Business Case Tradeoffs

Shaping long-term smart-grid strategy.

By Andy Trump

Smart grid has emerged as a cornerstone of the United States' new energy policy, and utilities are wrestling with how to give shape and coherence to specific project opportunities. Lots of attention goes to those utilities that have received *American Recovery and Reinvestment Act* (ARRA) funding—with dollars mostly focused on advanced metering solutions—but equally important for the community are the hundreds of utilities that didn't receive grants. For these utilities, and for the grant recipients looking at capturing follow-on investments, constructing a meaningful business case will become a central effort.

The business case accomplishes a number of goals. Most important, it provides a justification for making or deferring the investment. It also illuminates potential future scenarios and factors that affect the business. The work helps the utility gain a better understanding of what is becoming a rapidly evolving and complex set of conditions, requirements and risks.

If utilities wish to shape the direction of investments within their community of interests, their abilities to grapple with, and communicate about, complex tradeoffs will be an essential part of business case work. But this might require more discipline and flexibility, as well as different skill sets, in conceiving and executing the work. Additionally, the work might need the infusion of well-considered strategy guidance around core company objectives and intangible benefits. As the pace of change accelerates, utilities also might find it increasingly necessary to engage in a cycle of continuous strategies, business planning and business case development. This will be messy, but might be rewarded with a greater degree of alignment between the company's core objectives and imperatives and specific investment choices.

Ideal vs. Real World

In an ideal world, the business case effort is a smoothly functioning, rational, decision support tool and process built around: a clear purpose and objectives; a well-defined scope; rigorous evaluation methods; clear and relevant assumptions; meaningful and accurate evidence; and logical outcomes. It has a financial component that measures value to a variety of stakeholders. It's comprehensive in describing costs and benefits, both tangible and intangible. It also identifies critical success factors, sensitivities and risks. It provides a basis for justifying decisions for or against, and it illuminates possible future states. The process is conceived well, organized well, has good lines of communication with the organization and is provided with adequate funding.[1] Finally, through its discovery of hard costs and benefits, the work also creates a foundation that furthers business planning (*e.g.*, project plan, procurement requirements, business-process change requirements, information system requirements, and performance metrics).

Some of the most important strategic benefits are often the hardest to quantify.

The business-case work and the outcomes often suffer, however, from preformed biases as to the purpose and scope of the effort, and this has several consequences. Instead of organizing around a broad mandate and set of objectives, the purpose and scope of the effort is defined early on by others (*e.g.*, executive leadership, interpretations of PUC mandates) often narrowly, and around specific technology platforms and projects (*i.e.*, commonly smart metering). The endeavor begins as a validation effort about implicit decisions already made, not as a deep assessment of alternatives and tradeoffs.

First, by not providing clearer definition early in the business case endeavor, the utility can create fragmented internal efforts that over time turn into separate full-blown initiatives. Instead of coherence and alignment of a broad initiative, say, to provide customers greater control and convenience in their energy choices, the utility ends up with separate programs around technologies for advanced metering, price-responsive demand response, load control, and energy efficiency. Somewhere else, groups are evaluating tariff-change requirements, impacts to the energy and capacity supply portfolios, and customer outreach initiatives in support of these other initiatives.

Second, and related, the scope of the business-case endeavor can be discretionary and incomplete and lead to questions about cost and benefit allocations. The team might wrestle with how expansive in scope the work ought to be. Should it include home area network options, program considerations, and costs? Should it deal with backhaul communication issues impacting future distribution communication and automation? And what can the program take credit for in terms of benefits? Does it get credit for enabling demand response-driven reductions when that program already has been cast in stone?

Third, by a *de facto* narrowing of the scope resulting from the up-front bias, the business-case work never engages expansively about alternatives, whether technology, program design or implementation tactics-related. For example, if the AMI initiative isn't integrated with the demand-response critical peak

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pricing (CPP) initiative, how does the utility explore the tradeoffs of money, time, risk and outcomes of various CPP program designs? The CPP program design choice may help stretch out or contract capital spending, restrict or expand choices around network design, create different priorities for IT system changes and alter energy efficiency program priorities. These choices present their own tradeoffs to other potential smart-grid efforts as well.

