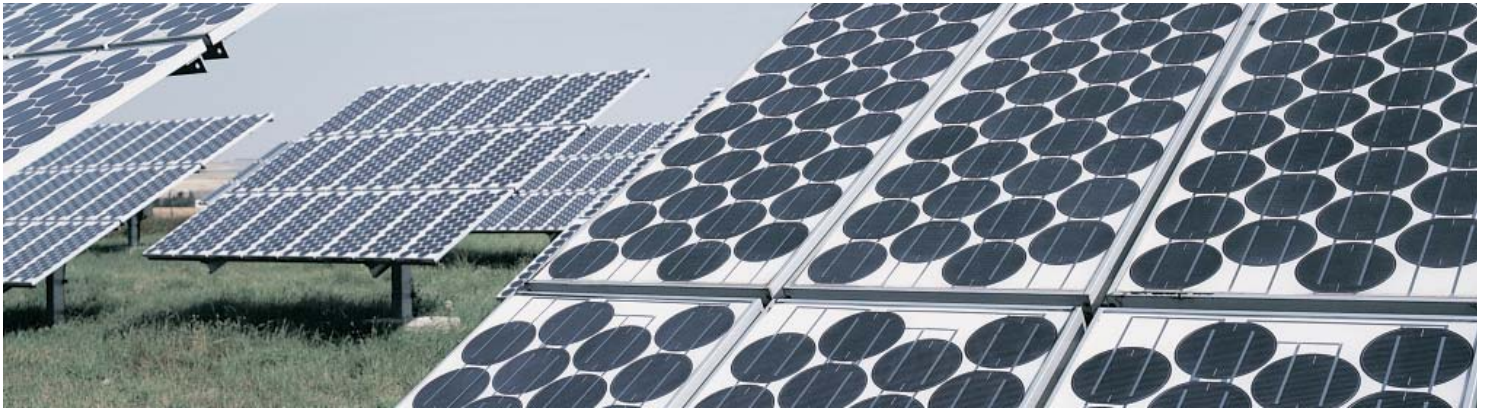




ENERGIZING UTILITIES FOR THE ECONOMIC STIMULUS PLAN

STRATEGIES FOR GREATER ENERGY
EFFICIENCY AND SUSTAINABILITY



For years utilities have seen a growing need to enable a smarter electric grid, promote cleaner power sources, and replace aging infrastructures. On February 17, 2009, these issues came into even sharper focus when U.S. President Obama signed into law the \$787 billion American Recovery and Reinvestment Act (ARRA).

This far-reaching legislation provides extensive funding for many energy initiatives – including programs that support transmission and smart grids, renewable energies, and clean-coal technologies. However, utility executives face strict compliance guidelines associated with the stimulus plan and ongoing environmental policies.

This *SAP Executive Insight* examines specific concerns that confront utility executives in today's economy. Further, it describes how gaining greater business visibility and transparency can enable organizations to execute decisively and effectively in this challenging climate. Such clarity can help executives answer the following key questions:

- How can we optimize energy efficiencies internally and with our customers?
- How can we best meet the mounting challenges of sustainability and increasingly complex government regulations?
- How can we maximize today's assets and build adaptable infrastructures for the future?

EXECUTIVE AGENDA

AT A GLANCE

Goals of the American Recovery and Reinvestment Act

Passage of the American Recovery and Reinvestment Act (ARRA) was a dramatic action designed to quickly stimulate an economic recovery in the United States. Over the next few years, billions of dollars will be spent on programs in areas such as education, infrastructure, technology, and healthcare. This historic stimulus plan also includes focus areas that directly affect the nation's energy utilities:

- **Energy efficiency and renewable-energy research.** Grants will help state and local governments implement strategies to reduce fuel emissions through energy efficiency, renewable-energy research, new technologies, and rebate programs.
- **Green technologies.** The plan encourages development in flood protection, navigation, hydropower, wind and solar power, water resource infrastructure, and technologies that reduce emissions.
- **Energy assistance for communities.** The goal of the Smart Grid Investment Program is to develop a modern electric grid. It includes funding for worker training and an Energy and Transmission Loan Guarantee Program to provide money for advancing proven renewable energy and transmission technologies.
- **Energy-efficient automobiles.** The plan encourages alternative fuels for cars, emerging vehicle technologies, and programs for cleaner energy sources.
- **Investor-owned utility and public utility incentives.** Grants and tax credits

are available to organizations that focus on energy conservation, renewable technology, and energy efficiency.

