DEPARTMENT OF ENERGY

DATA ACCESS AND PRIVACY ISSUES RELATED TO SMART GRID TECHNOLOGIES

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INTRODUCTION AND EXECUTIVE SUMMARY

This report by the Department of Energy (DOE) complements DOE's companion report, *Informing Federal Smart Grid Policy: The Communications Requirements of Electric Utilities.*[1] Both reports are also components of the federal government's much broader efforts to facilitate the adoption and deployment of various Smart Grid technologies. These ongoing broader efforts have encompassed many agencies including many operational units within DOE, the Federal Communications Commission (FCC), the Federal Energy Regulatory Commission (FERC), the National Institute of Standards and Technology (NIST), and the National Science and Technology Council Committee on Technology's Subcommittee on Smart Grid.

This report and its companion report also respond to recommendations directed toward DOE in the National Broadband Plan (the "NBP"), authored by the FCC at the direction of Congress.[2] The NBP seeks to ensure that every American has access to broadband capability. The NBP also includes a detailed strategy for achieving affordability and maximizing use of broadband to advance consumer welfare, civic participation, public safety and homeland security, health care delivery, energy independence and efficiency, education, entrepreneurial activity, job creation and economic growth, and other national purposes.[3] As part of this strategy, the NBP made recommendations to various Federal agencies, including DOE. In particular, the NBP recommended that DOE evaluate the overall communications needs of the Smart Grid, consider consumer-data-accessibility policies when evaluating Smart Grid grant applications, and report on the states' progress toward enacting consumer data accessibility and develop best practices guidance for states. This report implements the latter two recommendations, while the companion report implements the first recommendation.

Smart Grid technologies will be a critical long-term component of a more interactive, robust, and efficient electricity generation, transmission and usage system. Moreover, the advanced, state-of-the-art electrical grid that these technologies will create will be an important component of an overall national energy, economic, and security strategy predicated upon reasserting U.S. leadership in the race to develop cleaner, sustainable, and secure sources of energy—a race that Secretary of Energy Chu has called "a Second Industrial Revolution."

As DOE has emphasized, the promise of the Smart Grid is enormous and includes improved reliability, flexibility, and power quality, as well as a reduction in peak demand and transmission costs, environmental benefits, and increased security, energy efficiency, and durability and ease

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[1] *See* Department of Energy, *Informing Federal Smart Grid Policy: The Communications Requirements of Electric Utilities*, October 5, 2010, available at http://www.gc.energy.gov/1592.htm. This complementary report provides a more detailed summary of both the operation of Smart Grid technologies like advanced metering and the federal government's multifaceted efforts to promote their adoption and deployment.

[2] The Plan, developed pursuant to the American Recovery and Reinvestment Act of 2009 (P.L. No. 111-5), was issued on March 16, 2010 and is available at http://www.broadband.gov/plan/.

[3] *Id.*

of repair in response to attacks or natural disasters. But DOE also recognizes that long-term success of Smart Grid technologies depends upon understanding and respecting consumers' reasonable expectations of privacy, security, and control over who has access to potentially revealing energy-usage data.

DOE believes that privacy and access, in the context of a Smart Grid, are complementary values rather than conflicting goals. The practical impact of a Smart Grid depends on its capacity to encourage and accommodate innovation while making usage data available to consumers and appropriate entities and respecting consumers' reasonable interests in choosing how to balance the benefits of access against the protection of personal privacy and security. This report seeks to assist both policymakers and private and public entities interested in understanding how legal and regulatory regimes are evolving to better accommodate innovation, privacy and data-security. To that end, this report surveys industry, state, and federal practices in this evolving area to alert industry leaders, state regulators, and federal policy makers to trends and practices that seem most likely to accommodate all of these values and maximize the value of Smart Grid technologies.

This Report consists of two main components. The next section, *Key Findings*, summarizes DOE's impressions of the information it collected in the spring and summer of 2010 during its proceeding on the data-privacy and data-security issues raised by Smart Grid technologies like advanced metering. In particular, this section provides a coherent summary of developing trends, consensuses, and potential best practices emerging as States use or adapt existing legal regimes to accommodate the deployment of Smart Grid technologies. The second section, *Summary of Public Comments and Information*, provides a more comprehensive summary of the comments, both written and transcribed, that DOE received in response to the Request for Information ("RFI") and during the public roundtable discussion conducted during the preparation of this report.

Overview of Data Access and Privacy Concerns

Recognizing and addressing the significant concerns with access to and privacy protection for energy usage data are critical to the development of U.S. Smart Grid policies because of the enormous potential of consumer and authorized third party access to energy consumption data through the use of Smart Grid technologies, and the continued importance of utility access to such data.

Advances in Smart Grid technology could significantly increase the amount of potentially available information about personal energy consumption. Such information could reveal personal details about the lives of consumers, such as their daily schedules (including times when they are at or away from home or asleep), whether their homes are equipped with alarm systems, whether they own expensive electronic equipment such as plasma TVs, and whether they use certain types of medical equipment. Consumers rightfully expect that the privacy of this information will be maintained. The proprietary business information of non-residential customers could also be revealed through the release of energy consumption data, resulting in competitive harm. Studies conducted by utilities and consumer advocates have consistently shown that privacy issues are of tremendous import to consumers of electricity.

At the same time, access to consumer data continues to be of importance to utilities for operational purposes and to achieve the important national goals, discussed above, that Smart Grid technologies will advance. In addition, access to such data by consumers and authorized third parties has significant potential to enable American consumers to understand their energy use, and thus become more proactive in managing that use, ultimately saving money on their energy bills and becoming more efficient consumers of energy.

DOE recognizes that issues of data access and privacy are not entirely new. DOE commends the utilities' strong track record of protecting the privacy of customer data and acknowledges the traditional responsibility of state utility commissions in regulating issues associated with data privacy. The findings set forth in this report build up the continuing efforts of these entities to protect customer privacy, as well as the efforts of third party service providers and consumer groups to foster responsible data access to achieve the goals of Smart Grid. DOE believes that these findings will be applicable to issues of privacy and access that will continue to remain at the forefront as the technologies associated with Smart Grid continue to evolve.

