# 7 Reasons Why Grid Investments Fail

## A Smart Grid Research Consortium Study Finds that Many Coop and Municipal Utility Smart Grid Investments Will Not Provide Expected Returns

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**The Ideal Smart Grid Project.** For years industry publications have touted smart grid cost-benefit study results that show smart grid investments paying for themselves with reduced utility costs. The widely quoted EPRI report, *Estimating the Costs and Benefits of the Smart Grid* (March, 2011), estimated benefits that are 2.8 to 6 times the cost of the smart grid investment. According to this and similar studies, smart grid investments are a perfect application of new technologies to reduce costs, transform utility business practices , provide grid control capabilities and provide utility cost savings sufficient to pay interest and principal and even provide some rate relief.

**A Growing List of Smart Grid Problems.** SGRC's review of electric cooperative and public utility investment outcomes indicates that a growing number of utilities are unlikely to achieve these positive business case results.

The city of Leesburg Florida utility, with about 21,000 meters provides an example of pitfalls awaiting many smart grid projects. Begun in late 2009, the city utility's smart meter installation was completed two years late in July 2012. Software required for demand response is still not operational. Leesburg had to increase rates by 3.5 percent earlier this year to make up for the short-fall in savings. Several characteristics of the Leesburg strategy, including payments to General Electric, the prime contractor, of $900,000 per year for IT services and relying on demand response savings for 75 percent of savings, put Leesburg customers at considerable risk of additional rate increases in the future. The Leesburg project cost is over $20 million, which makes it one of the more expensive smart grid projects on a per meter basis. Leesburg smart grid project difficulties, which are extensively documented in a series of articles in the Orlando Sentinel, provide interesting insights on what can go wrong with a smart grid project.

A variety of other examples points to issues that impact both costs and benefits including the City of Naperville's $800,000 law suit against its software provider for nonperformance, Central Maine Power's request for a $99 million rate increase for a smart grid system that was originally estimated to save over $350 million, the California Energy Commission's 2013 finding that the state's demand response programs failed to achieve their peak demand reduction goal of 5%, and so on.

In addition, Smart Grid Research Consortium (SGRC) business case analysis conducted at 20 diverse coops and public utilities indicates that realistic returns on even the best smart grid projects are considerably less than suggested by industry literature and that profitable smart grid investment

strategies are uniquely utility-specific reflecting current utility infrastructure, utility customer characteristics, power cost structure and other factors.

The growing evidence of difficulties in achieving smart grid investment targets and evidence that even attractive smart grid projects require careful investment strategy development to ensure acceptable returns prompted this documentation of the most prevalent reasons for disappointing smart grid investments along with recommendations for avoiding smart grid investment pitfalls.

**Seven Smart Grid Project Pitfalls and Recommendations.** The SGRC review of projects and business case applications experience identifies seven avoidable pitfalls associated with smart grid investment strategy development.

1. **Pitfall: Vendor/integrator business case analysis**. Utilities often rely on vendors or system integrators to provide pre-investment business case analysis. Since these organizations have a financial interest in moving projects forward, a conflict-of-interest is inherent in this practice.

   **Recommendation:** Engage third parties who have no financial interest in the project to provide an unbiased financial evaluation of the smart grid project.

2. **Pitfall: Absence of risk analysis**. Changes in wholesale power cost structure, uncertainty over customer demand response participation, and many other factors can result in considerable uncertainty over estimated returns on smart grid investments.

   **Recommendation:** Smart grid business case analysis should include risk analysis associated with uncertain parameters and assumptions applied in the analysis. Scenario analysis helps identify impacts of uncertainty while value-at-risk analysis provides traditional financial risk analysis.

3. **Pitfall: Failure to quantify unique utility and customer characteristics.** Business case analyses often apply industry average parameters and estimates that poorly represent actual utility characteristics. SGRC experience shows that average cost/benefit parameters do a poor job of reflecting actual utility costs and benefits. Best practice requires an objective evaluation of the business case using available utility data. Hourly load data analysis is required to determine CVR potential and end-use demand response hourly load impacts.

