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SMART GRID: CASE STUDY RESULT & ANALYSIS

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ABSTRACT

Demand response services that engage consumers are an important emerging aspect of the smart grid. The advent of new consumer-facing technologies that communicate with the electric utility is enabling this transformation. This paper presents and analyzes case studies of different electric utility programs, including enabling technologies and incentives, on smart grid demand response. The program successes are evaluated in terms of reduction in peak load and/or customer energy usage and customer satisfaction. An analysis of lessons learned is provided on how various incentives can affect the success and scalability of smart grid demand response programs. This paper describes the drivers, characteristics and major technical components of smart grid. The associated smart grid benefits, challenges and worldwide implementations are also summarized. It is emphasized that although the smart grid implementation is promising, it faces huge challenges. The migration to smart grid is a long journey when various technologies will coexist which requires thoughtful planning. Demand response and distributed renewable resource integration can serve the needs of sustainability and relieve the demand for transmission and generation capacities. While many interests and efforts have been taking on advanced transmission operations (ATO), other smart grid components as advanced metering infrastructure (AMI), advanced distribution operations (ADO) and advanced asset management (AAM) should be investigated as well. Reconfigurable distribution network and integrated energy and communication system architecture (IECSA) are the foundation of future smart grid, so they should be integrated in system planning from now. Smart grid implementation will boost the developments of various technologies and wide range of industrial participants should be encouraged.

Keywords : Smart Grid Distributed Generations Demand Response Bi-Directional Communications Culture of Conservation

Ease of use -The Smart Grid—the next-generation energy distribution network now being rolled out—offers something for everyone: Greater transparency and lower costs for consumers. New opportunities for technology providers, appliance and consumer electronics makers, and power utilities. A smaller carbon footprint for the planet.

I. ELECTRICITY

Consumers love smart networks. Just ask any passer-by what makes the wider bandwidth mobile networks better than the first generation networks (once they put down their smartphone). They also love having choice, transparency, and control over the networks they use, from comparison-shopping for broadband to tailoring their

mobile usage to different rate plans. From this perspective, both our communications networks and the people who use them are as smart as can be.

Energy distribution is another story. Electricity flows on demand, but that's about it; there's no role for the consumer beyond plugging things in, turning them on, and paying the bills.

II. TURNING ON THE SMART GRID

The consumers who use it While companies throughout the value chain have important roles to play in delivering smart solutions, it's clear that consumers are **the lynch pin—and they've proved a tough sell for similar** technologies in the past. Programmable thermostats offer substantial cost savings with a minimal impact on comfort, yet only a small fraction of the consumers who own them ever actually program them. Power strips prevent TVs, rechargers, and other "vampires" from drawing current when not in use—but who wants to keep getting down on the floor to turn them off and on?

III. CONTENTS OF PROJECT AND HEADLINES

IEEE's approach to the smart grid is to view it as a large "System of Systems" wherein individual smart grid domains based on the NIST Smart Grid Conceptual Model are expanded into three layers: Power and Energy, Communications, and IT/Computer. IEEE considers the Communications and IT/Computer layers to be enabling infrastructure for the Power and Energy layer.

IV. IEEE SMART GRID PORTAL

As part of the first phase of IEEE Smart Grid, IEEE unveiled the IEEE Smart Grid Portal in January 2010. As originally designed, the site served as an online clearinghouse providing smart grid-focused news, information, commentary, videos, and event information for a broad audience including business and industry, academic, and government users, as well as consumers. The portal is also home to the initiative's monthly digest, the *IEEE Smart Grid Newsletter*.[]

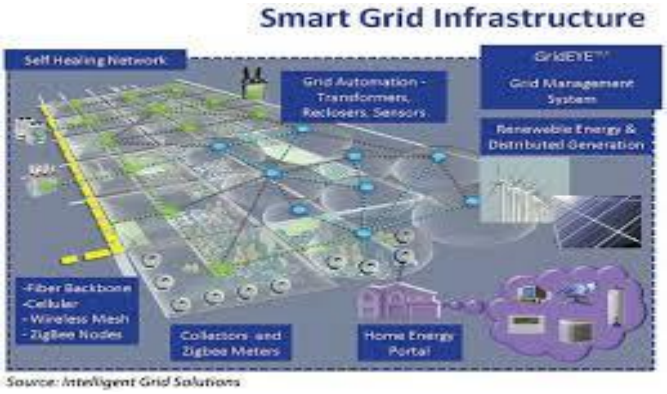
The IEEE Smart Grid Portal was relaunched in September 2011. The redesigned site included improved search capabilities and other new features, such as a broader selection of video interviews and Q&A's with industry experts, business leaders, and researchers. It also facilitated greater user access to approved and in-development IEEE smart grid standards and an expanded conference calendar.

V. STANDARDS

IEEE continues to work closely with NIST on its standards roadmap and conformance testing/certification framework for the smart grid. The organization also collaborates with other global standards bodies to effectively facilitate standards coordination and to ensure the intensifying smart grid movement's success.

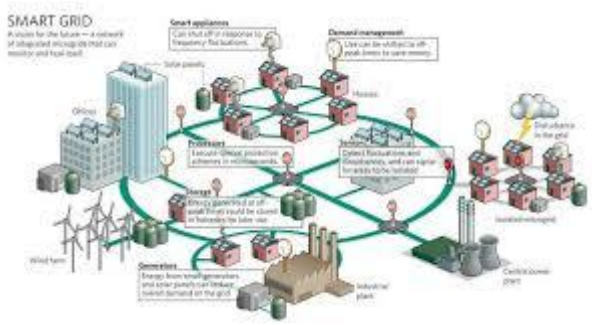
There are more than 100 standards that have been approved or in development[13] relating to the smart grid. Among the broad number of systems and technologies addressed by these standards are broadband over power line, cyber security, distributed energy resources, Distributed Network Protocol (DNP3), and Greenhouse gas emissions credits, among others.

Smart grid" generally refers to a class of technology people are using to bring utility electricity delivery systems into the 21st century, using computer-based remote control and automation. These systems are made possible by two-way communication technology and computer processing that has been used for decades in other industries. They are beginning to be used on electricity networks, from the power plants and wind farms all the way to the consumers of electricity in homes and businesses. They offer many benefits to utilities and consumers -- mostly seen in big improvements in energy efficiency on the electricity grid and in the energy users' homes and offices.



For a century, utility companies have had to send workers out to gather much of the data needed to provide electricity. The workers read meters, look for broken equipment and measure voltage, for example. Most of the devices utilities use to deliver electricity have yet to be automated and computerized. Now, many options and products are being made available to the electricity industry to modernize it.

The "grid" amounts to the networks that carry electricity from the plants where it is generated to consumers. The grid includes wires, substations, transformers, switches and much more.



VI. CONCLUSION

A **smart grid** is a system which includes a variety of operational and energy measures including smart meters, smart appliances, renewable energy resources, and energy efficiency resources.Electronic power conditioning and control of the production and distribution of electricity are important aspects of the smart grid.

Smart grid policy is organized in Europe as Smart Grid European Technology Platform. Policy in the United States . Roll-out of smart grid technology also implies a fundamental re-engineering of the electricity services industry, although typical usage of the term is focused on the technical infrastructure.

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