Summary of Recommendations

DOE's recommendations are discussed more fully in the section that follows. In summary, however, DOE notes that consumer education about the benefits of Smart Grid and the use of Smart Grid technologies will be of significant important to the success of Smart Grid. The pace of deployment will also be important and should not outpace consumer education.

This is particularly true given that Smart Grid technologies can generate very detailed energy consumption information. Because of its detailed nature, such information should be accorded privacy protections – and the accord of these protections will do much to increase consumer acceptance of Smart Grid. While utilities need access to this energy consumption data for operational purposes, both residential and commercial consumers should be able to access their own energy consumption data and decide whether to grant access to third parties. In addition, the special circumstances of certain populations, such as rural, low-income, minority and elderly populations, must be considered in any Smart Grid deployment strategy.

States should also carefully consider the conditions under which consumers can authorize third-party access. Commenters to this proceeding generally agreed that these conditions should include a prohibition on disclosure of consumer data to third parties in the absence of affirmative consumer authorization, and that the authorization should specify the purposes for which the third party is authorized to use the data, the term of the authorization, and the means for withdrawing an authorization. Commenters also generally agreed that authorized third parties should be required to protect the privacy and security of consumer data and use it only for the purposes specified in the authorization, and that states should define the circumstances, conditions, and data that utilities should disclose to third parties.

Issues of third-party access for which consensus proved harder to achieve include how consumers should authorize third-party access and how (though not whether) utility liability

should be limited when utilities are required to disclose data to authorized third parties, as well as applicable complaint procedures once third-party access has been authorized, and the specific data that utilities should be required to disclose to authorized third parties. In addition, commenters did not reach consensus on whether utilities could charge a fee for providing third-party access to consumer energy data, and whether authorized third-party service providers should be required to obtain further informed consent before disclosing such data. State certification requirements for third parties also remained an open issue.

To assist in the discussion and resolution of these issues, DOE proposes to create a web portal and act as a clearinghouse for data and information on Smart Grid data access and protection.

KEY FINDINGS

This section summarizes and records DOE's impressions of the results of its efforts to collect and analyze diverse perspectives on the current state of data security[4] and consumer access and privacy issues associated with the ongoing development and deployment of "Smart Grid" technologies. In so doing, it provides federal, state and local policymakers, as well as utilities and third-party providers of energy management services, with a concise, broad overview of the current state of ongoing efforts to assess the legal and regulatory implications of the data-security and data-privacy issues that were identified during a public information-gathering process conducted by DOE in the spring and summer of 2010. In this document, DOE attempts to provide a measure of certainty for all Smart Grid participants on issues where there is consensus, as well as highlight the pros and cons of various approaches where debate still exists.

DOE stresses the intended audience and the legal and regulatory focus of this report because efforts to encourage the deployment of Smart Grid technologies will depend significantly upon two factors. *First*, the success of such efforts depends upon the development of legal and regulatory regimes that respect consumer privacy, promote consumer access to and choice regarding third-party use of their energy data, and secure potentially sensitive data to increase consumer acceptance of Smart Grid. *Second*, the success of such efforts also depends upon the development of appropriate technical standards and protocols for promoting privacy, choice, and the secure, interoperable transfer and maintenance of sensitive data.

This report focuses on the first of these challenges. Federal efforts to investigate the second set of technical issues and promote the development of standards for addressing them are also underway. Those seeking analyses of the technical issues should consult publications like the *Guidelines for Smart Grid Cyber Security: Vol. 2, Privacy and the Smart Grid*, released by the National Institute of Standards and Technology in August 2010.[5]

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[4] The term "data security" in this report means the ability to protect the confidentiality, integrity and availability of the data. The term refers primarily to securing consumer data in the interests of privacy, and does not seek to encompass or answer more generalized Smart Grid cyber security issues. The systemic pursuit of cyber security throughout the Smart Grid serves to reinforce consumer data security, but the topic is dealt with narrowly here.

[5] Cyber Security Working Group (CSWG), Smart Grid Interoperability Panel (SGIP), *Guidelines for Smart Grid Cyber Security: Vol. 2, Privacy and the Smart Grid* (National Institute of Standards and Technology Interagency Report NISTIR7628, August 2010). This document is available at:

The proceedings conducted by DOE and the findings set forth in this report are particularly relevant because legal and regulatory infrastructures are now developing rapidly as various states and localities either begin to deploy Smart Grid technologies, or prepare to do so soon. These Smart Grid technologies have attracted widespread attention from policymakers, investors, industries and consumers who realize that a more interactive electrical grid can promote not only more efficient and transparent energy use, but also the sorts of unpredictable innovations often associated with the Internet.[6] Moreover, these technologies have important implications for the nation as a whole and for the continued development of our overall national energy strategy. An updated, more flexible and more interactive electrical transmission and distribution system will be critical to the long-term success of our move towards sustainable energy—particularly if plug-in electrical vehicles become widely used.[7]

At the same time, it is important to recognize the key role played by the States in the regulation of electrical utilities and consumer privacy.[8] In this report, DOE recognizes that the States will continue to play their traditional leading roles in regulating the deployment of Smart Grid technologies. DOE also believes that an effective partnership between federal and state agencies would be beneficial to broadly support and facilitate the development and deployment of a wide range of Smart Grid technologies.

Promoting American innovation in the development and deployment of cleaner, more sustainable and more domestic energy-generation technologies is a critical, long-term national priority. Moreover, in the long run, a "smarter," more flexible and robust electrical transmission-and-distribution system is unquestionably a prerequisite to the achievement of this priority. As exemplified by the Recovery Act, Energy Independence and Security Act of 2007 and other authorities, DOE has an important role in promoting the development, deployment and evolution of Smart Grid technologies. One means for DOE to do so is to carefully study diverse State and local efforts to develop and deploy these technologies and act as a "clearinghouse" for data that will help State and local officials, as well as private enterprises, identify the most promising research, development, regulatory and deployment strategies.