Part of the reason that the business-case efforts are set up this way can sometimes be traced back to the forcing regulatory requirements, which might be technology prescriptive and narrow. Programs get aligned to meet the regulatory mandate before key questions about the mandate are resolved. It's also convenient to align the organization's efforts to the technology itself, and so, for example, the company's evaluation of a high-speed backbone communication network might go to one group while the AMI system goes to another.

Fig. 1 Business and Policy Case for Enhanced Data Access

The Business Case for Customers

- Empowers the customer to benchmark and analyze data, set improvement goals for energy efficiency and demand reduction, and reduce energy use.
- Reduced staff hours dedicated to data collection.
- Reduced fees for obtaining needed data.
- Increased information transparency.

The Business Case for Utilities

- Improved customer relations and satisfaction.
- Demand reductions from better customer energy management.
- Lower costs for customer efficiency programs.
- Better basis for measurement and verification of efficiency programs.
- Better baseline data sources for demand response.

The Policy Case for Regulators

- Improved basis for measuring progress toward efficiency goals.
- Reduced utility program costs and rate impacts.
- Expanded public benefits of advanced metering and smart-grid investments.

Source: Utility Best Practices Guidance for Providing Business Customers with Energy Use and Cost Data, A Resource of the National Action Plan for Energy Efficiency, July 2008.

The purpose and scope of the utility smart-grid business case can be designed to mitigate the issues raised above, and to look at the complex tradeoffs associated with multiple technologies and programs. In fact, DOE's *Smart Grid Systems Report* (July 2009) identified "properly constructing the scope of the business case" as one of the key challenges facing smart-grid adoption in the United States:

> The business case for a smart grid needs to be firmly established for deployment decisions to progress. In many situations, individual applications may not be cost effective in isolation, but where common hardware and information network infrastructure can be leveraged to accomplish a number of objectives, the value proposition can become compelling.[2]

Objective Focus

As the utility scans the horizon for the next steps in smart grid's evolution, it's easy to organize the thinking around technologies. Storage, wind, solar, micro-grids, smart thermostats, prepay, direct load control, smart appliances, electric vehicles, distribution automation and distributed generation all have a decidedly technology footprint if for nothing more than the fact that they often are aligned with vendors, trade shows, market studies, and industry consortiums and they have unique forces shaping their product maturity. From the utility's perspective, however, it's better to organize around programmatic themes such as: transmission-level optimization; distribution system optimization and automation; facilitating renewable energy sources; facilitating the introduction of distributed resources; and assisting consumer choice. The technology prescription goes only so far.

To give proper consideration to these ostensibly competing opportunities, the utility will align the business case work with core company objectives. It can't queue up the business-case efforts within silos and restrict the work to a discovery of narrow operational benefits—that won't highlight the important tradeoffs. Take reliability as an example. It's one completely non-fungible utility company objective—few utilities would want to trade off lower reliability with, say lower energy costs; it just isn't a viable direction.[3] By elevating reliability into the business case it becomes possible to compare competing technology alternatives and programs around a central and non-fungible business requirement (recognizing at the same time that further concreteness around specific reliability outcomes is useful).

Part of the challenge of elevating objectives (*e.g.*, reliability) is that doing so will require the use of tools like power flow studies, which often is technically challenging, time consuming and expensive work. It also might require lots of work to sort out which particular aspects of reliability need addressing and how best to measure them. What's the value, for example, of improved NERC reliability compliance, or what's the value of being able to integrate various new forms of generation? In short, it could be difficult to bring in a very wide set of expertise into the business-case effort and create a sustained dialogue with disparate disciplines.

Another problem is that objectives might have ambiguous links to specific actions and project capabilities, and so these benefits sometimes appear intangible or soft. As a result, too often utilities don't work hard enough to stretch the benefits

case to include these benefits. Take the case of increasing commercial customer access to energy use and cost data. This is a high order priority for utilities. They also would agree that advanced metering is a concrete capability that facilitates, if not enables, energy management in commercial buildings by increasing the customer's access to energy use and cost data. The link is clear. As reported by DOE:

> By adopting energy management best practices, businesses can reduce their energy use significantly, by up to 30 percent or more. These practices include assessing energy performance, setting energy savings goals, and regularly evaluating progress, all of which require on-going access to consistent data. Use of continuous energy benchmarking is growing among commercial and industrial building owners and managers, and the results experienced by companies … are compelling.[4]

These benefits are outside those driven by demand-response CPP signals.[5] Rather, they reflect an energy efficiency savings created by innovative business managers evaluating their building performance in a myriad of ways and taking innumerable potential actions. These evaluations and actions are significantly assisted by the availability of advanced-metering data. There are a host of compelling benefits associated with providing greater access to quality data but they are hard to quantify at the utility system level within the AMI business case *(see Figure 1)*. To do so often requires use of speculative assumptions.

