Chapter 78
Energy Consumers' Perspectives on Smart Meter Data:
Privacy and Unjust Algorithmic Discrimination

Jenifer Sunrise Winter
University of Hawaii at Manoa, USA

ABSTRACT

This chapter employs the framework of contextual integrity related to privacy developed by Nissenbaum as a tool to understand consumer response to implementation of residential smart metering technology. To identify and understand specific changes in information practices brought about by the introduction of smart meters, energy consumers were interviewed, read a description of planned smart grid/meter implementation, and were asked to reflect on changes in the key actors involved, information attributes, and principles of transmission. Areas where new practices emerge with the introduction of residential smart meters were then highlighted as potential problems (privacy violations). Issues identified in this study included concern about unauthorized use and sharing of personal data, data leaks or spoofing via hacking, the blurring distinction between the home and public space, and inferences made from new data types aggregated with other personal data that could be used to unjustly discriminate against individuals or groups.

INTRODUCTION

The smart grid is a next-generation electrical power grid intended to upgrade and replace aging infrastructure, enhance energy conservation, and provide real-time information for decision making, allowing energy companies "full visibility and pervasive control over their assets and services" (Farhangi, 2010, p. 19). Whereas the existing power grid is an inefficient, unidirectional pipeline that is unable to access information about residences receiving power in real-time, the smart grid represents the marriage of information and communication technologies (ICTs) and power systems, adding new communication and data management capabilities (Depuru, Wang, Devabhaktuni & Gudi, 2011). The smart grid can

DOI: 10.4018/978-1-5225-7113-1.ch078

be seen as an aspect of broader sociotechnical developments focusing on the sensoring of everyday objects, the Internet of Things. The Internet of Things is described as a "backbone for ubiquitous computing, enabling smart environments to recognize and identify objects, and retrieve information from the Internet to facilitate their adaptive functionality" (Weber & Weber, 2010, p. 1). It is an emerging architecture intended to enable billions or trillions of heterogeneous objects to interact over the Internet. A key component is the development of machine-to-machine communication to automate the exchange of information, goods, and services. These developments represent the integration of the physical world with the virtual world, enabling increased instrumentation and tracking of natural processes. The new types and massive volume of data created in this environment are mined to enhance decision-making in business and government and offer increased convenience and safety (Uckelmann, Harrison, & Michahelles, 2010). One aspect of the Internet of Things is the development of smart cities and homes that, via ICT integration, allow advanced infrastructure monitoring, including smart grid management to govern cost- and resource-efficient use of energy (Khan, Khan, Zaheer, & Khan, 2012; Atzori, Iera & Morabito, 2010). Smart homes can include automatic lighting and power allocation (CERP-IoT, 2010). This use of ICT to lower environmental impact has been referred to as "Green ICT" (Vermesan et al., 2011).

Smart meters, a component of the smart grid, are energy meters installed at residences and used by electric utilities that can capture energy consumption data with more granularity than a traditional electrical meter (see Figure 1).

These data are captured in real-time and transmitted to the utility via a wireless network. In addition to allowing a constant stream of data about a home's energy use, smart meters also allow a utility to send commands to the meter, such as turning off the power due to nonpayment of tariffs or reducing the amount of energy available to a home based on the time of day or type of energy use. In doing so, smart meters "open the door to new and expanded services, such as time-based pricing, load control, budget, billing, high usage alerts, push notifications, and web services for energy management" (Cooper, 2016,

Figure 1. Residential smart meter