   **Recommendation:** Make sure that the business case analysis explicitly quantifies these benefits for your utility rather than relying on estimates from other utilities.

4. **Pitfall: Subjective system integrator/prime contractor selection.** Selecting a system integrator/prime contractor and approving subcontractors based on name recognition, sales representative relationships and other subjective considerations is dangerous in new technology application areas like the smart grid. While some components like AMI/smart meters may be reaching a mature application status, integration with demand response, alternative rate structures and advanced CVR/VOLT/VAR optimization are relatively new applications so

subcontractors included in smart grid proposals should be evaluated based on experience and track record.

**Recommendation:** Do not automatically assume that a "big name" prime contractor and its subcontractors can deliver all products and services without complications. The smart grid is a relatively new application area that will "shake out" non-performing companies – both large and small. You don't want to be stuck with the false start of a big-name company or the non-performing technology or service of a subcontractor that did not succeed in the market. The answer to this threat is to check many references and results of applications similar to yours.

5. **Pitfall: Software performance failures.** This item is related to the previous pitfall but software is so central to smart grid operation that it deserves special attention. The smart grid depends on software/IT performance. If your vendor's smart grid software/IT capabilities have not been successfully applied by several utilities like yours, proceed at your own risk. Software is notoriously difficult to implement and modify for different applications.

   **Recommendations:** Make sure that you talk with software vendor clients whose applications are similar to yours to ensure timely delivery and acceptable capabilities.

6. **Inadequate post-AMI implementation strategies.** Many smart grid business plans rely heavily on post-AMI benefits from customer engagement/demand response, DA and CVR. However, program development and implementation details are often left to be considered later resulting in benefits that are often delayed for years.

   **Recommendations:** Make sure that post-AMI benefits are appropriately considered with program development and implementation plans clearly identified and scheduled to limit implementation delays.

7. **Insufficient utility due diligence.** This last category is a catchall that captures all those things that utilities should consider including elements from some of the six items above. There are likely to be options that are not offered in a favored proposal that should be considered. For example, software as service (SAS) can provide an effective and lower-cost option to manage IT in-house as opposed to an outsourced IT operation.

   **Recommendation:** Each utility should retain an outside, independent evaluation firm for its due diligence or develop an in-house team of smart grid project participants from the various application areas who have responsibility for assessing and evaluating vendor/integrator/ subcontractor representations on technologies and programs.

**Fast-Tracking Smart Grid Benefits**. Utilities have good reasons to be conservative when considering improvements to the electric grid infrastructure. Customers expect reliable power delivery at low rates.

However, smart grid technology provides an opportunity to fast-tract certain benefits, well beyond, traditional utility standard practice. For example, the EPRI *Guidebook for Cost/Benefit Analysis of Smart*

*Grid Demonstration Projects (* December 2103), suggests that "after the VVO/CVR system is installed and tested, the efficacy of CVR will be examined through two years of day-on/day-off operation that will provide data to feed a regression analysis."

This two-year on/off approach is unnecessary and costly. Information from smart meters can be used in preceding day experiments and real-time applications to fine-tune CVR applications as soon as smart meters are transmitting information, two years in advance of the EPRI recommendation. Two years of CVR savings can be enough in many cases to pay for between one-third and one-half the cost of the AMI system that is providing this information. Similarly, delayed assessment and implementation of customer engagement programs dilute savings as these benefits remain unrealized long after they could be effective.

This fast-tracking opportunity is important as it can turn floundering smart grid investment programs into financially successful utility investments.

**Summary.** A growing number of smart grid projects are not meeting initial project savings estimates, requiring rate increases to pay for cost over-runs and savings shortfalls. This paper identifies seven smart grid investment strategy pitfalls and provides recommendations for avoiding negative investment outcomes. Fast-tracking certain smart grid application is recommended to increase benefits.