The Evolving Business Case Models for SmartGrid Projects

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ABSTRACT

SmartGrid business cases are undergoing whirlwind changes as conventional measures of return based primarily on O&M reductions developed for Smart Meter programs are expanded to include what have been historically "soft" benefits. Stimulus funding, a global focus on possible warming, carbon taxes, cap and trade schemes, credits for avoiding generation; all of these are influence factors that a year ago would not have been taken into account. Today, they are driving much of the value proposition. We examine these changes, and address how utilities and others seeking to participate in Smart Grid programs should think more expansively about unconventional, often "social good" norms in order to gain credibility with a wide range of constituencies that now have increasing influence over national energy policy and state regulators.

Keywords: SmartGrid, Business Case, SmartMeter, Stimulus

1 SMART METERS LEAD THE WAY

"SmartGrid, "SmartMeter". Programs with these labels have been in execution for several years in the electric utilities industry in the United States, Canada and Europe, but what may be most striking about their commonality is their difference. As Justice Powell said about obscenity "I can't define it, but I know it when I see it".

The reality is that today in the US marketplace many of the large, funded Smart Grid programs had their roots in Smart Meter projects. This is a reasonable starting point. Focused on the deployment of meters, the implementation of the infrastructure necessary for their communications and the integration of their capabilities to the existing Utility systems and infrastructure, Smart Meter programs have been a very effective way to begin the exploration of the Smart Grid. Smart Meters themselves are only a beginning, but they provide a key element in dealing with the expansion of conventional business case criteria to embrace an emerging set of criteria including Cost Avoidance and the Social Cost of Carbon (SCC).

As an industry we have struggled with developing a standard definition for such programs, reflecting the diversity of the challenges faced by utilities based on their regulators, size, geography and ownership structures. This diversity in definition has resulted in a wide range of business case approaches to justify the necessary investments.

2 HARD DOLLARS, HARD CASES

In 2005, a major US utility floated an RFP to assist in deploying their first generation "smart" platform. After months of work, the entire program was shut down as review of the business case discounted every benefit except the reduction in workman's compensation insurance resulting from moving meter readers to other jobs. How far we have come. Since then, a number of cases have been approved showing "hard" benefits; easily traceable economic results that could be identified, monitored and, as monetized, shared with consumers. For the most part, these were focused on O&M reductions:

Elimination of Meter Readers: With some utilities dealing with turnover rates in the meter reader population of over 400%/year, the cost of meter reading was seen as a primary target, reflecting rising costs for salary, pension, medical and liability expenses. Removing the meter reader also removed issues around customer security as in some areas meter readers needed to enter homes to read meters and personal privacy, intangibles in customer satisfaction.

Reduction in Billing Errors: Manual meter reading error rates range from 2% - 40% in some areas, mostly reflecting issues of employee quality/training, equipment maintenance and weather. These errors result in significant costs in manual re-reads, rebilling and manual adjustments, increased call center load and a reduction in customer satisfaction.

Reduction of Truck Roles: An improved diagnostic function, coupled with a reduction in re-reads leads to a reduction in the number of truck roles required for manual intervention, and a similar reduction in the number of vehicles, maintenance costs and operating costs (e.g. fuel, insurance, etc.) attributable to them.

To support these programs, we have developed a model for creating and testing these cases these cases. Capturing data and modeling it allows companies to quickly examine benefits and possibilities. Such modeling is critical to support working in a collaborative mode with regulators and others, exploring options and opportunities together to reach a mutually agreeable conclusion. Given the pace at which many of these cases are being developed, this kind of

collaboration can create good will and accelerate the approval and funding process.

However, the scope for business cases is changing, and we have to evolve with it.

3 NEW FACTORS AND INFLUENCES

Few of these factors are truly "new". In examining a number of business cases and the testimony that supported them over the last 5 years, most of the historically "soft" criteria have been cited repeatedly as collateral benefits of the Smart programs. However, they seldom have had "hard" benefits tied to them. This is changing, as issues like Energy Security, Environmental Stewardship and Global Warming move from discussions at the fringe to dinner table conversation. Perhaps most importantly they have become the objectives of the new Administration in Washington, which are backed by a number of powerful constituencies. While we can debate the science underlying some of these concerns, all will get attention at the Federal and State level. Consider:

3.1 Conservation

- In the US and Mexico, over 1mm distribution transformers/year are replaced. A move from silicon steel to amorphous core technologies is projected by to save 750 million kWh.[i]

- In the US, it has been estimated that if US utilities with greater than 3000 MW achieved top quartile performance for demand side management, more than 47Gw of generation could be avoided [ii]

- In a 2007 study conducted for the Department of Energy, the National Energy Technology Laboratory estimated that of the energy used to generate electricity, only 30% actually reached consumers as electricity, with losses in Transmission and Distribution estimated at $25 Billion/year. [iii]