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http://csrc.nist.gov/publications/PubsNISTIRs.html#NIST-IR-7628 (last visited September 28, 2010). The SGIP is administered under a contract from NIST, funded through DOE ARRA funding transferred to NIST to support NIST activities under the Energy Independence and Security Act of 2007 (EISA).

[6] *See, e.g.*, Consumer Electronics Association (CEA) at 1 (agreeing that Smart Grid technologies will "play a critical role in achieving national priorities like enabling new ways to enhance energy efficiency…"); Utilities Telecom Council (UTC) at 1 (noting that smart energy grids will "create an environment in which consumers will have greater abilities to manage their own energy usage and utilities will have new tools to affect grid-wide energy efficiencies"); National Association of State Utility Consumer Advocates (NASUCA) at 22-23 (discussing the need for privacy protections that take into account future developments involving not only electric vehicles but also other unforeseen devices); Google, Inc. (Google) at 1 (noting that consumer access to energy consumption data could lead to "countless new products and solutions to help consumers save energy and money"); Jeff Osborne, et al., *A Primer on the Smart Grid* (Thomas Weisel Partners, Aug. 6, 2009) (discussing potential investment opportunities associated with Smart Grid technologies).

[7] Tendril Networks, Inc. (Tendril), Data Privacy Public Meeting Transcript (PTR) at 21-22 (noting the relatively significant amount of energy used by electric vehicles).

[8] DOE recognizes that typically, States have jurisdiction over investor-owned utilities. Such utilities provide service to over 68% of electric utility customers. Most of the analysis and recommendations set forth in this report, however, are equally applicable to public and cooperative electric utilities.

In light of the above, DOE finds that:

First, this state-federal partnership model follows from the federal government's overall strategy towards clean energy technologies. In the Recovery Act, the Nation made an unprecedented investment in sustainable energy and high-quality jobs by, among other initiatives, directing DOE to support the development and deployment of a wide array of differing Smart Grid technologies and approaches. Through the Act, DOE will promote the transition of our Nation, with its diverse local geography and resources, towards more sustainable energy sources, as well as the creation of breakthrough technologies that will promote economic growth and exports during the 21st century.

Second, this partnership model is well advised given that Smart Grid technologies are only beginning to be widely deployed, and allowing for experimentation is a sound policy strategy. After all, our experience with Internet technologies strongly suggests that it may be difficult or impossible to predict the uses to which a "smarter" and more interactive electrical grid will ultimately be put. Our federal system of state and local governments was intended to provide opportunities to experiment so debates about the relative merits of differing approaches can be assessed by practical experience.

Third, Smart Grid technologies offer enormous potential benefits to the nation, to electrical utilities, and to consumers. Because the deployment of such technologies will impose costs that will likely be recovered from consumers, however, there is a strong case that any such decisions should be evaluated at the state level where the relevant agency can evaluate whether such investments are justified.

It should be noted that among the many Smart Grid technologies, advanced meters or "smart meters" figure heavily in discussions about consumer data and privacy. Many other components of a Smart Grid are potentially relevant to consumer privacy, but the advanced meter's ability to measure, record and transmit granular individual consumption, and its presence at the traditional boundary between the utility and the consumer, make it a focal point of this report. A Smart Grid, of course consists of hundreds of technologies and thousands of components, most of which do not generate data relevant to consumer privacy.

As part of its role in facilitating the continued development of an effective energy policy strategy for the 21st century, DOE therefore sets forth the following "Key Findings," which fall into two categories. First, some findings identify both situations in which participants in this proceeding and DOE's own analysis of relevant state laws, practices, and secondary sources suggest fairly broad agreement on particular issues. Second, other findings highlight situations in which the same sources suggest fairly broad agreement on the importance of confronting particular questions—even if those sources do not yet suggest broad agreement as to the best answers to those questions.

As an initial matter, DOE emphasizes the extent to which there was substantial agreement on matters related to data access, consumer privacy, and Smart Grid technologies. DOE was surprised about the extent of this agreement, given that issues related to privacy can be divisive,

and relevant state laws on consumer privacy and utility regulation can differ significantly as a result. Many Smart Grid technologies are just emerging or being widely deployed, and it is inherently difficult to predict just what net benefits and services will ultimately arise from a more interactive energy transmission system that provides more granular energy-consumption data. Consequently, it was encouraging to note the extent to which states, localities, private and public electrical utilities, potential third-party service providers, and information technology and consumer-electronics providers were not only thinking carefully about these issues and participating in federal efforts to enhance coordination, but also reaching somewhat similar conclusions.

Consumer education and flexibility in both technology and pace of deployment will be critical to the long-term success of Smart Grid technologies.

Commenters voiced broad consensus on this principle. Deployment of Smart Grid technologies offers important long-term benefits for both consumers and the electricity generation, transmission and usage system. These technologies can reduce energy costs for individual American consumers and across the American economy. They are also critical to our long-term efforts to create high-quality jobs and promote sustained economic growth by re-asserting American ingenuity and technological leadership in the global movement to transition energy production and consumption towards cleaner, more sustainable, and more secure energy sources.

Moreover, important long-term benefits of Smart Grid technologies arise directly from the more intelligent electrical-metering-and-usage-monitoring technologies that will be the focus of this report.[9] For example, smarter metering technologies and other customer-facing technologies (commonly referred to as home area networks, or HANs) could enable technologies that could reduce the overall costs of generating electrical power and encourage shifting load from peak to off-peak by rewarding consumers who curtail their energy usage during "critical peak-load" periods when particularly heavy demand radically increases the overall cost of electrical generation as particularly expensive generation methods must be brought online quickly. Smart metering can also encourage consumers to use less energy by providing consumers with information (through in-home displays and other devices) about energy usage. Enhancing consumers' ability to understand and manage their energy consumption will also be important to efforts to better integrate variable or intermittent renewable energy-generation technologies—like wind and solar—into our overall energy transmission and generation system. Similarly, the advent and use of electric vehicles will create new potential stresses on our use of electric power that can be minimized through Smart Grid technologies.

