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Via E-Mail

Michael Li
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U.S. Department of Energy
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1000 Independence Avenue, SW
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smartgridpolicy@hq.doe.gov

Re: Smart Grid RFI: Addressing Policy And Logistical Challenges

Dear Mr. Li:

On behalf of the Association of Home Appliance Manufacturers (AHAM), I would like to provide our comments on the Smart Grid RFI: Addressing Policy and Logistical Challenges, 75 Fed. Reg. 57,006 (Sept. 17, 2010).

The Association of Home Appliance Manufacturers (AHAM) represents manufacturers of major, portable and floor care home appliances, and suppliers to the industry. AHAM's membership includes over 150 companies throughout the world. In the U.S., AHAM members employ tens of thousands of people and produce more than 95% of the household appliances shipped for sale. The factory shipment value of these products is more than \$30 billion annually. The home appliance industry, through its products and innovation, is essential to U.S. consumer lifestyle, health, safety and convenience. Through its technology, employees and productivity, the industry contributes significantly to U.S. jobs and economic security. Home appliances also are a success story in terms of energy efficiency and environmental protection. New appliances often represent the most effective choice a consumer can make to reduce home energy use and costs.

The Department of Energy (DOE) sought comments from interested parties on policy and logistical challenges that confront smart grid implementation, as well as recommendations on how to best overcome those challenges. The residential sector likely represents the most untapped potential for demand response—in fact, residential customers are likely to offer as much demand response potential as small, medium, and large businesses combined. (*See* “National Assessment of Demand Response,” Federal Energy Regulatory Commission, June

2009). Home appliances will play a large role in tapping that potential, provided use of smart appliances in the home is properly incentivized by the government, both federal and state. AHAM is interested and involved in the development of the Smart Grid and the policies surrounding a Smart Grid in the United States. The objective of the Smart Grid is to provide technology and systems (integrated into appliances and consumer devices used in everyday activities) that will allow consumers to automatically control their energy use and costs. AHAM provides a unique perspective to the Smart Grid Vision because many of the products AHAM members manufacture must be part of our nation's future Smart Grid.

AHAM believes that in order for the Smart Grid to be successful, there are three essential requirements for the Smart Grid's interaction with consumers:

1. Pricing must provide incentives to manage energy use more efficiently and enable consumers to save money;
2. Communication standards must be open, flexible, secure, and limited in number; and
3. Consumer choice and privacy must be respected; the consumer is the decision maker.

These requirements must be addressed by several entities involved with development of the Smart Grid architecture and standards, as no one company, association, or government agency can accomplish this alone. The overriding concern should be the consumer. Without proper consideration of consumer needs in the development of smart grid initiatives, the vision of the Smart Grid is at risk.

In addition to our detailed comments below, we respectfully direct DOE to two AHAM documents that address, and attempt to answer, many of the questions DOE raised in its RFI.

1. For further information on AHAM's position on general Smart Grid issues—AHAM Smart Grid White Paper: The Home Appliance Industry's Principles & Requirements for Achieving a Widely Accepted Smart Grid (AHAM White Paper). The AHAM White Paper is embedded below for your convenience.



AHAM Smart Grid
White Paper.pdf

2. AHAM also did a follow-up report to the white paper, Assessment of Communication Standards for smart Appliances: The Home Appliance Industry's Technical Evaluation of communication Protocols (Communications Assessment). The Communications Assessment is the industry's technical evaluation of the multitude of existing communications protocols designed for the Smart Grid. It, like the AHAM White Paper, was built with a focus on consumers' needs. The Communications Assessment is embedded below for your convenience.



SGCommAssessment
_FINAL.pdf

I. Assessing And Allocating Costs And Benefits

DOE asked how it should assess and allocate costs and benefits related to the Smart Grid.