3.2 Carbon Reduction

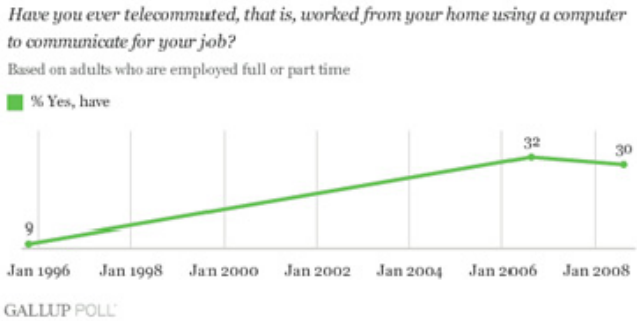
- The move to amorphous cores suggested above would avoid an estimated 465,000 tons of CO2. [iv]

- The Demand Response program suggested above would avoid an estimated 106mm tons of CO2 emissions/year. [v]

3.3 Security/Reliability

As a digital society, our dependence on reliable electricity has increased enormously. A 2008 Gallup poll illustrates the change in just the last few years in telecommuting behaviors.

Figure 4: Telecommuting Growth



The increased distribution of the working community, the reliance on digital storage, the use of complex telecommunications networks; all of these require a level of predictable reliability and rapid recovery for which the grid was not designed. Our new economic reality has transformed power availability into a new economic security issue. What is the possible impact of a catastrophic failure due to agencies natural or national?

- In 2008, the greater Houston area was hit by Hurricane Ike. With power out for several weeks in some areas, some estimates for the losses resulting from the storm are in excess of 4 billion dollars.

- In a 2008 interview with the National Journal[vi], Tim Bennett, the former president of the Cyber Security Industry Alliance, claimed US officials told him that the Chinese People's Liberation Army (PLA) in 2003 gained access to a network that controlled electric power systems serving the northeastern United States. Bennet further claims he was told the PLA was involved with the 2003 blackout that caused outages to over 50 million homes. While the specific involvement of the PLA is disputed, the specter of such interference by foreign or other hostile agencies causing a mass outage is encouragement enough to many in the Utility industry to rethink the structure and traditional reliance on centralized generation and conventional T&D structures supported by SCADA networks.

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4 PLANNING FOR SUCCESS

So, what is the impact on business case development for these new factors? Smart Grid business cases are evolving beyond technology or simple labor reduction measures, and are becoming the focus of a national debate on how we live and where we invest.

While significant attention is being paid to near term investments in our electrical infrastructure as part of the stimulus package proposed by the Obama Administration, these are near term dollars provided in a specific political context. Policies do not yet reflect the need for sustained investment, nor do they reflect the probable useful lifespan of the investments being considered. Unlike traditional T&D and IT investments, the move to new technologies, the accelerating rate of change, the inevitable failure of some technologies and success of others demand a rethinking of depreciation schedules and an acceptance that the rate of change within utilities will more closely resemble that of other industries that have been affected by extensive automation and reengineering.

Probably the two most easily quantified impacts to the Grid business plans reflect the emerging ability to quantify benefits in the Conservation and Carbon Reduction categories. The cost savings of avoiding the construction of new centralized generation is well documented. Baltimore Gas and Electric estimated that capital cost of DR at $165/kW, while peaking generation is between $600-$800/kW.

If Congress complies and sends the President the legislation he requested in his February 24th address, we will see some sort of "carbon cap" in 2010, with costs estimates for purchasing additional "credits" ranging from $10 to $200, but many falling in the $40 - $50/ton range. Factoring these costs into your program can dramatically change your business case. However, these costs, whether hard or "social", must be treated with care and worked through with your regulators.

Customer facing concepts like DR which rely on behavioral change and voluntary mass adoption for their success have to be piloted with customers to understand habits and issues. Many utilities focus solely on the technical challenges, and do not realize that it is the creation of a receptive customer and the maintaining of customer satisfaction that ultimately will provide the ongoing endorsement and investment needed. Changes to the interaction with customers will drive significant change within the utility itself, and adequate care must be taken to make sure that this is managed, driving up costs of deployment.

Finally, there is the issue of how a utility gets paid for encouraging its customers to use less of its product. Most of us would never be asked to encourage people to "use less" of what they create, and in the case of investor owned utilities, we need to be prepared to make it "worth their while" as a company to help us achieve our goals as a society. An example of thinking along these lines is the Save a Watt program being developed by Duke in which customers pay a to be determined percentage of the cost of power plants it would have built and operated were it not for the energy-efficiency plan.

5 CONCLUSION

Smart Grid business cases are changing because they matter to people who formerly never cared about the. Power was infinite, inexpensive and reliable. When we accept this s no longer the case, and begin to consider the implications of growth and dependence, we open our eyes to a range of value propositions that we have not previously considered actively. However, we must accept that the change we are currently facing will be transformational on every aspect of our industry. From our relationship to the customer to our need to becoming constantly transforming organizations, the Smart Grid business case is critical to executing in an effective and sustainable way. We will need to innovate constantly our processes, technologies and our people, and our business cases must take those factors into account, or they will leave us "stranded" between yesterday and tomorrow.

6 REFERENCES

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