In discussing the importance of consumer education, commenters in this proceeding consistently stressed that an overly prescriptive "top-down" approach to attaining these long-term national goals could prove unhelpful, or even backfire. In particular, commenters consistently identified three factors that, taken together, suggest that both patience and flexibility will be critical

[9] In this report, DOE uses the terms "intelligent electrical-metering-and-usage-monitoring" and "advanced metering" to refer, generally, to a wide range of metering technologies including AMR and AMI. These technologies vary widely in their capabilities, implementation, and costs.

components of any overall or long-term national strategy towards Smart Grid technologies generally and advanced metering technologies in particular.

First, both governmental and private proponents of smart-grid technologies and the advanced services that they can support should recognize that consumer education will be a critical component of successful efforts to promote the widespread adoption and deployment of various forms of intelligent electrical-metering-and-usage-monitoring technologies. To a considerable extent, the pace at which "smarter" metering systems can be deployed depends ultimately upon the extent to which the citizens of a given state or jurisdiction conclude that they will benefit by investing in advanced metering technologies. Consumer education and outreach to consumer advocates—some of whom still view advanced metering technologies with suspicion—will thus be critical components of efforts to promote the adoption of Smart Grid technologies.[10]

Second, states and localities will need the flexibility to carefully balance the costs, benefits, and deployment schedules of a wide array of intelligent electrical-metering-and-usage-monitoring technologies that vary significantly in their level of sophistication. Notably, states and localities will need the flexibility to consider the costs and benefits of requiring utilities deploying such technologies and home energy management systems to provide more or less granular data, and the willingness of the consumers in a particular jurisdiction to support the deployment of such technologies.[11]

Third, both of the preceding concerns will be heightened in the context of utilities that provide services to predominately rural or economically disadvantaged customers. In such areas, deployment costs may be unusually high, or relatively high compared to income levels, customer bases may be particularly cost-sensitive, and the need for focused consumer education may be greater.[12]

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[10] *See, e.g.*, CEA at 4; Office of Consumer Counsel, Colorado Department of Regulatory Agencies (CO OCC), PTR at 12-13, 32, 53, 102; Northwestern Energy (NW Energy), PTR at 13-14, 62; TechNet, Inc. (TechNet), PTR at 16-17; Sacramento Municipal Utility District (SMUD), PTR at 29, 48, 97; Telecommunications Industry Association (TIA) at 3-4; Tendril, PTR at 58-59 (discussing the gap between increased costs to consumers and the benefits consumers see from Smart Grid roll out); DTE Energy Company (DTE), PTR at 83-84 (same).

[11] *See, e.g.*, American Public Power Association (APPA) at 7; Avista Corporation (Avista) at 2; Edison Electric Institute (EEI) Reply at 11; NASUCA at 15-16; NW Energy, PTR at 48; Sawnee Electric Membership Corporation (Sawnee), PTR at 47. *See also* National Rural Electric Cooperative Association (NRECA) at 2 ("Cooperatives are widely embracing numerous Smart Grid technologies and have been recognized as leaders in integrating advanced grid technologies. For many Cooperatives, [AMI], distribution automation, and software integration are among the Smart Grid technologies that make sense. The operational benefits of [such] technologies are often greater in rural areas with low population densities. Low density increases the costs of meter reading, outage response, system maintenance, and distribution system losses. Advanced technologies help Cooperatives to address these issues and thus provide real benefits to consumers including lower distribution costs and fewer and shorter outages. (Citing F.E.R.C. Ann. Rep. on the Assessment of Demand Response and Advanced Metering 8 (Dec. 2008), *available at:* http://www.ferc.gov/legal/staff-reports/12-08-demand-response.pdf).

[12] *See* Institute for Electric Efficiency (IEE), *The Impact of Dynamic Pricing on Low Income Consumers* (June 2010) ("Based on bill impact simulations and the results review from four pilots and one full-scale program, we conclude that low income customers will benefit from dynamic pricing."). *See also* comments of Joint Center for Political and Economic Studies (Joint Center); Consumers Union, National Consumer Law Center, and Public Citizen (Joint Consumer Comment) at 5-6; TechNet, PTR at 31-32.

To be clear, most participants in this proceeding—including many of those who offered the cautionary notes summarized above—were very supportive of the development and deployment of Smart Grid technologies. Nevertheless, many also stressed that because the short-term costs of deploying such technologies will tend to precede their long-term benefits, it will be important for policymakers at all levels to recognize the importance of educating consumers and ensuring that the extent and the pace of deployment does not outpace consumer attitudes, which may vary significantly and depend upon local circumstances.

Many Smart Grid technologies can generate highly detailed or "granular" energy-consumption data that should be accorded privacy protections because it is both potentially useful and sensitive.

This principle also generated broad consensus among commenters. Data about the energy use of a given household can be a powerful tool for increasing efficiency, troubleshooting, and lowering overall costs because each of the many household devices and appliances that consume electrical power tend to do so in a way that can enable a sophisticated analyst—given enough sufficiently granular energy-usage data—to identify the contributions of particular appliances and devices to overall energy usage and to determine whether those contributions are consistent with those of an efficiently-operating appliance or device.[13] The current state of the art, in terms of the granularity of data collected by utilities using advanced metering, cannot yet identify individual appliances and devices in the home in detail, but this will certainly be within the capabilities of subsequent generations of Smart Grid technologies.

Such data, termed consumer-specific energy-usage data ("CEUD") by many commenters, has enormous potential to enable utilities or other third-party service providers to help consumers significantly reduce energy consumption, avoid costly breakdowns and repairs, and reduce the overall complexity of running a modern household full of increasingly complex and interactive devices and appliances.[14]

Because such data can also disclose fairly detailed information about the behavior and activities of a particular household, however, there was also broad consensus that the collection of CEUD raises privacy implications that should be acknowledged and respected during the development of intelligent electrical-metering-and-usage-monitoring technologies.[15] It is the energy usage data itself *and* the ability to tie that data to an individual or household that makes the data particularly sensitive.