As one business-case expert observes:

> Leaving out a benefit or cost is not appropriate if the expected impact is both real and material to the purpose of the case. Every attempt should be made to assign financial value or, failing that, at least make the benefit tangible with some other measure. A benefit or cost omitted from the formal analysis will carry exactly zero weight in case results and zero weight in recommendations based on them. The irony is that some of the most important strategic benefits are often the hardest to quantify, and therefore omitted.[6]

Incorporating important, yet hard-to-quantify benefits requires hard work. The following steps are suggested:

- Link the company's core objectives into the business case if there is a reasonably strong relationship; and
- Make substantive the linkage between business case and company objectives by considering metrics that help evaluate when the objective is met and allocations that apportion the share of benefits.

It's very important to bring in the strategic value of the benefits by following steps 1 and 2. The key point is to ensure that the utility brings the strategic benefit into the business case.

To accomplish this, the utility might want to consider other forms of smart-grid metrics that add substance to the benefit. GridWise Alliance, for example, has published guidance for assessing smart-grid projects.[7] Similarly, Section 1301 of EISA 2007 might provide guidance in its orientation to outcomes. It describes smart grid as a set of outcomes that "together characterize a smart grid."[8] It then goes on to describe these outcomes.[9] They involve the use of digital information and controls; dynamic optimization of grid operations; cyber security; ability to integrate distributed resources including renewables into the grid; incorporation of demand-side and energy efficiency resources; pervasive use of smart technologies in real-time with automation and interactivity that can reach down and automate consumer appliances and devices and can control metering and network communications; integration of advanced electrical storage and other peak-shaving technologies including plug-in electric and hybrid electric vehicles; and the provision of standards for communication and interoperability of consumer appliances. These outcomes are diverse and span technologies, rules and requirements, user types (*e.g.*, consumer-oriented), and market-design considerations (*e.g.*, lowering barriers to smart-grid technology adoption).

Overcoming Biases

As DOE points out, the business case work is one of several key ingredients to successful expansion of smart-grid systems in the United States. Ensuring that the projects are well considered and scoped, without a lot of pre-formed biases, will help utilities get better alignment of the business case with core company objectives. It also should help companies quantify explicit value in the business case for benefits tied to these objectives. Ultimately, doing so will enable utilities to get a dialogue going between those responsible for long-term strategy and those responsible for discrete project evaluation. This will be increasingly valuable as the pace of change in the market accelerates. F

Endnotes:

1. While business case techniques might appear self-evident, an excellent resource for the basics around business case design is *The Business Case Guide*, 2nd edition, by Marty Schmidt. The conceptual framework described here is borrowed from this guide.
2. Department of Energy, *Smart Grid Systems Report*, July 2009. Page 51
3. See *California's Electricity Restructuring: The Challenge to Providing Service and Grid Reliability*, EPRI, Palo Alto, CA, California Energy Commission, Sacramento, CA: 2002. 1007388. Chapter 6.
4. *Utility Best Practices Guidance for Providing Business Customers with Energy Use and Cost Data*, A Resource of the National Action Plan for Energy Efficiency, July 2008. Page 3-1.
5. See *Coordination of Energy Efficiency and Demand Response*, A Resource of the National Action Plan for Energy Efficiency, January 2010. The authors make an argument for the need for research to better determine the relationship between energy efficiency and demand response. The authors explain the important continuum that both programs occupy, and the need to integrate planning across them.
6. *The Business Case Guide*, 2nd edition, by Marty Schmidt. Page 9.
7. Available under copyright at: *http://www.gridwise.org/resources_gwaresources.asp.*
8. EISA, Section 1301.
9. *Id.*