Societal, Environmental Benefits in the Smart Meter and Smart Grid Business Case*

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The importance of appropriately valuing societal benefits such as environmental quality in economic decisions has increased in recent years as the impact of human activity on the world's environment becomes better understood. While environmental issues have long been important considerations in the utility industry, there is a greater understanding among the key stakeholder groups — utility customers, legislators and regulatory agencies and utilities, themselves — that environmental stewardship and corporate citizenship are important goals. Yet attempts to value these benefits are difficult.

Operational benefits typically account for 60 to 85 percent of the benefits for smart metering projects. These benefits represent the utility gains through improved operations such as eliminating manual meter reading, implementing remote connects and disconnects, improved outage response, improved distribution planning and asset management. Few organizations have embarked on a full smart grid business case, and none have made it into the public domain, yet it is reasonable to believe that operational benefits will not fully justify the costs of implementing the smart grid.

Utility regulators use five cost tests to evaluate a project for cost-effectiveness, aligned with the principal stakeholders: the customer, utility, region and society in general. These are the ratepayer impact measure, utility cost test, total resource cost test, participant cost test and societal cost test. The ratepayer impact measure assesses the effect the project will have on rates, while the utility cost test measures the revenue requirements of the utility related to the new program. The participant cost test measures the net affect on a customer under the new program. The total resource cost test measures the impact to the utility's service territory as a whole. The societal cost text also measures this impact to the service territory but factors in societal and environmental benefits.

For smart meter projects driven by utility operational needs, many utilities have proposed to use the value of demand response programs such as load control and pricing responsive rates to bridge the gap between operational savings and project costs. A complexity in this approach is that because energy costs normally are passed through to consumers, demand response benefits contribute primarily toward societal cost tests, whereas utility regulators are more comfortable using traditional project valuation methodology such as the ratepayer impact measure or the total resource cost test. Thus, these efficiency benefits might not garner the same weight as do operational benefits. Utilities are also beginning to attempt to value carbon reduction. In smart metering, this reduction comes primarily through:

- Reduced generation resulting from the energy efficiency benefit associated with providing customers their energy consumption through Web-based products,
- Reduced peak generation and power purchases resulting from technology and pricing demand response programs, and

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- Reduced vehicle emissions resulting from the elimination of manual meter reading and the reduction of service calls associated with re-reads, move ins and move outs, service disconnects and other smart meter-supported service enhancements.

Benefits can be estimated based on vehicle emission reductions and the particular utility's generation mix taken against the price of carbon credits. While sometimes significant, these costs are not likely to bridge the gap that can run upwards of hundreds of millions of dollars on large smart metering projects. Carbon represents a growth opportunity, however. While credits are trading at about $2 per ton as of early 2009, they have traded as high as $7.50 per ton in the United States and trade at approximately $30 per ton in Europe. At existing credit values, the carbon market is estimated to be trading at $30 billion per year and is predicted to grow to $1 trillion within a decade, partially because of the gradual reduction of allowed carbon emissions under various proposed cap-and-trade scenarios.

There are also soft benefits related to environmental programs that are intangible and hard to quantify. Some of these benefits include improved corporate image, value of social responsibility, beneficial environmental impact, increased innovation and heightened customer satisfaction. Studies and the marketplace have shown that utility customers often are willing to pay more for clean power. This is allowing the growth of marginally cost-effective renewable energy facilities and is being used in innovative utility pricing programs. While difficult to quantify, it might be possible to use valuation studies to establish accepted economic values. In some cases, more direct measures might be possible. For example, in the current difficult economy, corporate image might directly influence access to capital for investments, as well as the weighted cost of that capital.

The environment will have an increasing role in methodology.

The emerging field of ecological economics also provides some opportunities to differently value smart meter and smart grid programs. Utilities are discovering that perpetual growth is no longer possible, and many utilities are presenting proposals to their utility commissions to decouple fixed costs from capacity and energy costs in the face of the need to reduce their sales through efficiency programs. Ecological economics presents a method for valuation that take into account the benefit of suspending growth in favor of climate goals and provides for the use of contingent valuation methods to assess the economic value of programs such as environmental quality, species biodiversity and intergenerational equity (i.e., providing a sustainable ecosystem for future generations). As with valuation studies, these intangibles can be quantified by establishing the amount utility customers are willing to pay for availability or are willing to accept as payment in lieu of that availability. Ecological economics provides an alternative framework to valuation that might more equitably look at sustainable development, in contrast to perpetual development.

From an acceptance perspective, utility regulators have agreed with the economic valuation of demand response programs through the avoided cost methodology related to avoided power purchases or plant construction. The importance of the soft savings is normally related to the political acceptance of the projects or used to gain

approval for marginally cost-effective projects. The evolving ecological economics model, however, has not been used to attempt to justify smart metering or smart grid-type programs, so it is unclear what reception it will receive. Given the risk-adverse nature of utility regulation and the keen interest in maintaining rates as low as possible to stimulate economic growth, it is reasonable to assume that utility regulators will take a conservative approach. Many mechanisms can enhance the societal and environmental benefits present in the smart meter and smart grid business case. While some are easy to quantify, others are more difficult or use practices that have not gained widespread acceptance. As the significance of environmental impact continues to grow, however, it will play an ever-increasing role in the utility's portfolio and project evaluation methodology.

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