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[13] *See, e.g.*, Tendril, PTR at 22, 26, 33-34, 75; Whirlpool Corporation (Whirlpool), PTR at 75; Honeywell International, Inc. (Honeywell) at 8-9.

[14] *Id.* For comments directed to the definition of CEUD and other relevant types of data, *see, e.g.*, Silver Spring Networks (Silver Spring) at 1-3; Avista at 5; NASUCA at 4; EEI at 3, 6; Cleco Power, LLC (Cleco) at 2; DTE at 2-3; Demand Response and Smart Grid Coalition (DRSG) at 1; CPower, Inc. (CPower) at 1.

[15] *See, e.g.*, NARUC at 2 (stating that "[w]hile the deployment of smart grid technologies may empower the consumer and provide more options, it also poses significant privacy issues that need to be considered and resolved by regulators").

Many commenters also agreed on a closely related principle: At any given moment, many consumers are likely to have widely varying views about how they want to balance the privacy and efficiency implications of energy-usage data generated by certain Smart Grid technologies, and their views may evolve significantly over time as real-world experience demonstrates added-value by revealing the relative advantages of differing sets of choices. Consequently, consumers should have rights to protect the privacy of their own CEUD and control access to it.[16] Well-designed implementations of Smart Grid technologies should also empower individual consumers to make a wide array of choices about whether or how to manage their own energy-consumption data via home energy management systems.[17]

Utilities should continue to have access to CEUD and to be able to use that data for utility-related business purposes like managing their networks, coordinating with transmission and distribution-system operators, billing for services, and compiling it into anonymized and aggregated energy-usage data for purposes like reporting jurisdictional load profiles.

Many commenters stressed not only that the utilities' use of CEUD will support critical functions, but also that the importance of utility access to and use of such data is likely to increase significantly as we move towards more sustainable and non-polluting means of energy generation and consumption like renewable energy sources and plug-in electrical vehicles.[18] In particular, utility access to consumer data will be important to efforts to better integrate variable or intermittent renewable energy-generation technologies into our overall energy transmission and generation system. Moreover, the charging of electrical vehicles—though it may tend to occur during "off-peak" hours in most jurisdictions—may impose significant challenges that will require utilities to carefully monitor electrical consumption across their networks as such vehicles become more popular.[19]

[16] *See, e.g.*, APPA at 5, 7; Avista at 1-3; AARP Reply at 4; Baltimore Gas & Electric (BG&E) at 2; Cleco Power LLC ("Cleco") at 1-2; CEA at 2-4; Joint Consumer Comment at 8; CPower at 1-2; DRSG at 2-3; EEI at 8-11, 17; EEI Reply at 6-7; Elster Solutions (Elster) at 1; EnerNOC, Inc. (EnerNOC) at 2-3; Exelon Corporation (Exelon) at 2; Florida Power & Light Company (FPL) at 4-5; Google at 1; Honeywell at 2-3; Idaho Power Company (Idaho Power) at 4-6; Joint Center at 11-12; NASUCA at 8-9, 16; NRECA at 7; Oncor Electric Delivery Company, LLC (Oncor) at 3-5; Pepco Holdings, Inc. (Pepco) at 1-2; Southern California Edison (SCE) at 1-2; San Diego Gas & Electric Company (SDG&E) at 4, 6; Silver Spring at 2, 4; SMUD, PTR at 56; Southern Company Services, Inc. (Southern) at 3-4; Tendril at 3-4; TIA at 3; United States Telecom Association (US Telecom) at 1-3; UTC at 6-7, 10-11; Verizon and Verizon Wireless (Verizon) at 1-3; Whirlpool at 2-3; Xcel Energy (Xcel) at 4-5; Xcel Reply at 4-5.

[17] *See, e.g.*, Cisco Systems (Cisco), PTR at 15-16; SDG&E at 11-12; APPA at 11; DRSG at 6; CEA at 5; EEI at 23-24; FPL at 7-8; Idaho Power at 7; Tendril, PTR at 44-45.

[18] Cleco at 3; Oncor at 4.

[19] Tendril, PTR at 21-22. Most, but not all, commenters agreed that consumers should not be allowed to "opt out" and disallow a utility from using their personal energy-usage data for planning or network management. These commenters raise valid concerns about the potentially deleterious effects that the resulting incomplete data sets could have upon planning or network management activities required to ensure the reliability and adequacy of our electrical generation and transmission system. *See, e.g.*, Oncor at 3-4; Pepco at 2; EEI at 15-16; DRSG at 3. *But see* CPower at 2; Joint Consumer Comment at 5.

Consumers should be able to access CEUD and decide whether third-parties are entitled to access CEUD for purposes other than providing electrical power.

There is almost universal consensus on the question of consumer access to their CEUD, though some parties disagree about whether the right that customers have to CEUD should be described as a right of access or ownership. Many commenters assert that customers have ownership rights in their own CEUD.[20] Many others assert that those rights are more accurately described as access rights.[21] When discussing the privacy implications of Smart Grid technologies, the difference between these two positions is not entirely semantic, but it need not be dispositive.[22] While the nature of the CEUD provided to a given consumer may vary somewhat, depending upon which technologies are employed and how they are implemented, there seems to be broad consensus that providing consumers with access to "actionable" data, CEUD that they can use to alter their energy-use patterns to reduce their overall energy costs, should be a critical goal of any implementation of Smart Grid technologies like advanced metering.[23] Indeed, the long-term national benefits of such technologies depend significantly upon meaningful access to such data.

There also seems to be a broad consensus on perhaps the most critical question in the context of Smart Grid technologies: who should control the extent to which third parties should be able to access CEUD for innovative purposes other than the provision of electrical power? On this question, almost all proponents of both consumer-ownership rights and consumer-access rights agree: Consumers should decide whether and for what purposes any third-party should be authorized to access or receive CEUD. Consumer control of third-party access to CEUD would promote the development of a competitive, open, transparent, and innovating marketplace for the use and management of energy-consumption data.[24] Most advanced smart meter technologies would provide consumers with data (through in-home displays or other devices) that could be used to reduce energy costs by managing their energy use or using automated means of doing so.