Key Challenges for the Utilities Industry

While utility executives sort out the implications associated with ARRA funding, they continue to confront challenges specific to the industry. Key areas of concern include:

- **Energy inefficiencies and costs.** By some industry estimates, up to half of the energy-generating components in the United States are mostly idle during off-peak hours. This "deadweight" loss is funded by consumers and increases our dependence on imported oil. Utilities must leverage an ever-growing amount of data to support strategic business decisions that optimize energy efficiencies and costs.
- **Complex regulatory requirements.** The government has established guidance and deadlines for regulations such as those dictating reduced carbon emissions. To avoid high fines, utilities must address these regulations while balancing the high cost of retooling the infrastructure and fulfilling the mandate for guaranteed power availability.
- **Aging infrastructure.** The country's utilities manage trillions of dollars in assets – from the transmission infrastructure to individual home meters. Some of these components are over 50 years old. Replacing such assets can be a long, complex, and costly effort that, if done inefficiently, could disrupt existing usage.

Technology Leads the Way for Utilities

Technology is seen as a critical enabler for implementing the stimulus plan. In total, ARRA includes approximately \$100 billion in funding specifically for technology to be spent incrementally between 2009 and 2014. Technology can help utilities see, think, and act more clearly as they develop and execute the strategies necessary to:

- **Optimize energy efficiencies.** New energy-grid technologies can help utilities balance supply and demand while improving the efficiency of energy delivery and consumer usage. These metering and data-exchange systems, however, require real-time communications and greater system interoperability.
- **Respond to sustainability concerns.** Increasingly, the adoption of sustainable energy practices is becoming a business imperative. Today's utilities are challenged to take a holistic approach to sustainability that simultaneously addresses compliance, globalization, environmental impact, and energy politics. Visibility into all aspects of a utility's operations and end-to-end process control are keys to success.
- **Develop higher-performing assets.** Managing today's aging infrastructure for peak efficiency while making the energy investments that will deliver maximum value tomorrow are basic tenets of the stimulus program. Utilities must be able to maintain existing equipment, model current and future assets, and analyze complex energy scenarios.

OPTIMIZING ENERGY EFFICIENCIES FOR UTILITIES AND CONSUMERS

TECHNOLOGY AND DEMAND MANAGEMENT

An Energy Agenda

On March 19, 2009, U.S. Vice President Biden and Energy Secretary Chu announced plans as part of ARRA to invest \$3.2 billion in energy efficiency and conservation projects across the country's cities, counties, states, territories, and Native American tribes. This Energy Efficiency and Conservation Block Grant program provides formula grants for projects that improve energy efficiency, reduce total energy use, and decrease fossil fuel emissions. Delivering smart energy through cutting-edge technology is at the core of many such projects.

The Promise of Advanced Metering Infrastructure

Advanced metering infrastructure (AMI) technologies, for example, can help consumers and utilities better understand and manage energy use. With AMI, energy consumption is recorded at regular time intervals – for example every 15 minutes – and then billed at different rates based on peak and off-peak hours. As a result, consumers and suppliers can collectively lower overall energy requirements and reduce carbon emissions.

