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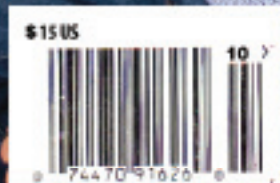
Andy Hill, Co-founder & CEO
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◆ CXO INSIGHT



Smart Utilities and Sustainable Resources Management

By John Neate, President, GLOBE Performance Solutions

Technology developers, manufacturers, and entrepreneurs are creating productive solutions to optimize the efficient use of energy and resources, while minimizing the potential for negative environmental impacts. With the increased availability of inexpensive micro-sensor technologies, everything is becoming “sensor-tagged”. Energy and water utilities are benefiting from this “sensorization” of our infrastructure and the associated smart technology advancements. These progressive utilities are employing innovative, real-time monitoring and control applications with high volume and low processing capabilities to improve the management of critical assets and service delivery infrastructure.

What are Smart Utilities?

A smart utility is a system or network that can cost-effectively integrate the behavior and actions of all users connected to it, including producers, generators, distributors and consumers, to ensure efficient, sustainable service supply with low losses and high levels of quality, reliability, security and safety. In doing so, smart utilities enable greater control over the critical decisions that influence production and consumption patterns.

The use of smart technology delivers benefits for both utilities and their customers. The key to unlocking these benefits lies in the data that smart technology delivers. The ability to analyze and identify patterns in the data becomes an important part of the

overall investment. Smart technology can reveal problematic areas within the system and better manage the production, storage and distribution of energy or water. Utilities are increasingly using this data to manage operational challenges and costs, identify and solve performance issues, improve customer service and prioritize infrastructure investments.

Market drivers for smart utilities

In the energy sector, global initiatives to reduce greenhouse gases and improve security of energy supply require increased usage of renewable energy and improved energy efficiency. Electric power utilities require smart networks to receive distributed power and manage fluctuations in energy demand resulting from innovations that may be introduced by customers. Natural gas utilities also require smart networks and advanced energy conversion systems that reduce requirements for electricity storage while increasing overall energy system efficiency, especially with the increasing use of intermittent electricity generation from renewable energy sources.

In the water sector, the challenges of aging infrastructure are a growing burden. Key issues for many water utilities include managing capital and operational costs, improving water conservation, preventing water losses from leaks and other system failures, and optimizing energy use. The need for better asset management is driving technology investments. Progressive water

utilities are using smart technologies to address these challenges.

Regulatory Approaches and Incentives to Enable Smart Utilities

New commercial and regulatory arrangements are necessary to enable smart technology development and the advancement of smart utilities. Regulators need to be smarter, just like the utilities they are regulating. Although there is considerable experience with performance indicators for quality of supply, it is equally important to develop performance indicators and benchmarks for integrated smart networks, for example where distributed generation and demand-side management play a role.

A clear definition of regulatory scope and responsibilities is needed to facilitate the development and effective implementation of smart technologies and networks and to address the changing role of utility providers, from serving primarily as suppliers to playing an active role in resource optimization. To achieve this, greater interaction amongst utilities is essential, coupled with a better understanding of the relationships and expectations amongst stakeholders.

Incentives can be used to encourage utilities and network operators to make investment decisions that enable the most cost-effective, sustainable solutions. Regulators should allow utilities to recover cost-justified investments in utility-side smart management systems. Utilities and network operators should also be encouraged to earn revenue based on efficiency gains at lower peak investment levels, rather than depending on additional sales.

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A Path Forward for Smart Utilities

Utilities implementing smart technologies and networks face challenges in understanding the necessary equipment, information tools and data analytics solutions needed to effectively manage the data generated. Utilities considering smart infrastructure investments should have a detailed roadmap in place, not just for the necessary infrastructure, but also for the use of the data generated. Solutions should be customizable and meet the future needs of the utility. There are five aspects to this:

- Stakeholder engagement—Determining relevant performance parameters that reflect the needs and priorities of the principal stakeholders
- Obtaining the right data—Acquiring and installing the core



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infrastructure to gather and analyze the data, including sensors, meters, systems, networks, and other automation software and hardware

- Managing the data—Storing the data in a functional manner that addresses the operational requirements of the utility
- Using the information derived from the data – Analyzing the data to reveal trends and patterns, and applying the information to address challenges and improve service efficiency
- Verifying system performance—Using performance benchmarking and verification to validate system design and outcomes within a transparent, quality-assured reporting framework.

Stakeholders may also require independent verification of capital, operating and maintenance costs to determine return on investment and long-term financial sustainability. A pilot program can help utility managers better understand the achievable return on investment.

The bottom line is that greater flexibility and functionality can be achieved by utilities incorporating smart technologies. Data analytics that target performance and system optimization ultimately lead to better planning and capital investment decisions. These integrated benefits translate into more effective asset management, service delivery, and sustainable resource stewardship.