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[20] *See, e.g.*, CEA at 2; Elster at 1; EnerNOC at 2; Honeywell at 1; NASUCA at 7, 16 (arguing that the consumer pays for the infrastructure by which the utility obtains access to the data, which can reveal personal information about the consumer); NASUCA Reply at 2-5; SDG&E at 3; Sawnee, PTR at 40; Whirlpool at 2.

[21] EEI at 4-5 ("Ownership of energy consumption data is a complex question that extends beyond a simplistic notion of 'ownership,' and pertains more to issues of data access and usage."); *see also* BG&E at 2; FPL at 3; Idaho Power at 4; NRECA at 3; Oncor at 2 (while noting that under Texas law, consumers served by investor-owned utilities own their energy consumption data); Pepco at 1; Southern at 3; Tendril at 2-3; UTC at 3-6.

[22] Utilities may be correct to assert that the rights that consumers have in their CEUD might most accurately be described as rights of access and control. *See, e.g.*, EEI at 4-5. But the particular term used to describe the rights that consumers have as to their own CEUD may not matter provided that the rights that consumers have as to CEUD do not impede utilities from using CEUD for purposes associated with the provision of electrical power, or the management of the generation, transmission, and billing processes. Indeed, enhancing the ability of utilities to manage, plan, and troubleshoot are among the most important advantages of Smart Grid technologies. And as many commenters noted, utilities have long collected, used, and protected potentially sensitive data about their customers. *See, e.g.*, FPL at 3; Idaho Power at 4-5; APPA at 16-17; NRECA at 17-19. The data privacy concerns associated with Smart Grid are not new, though as discussed above, the more detailed data potentially provided by Smart Grid technologies may warrant review to ensure the adequacy of existing laws, standards, and practices related to utilities' management of CEUD.

[23] Google at 1.

[24] *See* http://www.smartgrid.gov/sites/default/files/pdfs/wh_response_letter_4aug2010_to_climategroup_and_consumer_groups_on_sg_data.pdf "We believe that providing consumers with clear, timely, and appropriate information about their energy consumption and electricity pricing is critical to optimizing the efficiency of the electric grid and facilitating our Nation's transition to a clean energy economy."

Nevertheless, many commenters argued that third parties may well use data generated by such meters to provide consumers with far more innovative or sophisticated energy-management or other services. There seems to be broad consensus that empowering consumers to authorize disclosure of their CEUD to third-party service providers will promote innovation.[25]

There was less consensus on the closely related, but distinct, question of whether utilities or other third-party service providers should be allowed to reduce the costs of their services by disclosing or reselling CEUD to third parties for purposes of targeting advertising. While there appears to be widespread agreement that such practices, if permitted, should require further affirmative and informed consumer consent, one jurisdiction requires at least utilities to obtain regulatory approval before disclosing any potentially sensitive data.[26]

All classes of electric utility customers should be entitled to protect the privacy of their own individual energy-usage data.

This proceeding focused on the issue of *residential* consumer data-security and privacy. Participants frequently noted, however, that the deployment of Smart-Grid technologies also has important implications for other classes of utility customers. Commenters stated that all classes of electric utility customers besides residential consumers (e.g., industrial, commercial, small business, and non-profit customers) are also users of electrical power and customers of an electrical utility. As a result, such customers are similarly entitled to privacy protections for their individual-specific electric usage data.

In particular, many commentators agreed that for many of the same reasons that consumer energy-usage data should be treated as CEUD, commercial or organizational customers of utilities should also be entitled to protect the privacy of their energy-usage data. Just as detailed energy-usage data could be used to generate information about household activities that many consumers might consider personal or sensitive, so too could such data be used to discern information about commercial or organizational activities that many of these entities might consider to be proprietary or highly commercially sensitive. Consequently, many commentators stressed that well-designed regulations or deployments of Smart Grid technologies should carefully consider the implications of these technologies for commercial and organizational utility customers, as well as consumers.[27]

Beyond this point, the relationship between commercial and organizational customers and Smart Grid technologies raises complex questions that exceed the intended scope of this proceeding and as to which no clear consensus positions seemed to exist.[28] Should further information on such matters prove helpful, DOE would consider conducting further study on these issues and

[25] *See, e.g.,* Google at 1; Cisco, PTR at 68-69; Silver Spring at 6; Tendril, PTR at 75-76; Sawnee, PTR at 104-105. *But see* http://www.ftc.gov/bc/international/docs/smartgrids_usa.pdf.
[26] *See,*Cleco at 2; *See also, e.g.,* Avista at 4; EEI at 8-9; FPL at 3; Idaho Power at 4; NASUCA at 29-30; Pepco at 1, 11-13; SDG&E at 3.
[27] *See, e.g.,* Avista at 1; EEI at 9; EEI Reply at 6-7; NRECA at 7; SDG&E at 4.
[28] *See, e.g.,* Building Owners and Managers Association (BOMA) at 2; Real Estate Roundtable (Roundtable) at 3-5.

providing the results of such studies and any further information gathering in its role as an information "clearinghouse", as discussed in more detail later in the Report.

Deployment strategies must be flexible for utilities serving rural, low-income, minority or elderly customers, and consider the special circumstances of those customers, but should not presume that Smart Grid technologies are inappropriate or unhelpful to such customers.

Commenters addressing the issue consistently stressed that efforts to deploy Smart Grid technologies should be flexible and consider the special circumstances of rural, low-income, minority, and elderly electric utility customers. Nevertheless, commenters did not always agree about the implications of these technologies for these important constituencies. Some worried that advanced metering is likely to be more of a cost than a benefit to such constituencies because they are less likely to understand its implications, and have access to resources, like broadband Internet access, or lack the financial resources required to exploit them.[29]

Commenters like the Joint Center for Political and Economic Studies stressed that overall strategies toward the Smart Grid should consider the unique circumstances of rural, low-income, minority, and elderly electric utility customers precisely because these constituencies "are most susceptible to high energy costs" and therefore can most benefit from savings in those costs.[30] The National Rural Electrical Cooperative Association notes that non-profit rural cooperatives have been early adopters of technologies like AMI because they "provide real benefits to [low-density populations] including lower distribution costs and fewer and shorter outages."[31] The Institute for Electric Efficiency has also released a whitepaper discussing several pilot programs that show low-income consumers can and do benefit from the dynamic pricing that Smart Grid technologies enable.[32] That said, DOE recognizes that the relevant costs and benefits of different Smart Grid technologies will be borne out over time as experiments with different approaches realize different results. These results will reflect an array of factors, such as the specific technologies in question, the relative effectiveness of consumer education as to how to use the technology, and the ability to cohere with consumer behavior (e.g., employ "set-and-forget" defaults to limit the demands on consumer to monitor real-time energy use).