Energy consumers. Customers can manage their energy consumption with greater understanding of appliance energy use and price variations. Home automation network (HAN) technologies can help consumers adjust their behaviors to maximize energy and cost effi-

ciencies; for example, deferring the use of high-consumption appliances until off-peak price periods and powering off devices completely when not in use. Having a clear profile of personal consumption educates customers on their individual carbon emission patterns and assists them with making better energy-efficiency decisions.

Energy suppliers. With AMI technologies, energy providers can improve the balance between energy demand and supply. The data collected through AMI technologies enables utilities to better profile energy requirements during both peak and off-peak hours and to predict energy usage spikes due to environmental changes. AMI also supports smart-grid technologies that improve the delivery of energy by providing greater control over load shedding, energy leakage, and outage management.

AMI technology can help utilities stay competitive in ways that older metering and data-exchange technologies simply cannot. But without a proper IT infrastructure that enables companies to implement and work with AMI in a cost-effective manner, utilities will find it difficult to deliver the flexible pricing options that the market demands. AMI requirements for data management and real-time information exchange call for improved communication and collaboration between customer and utility. It also requires far greater interoperability of systems within the utility's IT landscape and across enterprise boundaries.

Further Changes

Energy markets throughout North America, Europe, Australia, and elsewhere are changing in response to legislative mandates and market pressures to conserve resources, protect customers, and increase competition by offering customers more service choices. Traditional utilities that once enjoyed the protection of highly regulated markets need to improve the customer experience while controlling costs. Upgrading metering and data-exchange infrastructures can increase the quality of a company's sales and customer service processes. In addition, automated business-control processes can help utilities manage the variations between peak and off-peak production – reducing the overall cost to serve while lowering the cost per kilowatt hour.

“Today, our average residential customer uses eight percent more electricity than a decade ago. This [SAP AMI Integration for Utilities] software will allow us to provide more information to our customers so they can better manage their energy consumption.”

Sue Swan, Vice President of Business Technology Solutions, Consumers Energy

GENERATING STRATEGIES FOR SUSTAINABILITY

THE PATH TO A CLEANER ENERGY FUTURE

The New World of Business

Over the last few years, the global business climate has fundamentally changed. Protecting the environment is no longer simply a philanthropic or moral issue; it is becoming a highly relevant element of the core business. The primary factors driving businesses to adopt sustainability are:

- **Compliance.** Government regulations – such as the U.S. Clean Air Act and the European Union Emission Trading Scheme – now enforce certain behaviors by law.
- **Cost and profit.** Many companies are reducing costs through more efficient use of resources. Others are also seeking greater profitability in new revenue opportunities presented by the move to sustainability.
- **Reputation.** Companies are redefining their brand image to demonstrate their social or environmental responsibility. In doing so, these organizations are also appealing to an increasingly concerned consumer base.

From Governments to Consumers

The push for sustainability is being seen across all levels of government and in every economic sector. For example, many U.S. Environmental Protection Agency initiatives are now underway to promote more efficient energy use and to improve environmental quality without disrupting energy supplies. These efforts include programs to explore renewable energy

sources and advance the sustainable production of biofuels.

Federal agencies are also helping states and local communities foster urban sustainability by supporting initiatives such as:

- Smart-growth projects that include sustainability metrics for urban development
- Green building and infrastructure design
- Energy efficiency in homes and commercial buildings. Household carbon-emission calculators, for example, enable consumers to estimate their carbon emissions. In addition, these devices can provide recommendations on how to reduce emission totals.

Businesses can take a proactive approach as well. Many companies now actively participate in international committees working on global standards for calculating environmental impact. The Greenhouse Gas Protocol Initiative (GHG Protocol Initiative, Scope 3), for example, is drawing up a set of standardized guidelines for measuring carbon dioxide emissions for individual products and services. This initiative is supported by World Resource Institute and World Business Council for Sustainable Development.

The Impact on Utilities

The thirst for energy continues to increase across the globe – even as traditional sources of energy genera-

tion, such as fossil fuels, are dissipating. And this consumption contributes significantly to climate change and other environmental concerns. A chief obstacle utilities confront today is how to migrate to cleaner technologies in a cost-effective and time-efficient manner.