The growth of Smart Grid infrastructure in the U.S. (60 million smart meters, or 47% of U.S. households, are planned by 2019) will provide the hardware and rate structure incentives to enable consumers and utilities to manage the use and demand for electric energy. The resulting Smart Grid system will produce energy and financial savings to both the grid and individual consumers. It is critical, however, that the implementation costs of the grid infrastructure and smart appliances themselves results in benefits that far outweigh the costs. To assure that the implementation costs are minimized for smart appliances, national communication standards are needed to allow manufactures to develop mass produced products suitable for nation-wide distribution. AHAM does not presently intend to develop these communication standards, but has undertaken a technical evaluation of existing communication standards, and an assessment based on their application with home appliances, for standards bodies and government agencies to consider. That Communications Assessment is embedded above.

II. Greater Collaboration Is Essential

DOE asked about how various Smart Grid stakeholders and regulators can work together to implement the Smart Grid.

AHAM is optimistic that with proper coordination, cooperation and communication among the various Standards Development Organizations, associations, government agencies and companies, the above-identified requirements can be addressed and the Smart Grid Vision will be achieved. AHAM suggests a cooperative effort among appliance and other product manufacturers, DOE, the National Institute of Standards and Technology (NIST), states, energy regulatory agencies, utilities, and smart meter manufacturers.

Suggested areas of cooperation include:

- **Electricity Rates:** It must be recognized that existing residential tariffs and rate structures do not provide sufficient economic incentive to spur maximum consumer participation in the use of Smart Grid technologies. The current structures do not support the cost, innovation, and creativity required to make the Smart Grid a success. Success of the Smart Grid requires dynamic rate structures that are designed to support a total systems approach. Dynamic pricing is an essential component to consumers and energy providers participating in the benefits of the Smart Grid system. Strong consideration should be given to the development of uniform pricing and usage information standards that provide for a harmonized way of communicating local rate and timing information.
- **Communication Standards:** There must be a rapid drive towards open standards, with specific attention to the interface between the Smart Grid and the consumer. The utility industry and state regulatory bodies are encouraged to work with product manufacturers

and consumers to establish a common nationwide communication standard that impacts the area between the smart meters or home energy management system and appliances in the home. Efforts to leverage existing communication technologies in the home, such as the Internet, should also be a priority. The Communications Assessment discusses this in more detail.

- **Consumer Focused Smart Grid Pilot Projects:** Smart meter or other pilot projects that include open standards and architectures that are expandable in the future must be pursued. Consumers should be able to easily transition from a system that controls one device to a whole home energy management system. Projects should emphasize the consumer as the decision maker as opposed to scenarios where the utility possesses absolute control over the consumer's appliances and devices.
- **Funding:** Funding should be allocated for research, development, and demonstration of concepts that achieve the Smart Grid Vision. There are large amounts of complex information that need to be consolidated in a simple and understandable way.

AHAM further recommends these cooperative efforts include the manufacturers of all residential devices such as manufacturers of home appliances, consumer electronics, HVAC equipment, thermostats, lighting, communications, networking, residential generators, and electric vehicles to ensure that the Smart Grid Vision, as it applies to residential consumers, will become a reality.

III. Long Term Issues: Managing A Grid With High Penetration Of New Technologies

DOE asked several questions regarding long term management of a Smart Grid with high penetration of new technologies.

National standards are needed to ensure an appliance has the capability to function anywhere in the U.S. where the Smart Grid infrastructure is available. These national standards also will promote interoperability between appliances and enhance consumer choice. National standard communications and application protocols will make it possible for consumers to move from one area of the country to another while continuing to benefit from Smart Grid technologies without having to replace, modify, or upgrade their appliances.

AHAM's Communications Assessment evaluated issues across numerous existing communications technologies with respect to the following key communications layers: Application (APP), Network (NET), and Media Layers (MAC, PHY). It was often impossible to separate a technology's value statement from an associated networking technology—thus, these were often combined for evaluation purposes. Each communications technology was evaluated against a set of clear, consumer driven requirements, as identified by participating AHAM members based on their expertise and knowledge of the industry. Each technology was evaluated through a requirements driven scoring system, by an independent consultant to rank the ability of the studied communications technologies to meet the unique needs of appliance consumers. According to the Communication Assessment's results, the most relevant communications technologies were clearly separated from their peers for use in Smart Grid appliance applications. For the Application layer, SEP 2.0 and OpenADR scored the highest.

Across the media and network layers evaluated, Wi-Fi, ZigBee, and HomePlug Green PHY, scored the highest.