[29] APPA at 8-9; Joint Center at 9-10 (noting that further study was needed to determine the impact of Smart Grid on these consumers).
[30] *See* Joint Center at 1; *see also* Google OSTP Comments at 2 (arguing that low-income customers are particularly price-sensitive and that "studies indicate the access to direct feedback on energy consumption leads to energy and money savings"); Google FCC comments at 4-5 (citing studies and discussing the "Prius effect" in which near-real-time data on energy consumption encourages energy-conserving behaviors).
[31] NRECA, at 2 (citing F.E.R.C. Ann. Rep. on the Assessment of Demand Response and Advanced Metering 8 (Dec. 2008), *available at:* http://www.ferc.gov/legal/staff-reports/12-08-demand-response.pdf.)
[32] *See* IEE, *The Impact of Dynamic Pricing on Low Income Consumers* (June 2010) (concluding "that low income customers will benefit from dynamic pricing"). *But see* "The Need for Essential Consumer Protections" (August 2010), issued by a group of consumer entities raising questions about the methodology and findings contained in the IEE report.

Consequently, deployment of Smart Grid technologies should not presume that low-income, minority, and elderly constituents will be harmed by, or should be excluded from, the Smart Grid. Rather, deployment strategies should be crafted to identify and serve the needs of these important constituencies.[33] For example, the Public Utility Commission of Texas has approved both consumer-education efforts related to Smart-Grid and the funding of a program that will provide low-income consumers with free in-home monitors to help them monitor their energy uses. Texas and other jurisdictions have also authorized the use of prepayment plans that have proven to be popular with low-income consumers. Under such plans, consumers purchase a given dollar-value of power, and an in-home monitor that interoperates with a smart meter reports both their energy usage and the amount of money left in the account.[34]

States must carefully consider the conditions under which consumers can authorize third-party access to CEUD.

The issue of third-party access is complex and fairly contentious, but may be somewhat narrower than it sounds. If consumers can access or own their CEUD, then once that data has been provided to them, consumers could ordinarily keep it private or disclose it to whomever they choose. Indeed, more advanced smart-meter technologies may soon make it much easier for consumers to provide at least some types of CEUD directly to third parties. Such meters can interconnect through a home-area network ("HAN") with interoperable devices using secure protocols.[35] It should be noted that easy transferability of CEUD should be considered as such technologies are developed. Transition to the use of standardized, machine-readable formats is discussed in more detail later in this report.[36]

Nevertheless, in some contexts, more granular CEUD may be more useful to consumers if they can authorize their utilities to disclose it directly, and on an ongoing basis, to a third-party service provider selected by the consumer. Consequently, the issue of third-party access focuses on whether or how states should regulate the process through which a consumers can grant (and

[33] *See* comments of the Joint Center; Exelon at 3; NASUCA at 18-19; Pepco at 3-4; UTC at 11-12 (citing the IEE whitepaper).
[34] *See, e.g.*, Oncor at 4, 6.
[35] *See, e.g.*, Oncor at 9 (noting that for security purposes, consumers must use a utility's provisioning process in order to ensure that only devices approved by them are associated with their meter); *see also* SCE Reply at 1 (discussing the interaction of HANs, advanced meters, and interoperable devices); EEI at 9 (advocating privacy protections for "more general consumer information that may be generated, not only by smart meters, but also by [HANs] and devices connected directly for third party access"); Google OSTP Comments at 1 (noting "multiple gateways for residential energy use data, price data, and demand response signals").
[36] DOE understands that NIST has initiated efforts to support standardization of energy usage information with a North American Energy Standards Board (NAESB) standard information model for customer energy usage information and an American Society of Heating, Refrigerating and Air-Conditioning information model for facility energy usage. In addition, other standards supporting implementation of these information models are already under development, including Open ADE (with NAESB) and the Zigbee Smart Energy Profile 2.0. DOE notes that once any protocols or model standards are developed and published by NIST for the interoperability of Smart Grid devices and technologies, an investment that fails to incorporate any of such protocols or model standards is not eligible for reimbursement under the Federal Smart Grid Investment Matching Grant Program. Pub. L. 110-140, Section 1306.

retract) authorization for a utility to disclose CEUD to a third-party service provider selected by the consumer.

Commenters certainly agreed that this is one of the most important and difficult issues inherent in deploying and regulating Smart Grid technologies. This question of how consumers authorize utilities to disclose CEUD to third parties thus raises difficult questions on which there seems to be fairly broad consensus on some core principles, but less agreement on how best to implement those principles. In general, there seems to be substantial consensus on the following principles:

***First,* Utilities should not disclose CEUD to third parties unless a given consumer has consented to such disclosure affirmatively, through an opt-in process that reflects and records the consumer's informed consent.** Often, the use of such an opt-in authorization process will have to comply with existing laws that prohibit utilities from disclosing customer data to third parties without a particular customer's informed consent. In any case, commenters were virtually unanimous that an opt-in authorization process predicated on informed consent should be required before utilities disclose CEUD to third-party service providers.[37]

***Second,* jurisdictions designing such opt-in authorization processes should require a valid authorization that specifies the purposes for which the third-party is authorized to use CEUD, defines the term during which the authorization will remain valid and identifies the means through which consumers can withdraw such authorizations.** Commenters tended to stress, in particular, that the informed consumer consent required by an opt-in process should require a valid authorization to identify both the type of CEUD that the third party seeks to obtain and the purposes for which that third party is authorized to use the CEUD. Here again, many commenters stressed the importance of full and clear disclosure if the third party intends to use CEUD for purposes of targeting advertising or marketing towards the consumer.[38] Such disclosure requirements and the ability to opt-in to Smart Grid data sharing must be clearly communicated to consumers as part of any Smart Grid education effort.