Adopting renewable generation technology, such as nuclear, wind, and solar power, is costly. Such a transition includes acquiring land, creating new generation plants, and extending delivery grids. In addition, providing new forms of power to the grid involves the implementation and tracking of new processes. For example, when energy is produced through consumer-owned generation, utilities must consider purchasing back and reloading power. With wider acceptance of electrical cars, chargebacks during nonusage periods will be another consideration. Even those utilities that continue with current fossil-burning facilities need to implement new technologies to support emerging requirements for emissions tracking and reporting as well as carbon-credit trading.

DEVELOPING HIGHER-PERFORMING ASSETS

THE TRANSFORMATION OF ENERGY TRANSMISSION

The Infrastructure Challenge: Maintain and Retool

Utilities face a true challenge today. Current assets are aging, and a more adaptable infrastructure is needed moving forward. For the near term, utilities must optimize current asset efficiency and availability. Downtimes must be limited to planned shutdowns and necessary overhauls only. Stringent maintenance processes can help ensure high levels of equipment reliability. Moreover, proactive planning can establish a stable environment where resources such as personnel, contractors, parts, and tools can be optimized.

Future increases in bulk transmission capacity, however, require significant improvements in transmission grid management. A smart grid, for example, can upgrade the use of capital assets while minimizing operations and maintenance costs. Smart grids precisely limit electrical power down to the residential level. Optimized power flows reduce waste and maximize use of the lowest-cost generation resources.

Assets for the Energy Future

Harmonizing local distribution with inter-regional energy flows and transmission traffic can further reduce grid congestion and bottlenecks – ultimately resulting in consumer savings. Such improvements can help create an open marketplace where alternative energy sources from many distant locations are sold easily to consumers wherever they are located. Intelligence in distribution grids can enable small producers to generate and sell electricity at the local level

using alternative sources such as rooftop photovoltaic panels, small wind turbines, and microhydro generators. However, intermittent power sources require sensors and software designed to react instantaneously to imbalances in order to ensure system quality with such distributed generation strategies.

In addition, operators and managers must have the right tools to effectively and efficiently operate a grid with an increasing number of variables. Technologies include visualization techniques that reduce large quantities of data into easily understood visual formats, software that provides multiple options when operator actions are required, and simulators for operational training and “what-if” analysis.

The Right Investments

Before a utility installs any type of smart system or advanced metering system, it must make a business case for the investment. For example, some components, such as power system stabilizers installed on generators, are very expensive, require complex integration in the grid’s control system, and are only effective if other suppliers on the network have them as well. Without a real incentive to install them, power suppliers typically do not.

In another example, most utilities find it difficult to justify installing a communications infrastructure for a single application, such as meter reading. A utility must identify several applications that will use the same communications infrastructure to perform tasks such as reading a meter, monitoring power quality,

controlling remote connection and disconnection of customers, or enabling demand response. Ideally, the communications infrastructure can support not only near-term applications but also unanticipated applications that will inevitably arise in the future.

Other factors also influence utilities as they decide which pieces of the smart-grid puzzle to implement. Each utility has a unique set of business, regulatory, and legislative drivers that guide its investments. As a result, each utility will have a different adoption rate and take a different path to creating its smart grid.

“And while as many as 94% of utilities agree that asset management is core to utility performance and 60% agree that addressing the aging utility infrastructure is a very high priority, a predominance of utilities report being ‘reactive’ to asset investment and maintenance.”

