for everyone to get on the same page and take a proactive, holistic approach to managing materials and services costs. Doing so can drive step-change improvements across all facets of a utility's business, including upstream suppliers and downstream customers, and produce a Total Cost of Energy (TCE) ecosystem.

It's not an increase in demand, it's a change in demand

Renewables and unconventional generation will increase to almost 20% of generation by 2038, a 72% increase.[1] As electricity becomes a more widespread source of consumers' energy (HVAC, vehicles, mass transit, etc.) and distributed generation increases, the demands on the electric grid may become unprecedented. Utility companies will need to make investments from the meter back to the generation facility and virtually everything – from transformers, to cable, to substations, to transmission lines, to generation facilities – will need to be upgraded or replaced. Compounding these infrastructure challenges may be Public Utility Commission (PUC) demands to ensure that rates reflect building-out the new grid and align with the benefits achieved. In short, utilities may have to do much more with significantly less, so effective materials and services cost management is essential.

Managing competing priorities

In the past, most infrastructure improvements and all storm restoration costs were passed on to ratepayers. This is not necessarily the case today, nor may it be in the future. Utility companies are struggling to adapt to a new reality where many PUCs are:

- Demanding flat-to-negative real rates
- Unwilling to fund large-scale infrastructure projects needed to replace aging infrastructure without tangible benefits
- Increasing scrutiny of new technologies that promise to drive grid reliability and provide scheduling and pricing flexibility

Compounding this new reality is some utilities' reliance on 100-year-old infrastructure (plants, lines and sub-stations). To "keep the lights on," utilities rely on incremental CAPEX, break-fix maintenance (also known as "run to failure"), and storm response to concurrently provide services to ratepayers and generate an acceptable return to shareholders. Add the need to modernize the external supply chain and associated back office functions, and the potential for competing priorities and tapped-out budgets becomes apparent.

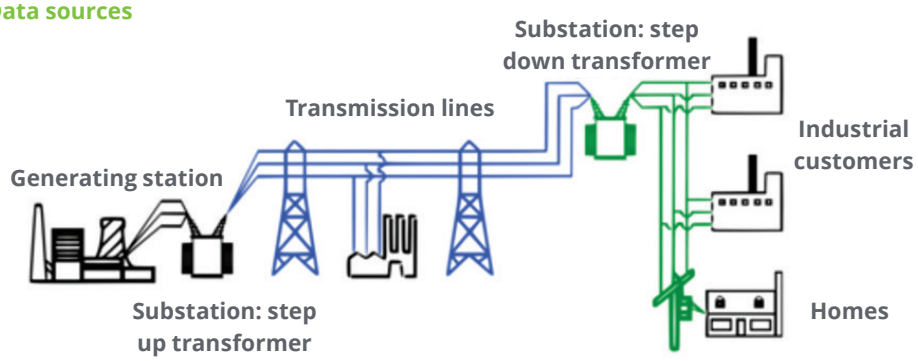
1 U.S. Energy Information Administration, Annual Energy Outlook 2015, Page ES-6 & ES-7

Using data to empower the supply chain

Technology-based innovations such as Smart Grid, sensors, and predictive risk tools have the potential to change the traditional break-fix utilities maintenance model to a predictive, replace-before-break version. On the capital side, critical components can be monitored using dedicated sensor technologies that measure and transmit "health data" to a central control room that analyzes it for trends and potential issues. This automated, real-time information system can help to identify problems, deploy maintenance crews, secure needed repair materials, and reorder consumed materials.

Taking a TCE view and using analytics-driven insights allows executives to ask new and different questions such as: Would it make sense to change a transformer's lifespan from 20 to 30 years? Doing so may increase the initial outlay but it could also lower maintenance and repairs over the product's life, increase reliability, and lower regulatory risk.

Data sources



- Operations data
  - Unplanned outages
  - Uptime analysis
  - Vibration and temperature data
  - Maintenance rounds
  - Tag outs
  - Tool cribs
- Transmission and distribution data
  - Outage alerts
  - Maintenance planning and scheduling
  - System reliability
  - Storm response
  - Temperature data (transformers, switchgear, etc.)
- Customer data
  - Outage alerts
  - Usage patterns

All of a utility's operational stakeholders, both internal functions and external suppliers, should collaborate to develop strategies that use a lifecycle cost approach for critical services and materials spend. Resulting solutions can lower the overall total cost of energy for consumers and be acceptable to ratepayers, PUCs, and shareholders. Lacking a commitment from all parties, utilities may be unable to optimize technology and data investments. They also may be unable to explore new infrastructure and increasingly popular alternative forms of energy generation such as wind and solar.

Global positioning systems and geographic information systems (GPS/GIS) can provide utility executives near- or real-time visibility into key performance measures including grid operations, turbine vibration, heat data, and line maintenance progress. Combining operations performance, productivity, and total cost data into a single cost of operations measure would be the first step in actively managing overall performance. For example, supply chain executives could use this data to execute long-range category and supplier management strategies focused on operational excellence, value generation, and risk mitigation. They could also develop third-party spend analytics and demand planning tools to identify potential savings opportunities. Similarly, gathering market intelligence, developing cost models, and employing robust supplier programs may contribute to a step-change in supply chain management value.

The "power ecosystem"

Successful implementation of the P&U TCE ecosystem will bring disparate functions within a utility model into a single, integrated value chain. The ecosystem may be one independent utility or a collection of pure-play utilities that leverage each other's expertise to collective advantage. The most advantageous model may be a collaboration among several IPPs a Transco, a Distco, and a customer-focused retail company to drive the lowest TCE – in essence, forming a "power ecosystem." Including key suppliers with installation and maintenance expertise may further increase the ecosystem's competitive advantage. The stronger and more connected the ecosystem, the greater the value. Utilities and their customers should gain:

- Unprecedented levels of customer service, transparency, and flexibility to choose among generation (wind, solar, etc.) and delivery alternatives
- Increased reliability based on leveraging best-in-class operations and each partner's area of expertise
- Clear understanding of the value delivered from a pure-play, focused business within their ecosystem
- Lower overall cost structures
- Alignment with the PUC on future investments and programs

As utility companies grapple with balancing CAPEX and O&M cost pressures with system reliability, they will need to embrace a more proactive and holistic way to manage materials and services costs – one that focuses all company functions and external suppliers on driving to the lowest Total Cost of Energy. Doing so can be the catalyst to drive enterprise-wide operational, financial, and supply chain improvements.

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