The Smart Grid

Since Thomas Edison developed an electricity distribution system in the late 1800’s (Wikipedia, 2014), utility companies have employed workers to read meters for the purpose of charging customers appropriately as well as find and fix broken equipment (“Smart Grid”, n.d.). Current technological advances make it possible for many functions of the electricity grid to be computerized and automated. In this sense, and following the nomenclature of the “Smart phone”, the electricity grid can become a “Smart Grid” (“Smart Grid”, n.d.).

More specifically, Marsic (2010) defines “Smart Grid” as the “modernization of the electricity grid that involves supporting real-time, two-way digital communications between electric utilities and their increasingly energy-conscious customers” (p. 384). Rather than sending workers out periodically to read meters, utility companies would have access to real-time customer electricity usage data through the use of digital meters, sensors, and a network in support of this information. Specifically, each networked device can have a sensor which gathers data and a two-way digital communication device to transmit the data between the device itself and the network’s core. In this way, the electric provider can adjust and control individual devices or millions of them from a central point (“Smart Grid”, n.d.).

The United States Department of Energy has been leading and coordinating the modernization of the electric grid because the benefits of a Smart Grid are numerous (“Smart Grid”, n.d.). The functional characteristics of the proposed Smart Grid are:

* + - Self-healing from power disturbance events
    - Enabling active participation by consumers in demand response
    - Operating resiliently against physical and cyber attack
    - Providing power quality for 21st century needs
    - Accommodating all generation and storage options
    - Enabling new products, services, and markets
    - Optimizing assets and operating efficiently (“Smart Grid”, n.d.).

With these characteristics in place, the Smart Grid will prove to be more flexible, reliable, resilient and efficient (“Smart Grid”, n.d.). The Smart Grid is essential to integrating renewable energy sources like allowing windmill farms and buildings with solar panels to feed electricity back into the network (Marsic, 2010). By having real-time data regarding usage, the utility companies will be able to detect overload conditions on the grid and adjust accordingly. Moreover, the sensors can provide the information necessary to detect where a fault is and route power around it. A Smart Grid also enables more efficient and controlled use of electricity in line with green initiatives. For example, the price of electricity can be varied with the grid’s load in real-time, such that the cost will rise as the demand rises. This, in turn, encourages customers to use less energy during those peak hours. Not only could customers manage their electricity usage, but the utility company itself could intervene. Smart meters could be programmed to turn off devices automatically if the cost reaches a set price. Even more intelligently, the utility company could stagger which appliances get turned on at various times. Marsic (2010) give the example that an electric company could ensure that “not all of a neighborhood’s vehicles are being charged at the same time” (p. 385).

It has been over 100 years since electricity has been distributed to households in the United States. With the infrastructure that internet technology makes possible, the electric grid can now be modernized and automated. The Smart Grid promises a more reliable and efficient electric delivery system that will flex with demand and encourage conservation. The work that is being done to revolutionize the electricity delivery system should prove beneficial for years to come.

References

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