Source: *Aging Workforce and Aging Assets Trends 2007–2012*, UtiliPoint International Inc., April 2007

ACHIEVING VALUE THROUGH A CLEAR ENTERPRISE

THE ROAD TO BECOMING A BEST-RUN UTILITY

Today the industry is at an inflection point. Utilities across the United States are confronted by:

- **Greater complexity** from doing business through a period of unprecedented economic volatility and as participants in global networks
- **Increased accountability** from stakeholders who demand sustainable business practices

To survive in this environment, utilities must see clearly, think clearly, and act clearly. Only those organizations that can execute decisively and effectively can endure the current conditions and emerge in a stronger competitive position. To gain this clarity, utilities need:

- **Visibility** to refocus business strategies and streamline operational execution
- **Transparency** to demonstrate compliant and sustainable business practices

Clear enterprises understand what is going on in every aspect of their business and business networks. They operate with increased speed, relevance, and accuracy. They are prepared for risk and uncertainty and can adjust operations as market conditions change. In short, such enterprises are:

- Transparent and accountable
- Lean and agile
- Customer-centric and collaborative

Becoming a clear organization improves every aspect of managing an enterprise. It can help utilities survive and thrive in the near term and be sustainable over the long term. For example, sustainability presents both significant risks and new opportunities

to improve profitability. But being sustainable requires more than knowing your carbon footprint. It requires real-time knowledge of your business and business network – and the confidence to share this information with customers, stockholders, and other stakeholders.

Best-run utilities can use the SAP for Utilities solution portfolio to overcome functional silos and optimize their performance. The portfolio includes industry-specific solutions that help utilities close the gap between strategy and execution by delivering:

- **Insight** for improved performance
- **Efficiency** for optimized operations
- **Flexibility** to adapt quickly to changing market and regulatory conditions

Specifically, these solutions include:

- Proven AML integration with advanced customer systems
- Enterprise asset management for smart-grid development, renewable generation, and infrastructure projects
- Real-time analytics for multilevel decision making about energy efficiency

A clear enterprise – with broader insight, improved efficiency, and more flexibility – enables utilities to act with greater efficiency and sustainability in this challenging environment.

About the Authors

James McClelland is senior global director of the SAP Utilities & Energy Industry Solution Marketing group. He has worked in the utilities industry for over 25 years managing industry solutions and creating business strategy for utilities deregulation.

Aditi Chhaya is a principal in the SAP Value Engineering team, focusing on strategic industries. She concentrates on helping customers develop value-based business strategies, enabled by technology, that align to corporate priorities.

Further Reading

To learn more about the topics in this paper, please visit www.sap.com/usa/industries/utilities and www.sap.com/usa/industries/utilities/economic_recovery.

You can also contact your SAP representative about the following documents:

- *The Business of Sustainability: Information Technology as a Catalyst for Short- and Long-Term Profitability* – SAP thought leadership paper
- *The Future Is Here . . . Advanced Meter Infrastructure (AMI): Composite Technologies to Meet New Demands in Sales and Customer Service* – SAP white paper
- *Enterprise Asset Management: Maximize Return on Assets with an End-to-End Solution* – SAP solution brief

All rights reserved. SAP, R/3, SAP NetWeaver, Duet, PartnerEdge, ByDesign, SAP Business ByDesign, and other SAP products and services mentioned herein as well as their respective logos are trademarks or registered trademarks of SAP AG in Germany and other countries.

Business Objects and the Business Objects logo, BusinessObjects, Crystal Reports, Crystal Decisions, Web Intelligence, Xcelsius, and other Business Objects products and services mentioned herein as well as their respective logos are trademarks or registered trademarks of Business Objects S.A. in the United States and in other countries. Business Objects is an SAP company.

All other product and service names mentioned are the trademarks of their respective companies. Data contained in this document serves informational purposes only. National product specifications may vary.

These materials are subject to change without notice. These materials are provided by SAP AG and its affiliated companies ("SAP Group") for informational purposes only, without representation or warranty of any kind, and SAP Group shall not be liable for errors or omissions with respect to the materials. The only warranties for SAP Group products and services are those that are set forth in the express warranty statements accompanying such products and services, if any. Nothing herein should be construed as constituting an additional warranty.

www.sap.com/contactsap