IV. Managing Transitions

DOE also sought comment on managing incremental change during the gradual evolution of the Smart Grid that may transform the power sector over the next few decades.

Although there could be other viable architectures, the AHAM Communications Assessment reflects a clear preference by the home appliance industry that the best communications architecture at this time features a hub or gateway that can communicate using common protocols and serve as the adapter or bridge to other devices on the Home Area Network (HAN). This type of architecture is consistent with the OpenHAN architectures and provides simplicity for the consumer, and the flexibility needed for future development needs. Additionally, this type of architecture supports a more robust, comprehensive “home networking” system approach compatible with consumer electronics devices. The Communications Assessment further finds that the application protocols identified above, and the media capable of delivering them, are the best performing protocols for Smart Grid targeted applications for a consumer audience. Appliance manufacturers may voluntarily use these results to increase the energy management capabilities of their appliances, recognizing that other considerations may apply. Incentives for consumers and appliance manufacturers need to be pursued in all applicable areas to promote active and rapid growth of the role of appliances in the Smart Grid ecosystem.

V. Reliability And Cyber-Security

DOE invited comment on the reliability opportunities and challenges that Smart Grid technologies create. DOE also invited comment on cyber-security issues.

Privacy and Security are extremely important in the consumer environment. In a societal environment where identity theft is rampant, consumers are sensitive to the issue of devices in their home that could compromise their personal safety or privacy. The appliance industry must do its part to protect the consumer. For that reason, AHAM’s Communications Assessment weighted the requirements related to privacy and security the heaviest by giving them a weighting of five out of five. Furthermore, protocols make use of encryption at different layers. NIST has established standards for encryption techniques and the handling of the keys used within those techniques.

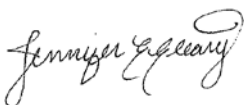
The AHAM Communications Assessment gave preference to the protocols that follow the NIST recommended techniques. The task of providing security services for the Smart Grid is not trivial due to its large scale deployment, legacy devices, scattered field devices, and its heterogeneous architecture. (Cisco, “Securing the Smart Grid”, available online: http://www.ciscosystemsnetwork.net/web/strategy/docs/energy/SmartGridSecurity_wp.pdf, 2009). An attacker may launch a wide range of attacks including man-in-the-middle (MITM), impersonation, eavesdropping, message forgery, packet dropping, message storms, and noise injection. Impacts of these attacks can be as serious as blackouts.

Thus, there are many crucial security requirements for the Smart Grid such as device authentication, privacy, message authentication, data integrity and data availability. All these requirements rely upon securely authenticated devices as a basis. Further, the HAN is the only part of the grid for which the utility has no direct control. It may, therefore, be the most vulnerable part of the Smart Grid. For this reason utilities have put in place the Energy Service Interface (ESI) in AMI HAN systems. Third parties will also implement an ESI to protect their systems from possible attacks to the HAN. Appliance applications should use appropriate security measures to ensure that consumers have control of their appliances, and that unauthorized persons do not. Different security measures can be used to accomplish that goal. Encryption is used to ensure that consumer information is not visible to unauthorized persons. Authorization logic is used to grant privileges to consumers using access controls. Authentication is used to verify that users are who they represent themselves to be. Authentication logic is typically implemented with passwords. Various combinations of these security measures may be necessary to meet the security needs of smart appliances.

Despite advances in the security area, there is still work ongoing in this area for the HAN due to identified flaws in current schemes. These flaws include the need for user intervention or effort in establishing the security association, MITM attack vulnerabilities, and risk of compromise through other means. Thus, the ongoing work in the NIST Cyber Security Working Group on key management and cryptography is of fundamental importance as the Smart Grid evolves. Allowing for adaptation as advances occur in the security area was also considered within the hub architecture and addressed by the ability of the architecture to facilitate updating and improving of security at the hub.

AHAM appreciates the opportunity to submit these comments on the Smart Grid RFI: Addressing Policy and Logistical Challenges. We would be glad to discuss this matter further should you request.

Best Regards,

A handwritten signature in cursive script, appearing to read "Jennifer Cleary".

Jennifer Cleary
Director, Regulatory Affairs