***Third,* third parties authorized to receive CEUD should be required to protect the privacy and the security (including integrity and confidentiality) of CEUD that they receive and to use it only for the purposes specified in the authorization.** Some commenters asserted that third-parties should be required to comply with all legal requirements related to the protection of CEUD that are applicable to utilities. Others proposed more general legal duties.[39] Nevertheless, there was broad consensus that authorized third parties should be required to

[37] *See, e.g.*, DTE, PTR at 86; EEI at 17, 23-24; Honeywell at 3; NASUCA at 16; NW Energy, PTR at 41; Oncor at 4-5; Pepco at 6; Southern at 4; Tendril , PTR at 36, 43; TIA at 3.

[38] *See, e.g.*, APPA at 6; Silver Spring at 3; Xcel at 3, 7-8; Xcel Reply at 7. A number of commenters also supported the Fair Information Principles developed by the Federal Trade Commission (FTC FIPPs) and other similar practices that include identification of the types of CEUD sought and the uses to which the CEUD will be put, as well as the identity of the entity collecting the data and any potential recipients of the data. *See, e.g.*, CEA at 3; DRSG at 2, 4; EnerNOC at 4; NASUCA Reply at 7-8; Pepco at 4; TIA at 3; Tendril at 3-4; SCE at 1, 4; Xcel at 6.

[39] *See, e.g.*, EEI at 14, 30; Elster at 4; Exelon at 3-4; Oncor at 8; SMUD, PTR at 64-65; Tendril, PTR at 42; US Telecom at 2 (all supporting applicability of the same standards to which utilities are held). *See also* Cisco, PTR at 68-69 (noting that standards for third party handling of data are still an open question and that not any one system is necessarily the right one).

protect the privacy and security of CEUD and use it only for the purposes specified in the authorization.

***Fourth,* States should enact laws or rules that define the circumstances, conditions, and data that utilities should disclose to third parties.** For different reasons, both third-party service providers and utilities expressed concerns about the implications of systems in which utilities determine whether or when potential competitors will be granted access to CEUD.[40] Nevertheless, States defining such terms may wish to consider defining the set of data that utilities must disclose without precluding utilities from agreeing to disclose other data to authorized third-party service providers. Such flexibility may be needed because it now seems difficult to predict whether and to what extent security and cost considerations will tend to make utilities or consumers (empowered by Smart Grid technologies) the long-term, low-cost providers of useful, secure access to any given class of CEUD.

There are, however, many more issues relevant to third-party authorization as to which there is no clear consensus among jurisdictions or commenters. As to these issues, there is consensus that certain questions need to be addressed when Smart Grid technologies are deployed, but divergent opinions as to what the best answers to those questions are, and the extent to which the best answer may differ from jurisdiction to jurisdiction. Consequently, in these areas, it is appropriate to note the most important questions, identify varying approaches to them, and assess the record for evidence of trends or potentially superior solutions.

How should consumers authorize third-party access to CEUD? Texas currently requires consumers to submit a written letter of authorization.[41] Third-party service providers like Oncor argue, however, that it would be more efficient to let consumers authorize third-party access online, through a secure web portal.[42]

An online authorization process is currently in use in California.[43] While California law also requires written authorization, such authorization is construed to encompass electronic authorization for purposes of SDG&E's protocol that allows a customer to authorize, using SDG&E's "My Account" webpage, transmission of that customer's usage data to third parties. Once a customer provides authorization, SDG&E assigns a unique identifier to the customer and his or her usage data to facilitate the transfer of that data to authorized third parties. SDG&E established this protocol in response to the recent CPUC requirement that investor-owned

[40] *Compare* Tendril at 7-8 (noting that "customers should be free to choose from services available from an open and transparent marketplace"), *with* EEI at 10-11; EEI Reply at 18 (noting that "unfettered third party access is insufficient and overlooks important state-based consumer protections, as well as the need for third party verification") and National Association of Regulatory Utility Commissioners (NARUC) at 1 (noting its 2009 resolution calling for, among other things, policies and standards that "should promote a flexible, non-proprietary, open infrastructure," and "encourage interoperability of the electric grid and information services to foster a vast array of resources and information services."

[41] Oncor at 4-5, 11.

[42] Oncor at 4-5, 11.

[43] SDG&E at 15-16.

electric utilities provide third parties with access, upon the customer's consent, to that customer's real-time or near real-time usage information by the end of 2011.[44]

An online authorization process raises additional security concerns, and would require strong authentication protections to ensure that any person purporting to authorize access was actually the consumer who had the legal authority to grant such access. Nevertheless, DOE recognizes the obvious efficiencies of an online process and the expanding range of sensitive e-commerce and other transactions strongly suggest the long-term advantages of online authorization processes. Consequently, States could consider transitioning towards an online authorization process, such as the process currently being studied in Texas.[45]

When and how should jurisdictions limit the potential legal liability of utilities required to disclose CEUD to consumers or authorized third parties? In many jurisdictions, electric utilities have legal duties and existing policies that require them to protect the confidentiality and security of CEUD that they collect, possess or use. Obviously, when utilities are required to transfer CEUD to consumers or authorized third-party service providers, they cannot, as a practical matter, continue to protect that transferred data's confidentiality and security. Utilities thus argue that they should not be legally liable for CEUD that has been disclosed to an authorized third-party provider: "[A]uthorized third parties must be responsible for protecting that data and liable for any unauthorized access or intellectual property infringement that may occur."[46]

This is an important issue. Third-party service providers, not utilities, should assume legal responsibility for protecting the security and privacy of CEUD that utilities disclose pursuant to a consumer authorization. Nevertheless, relevant state and local laws vary, and consequently, there may be no one approach to defining the bounds of legal liability for CEUD that works for all jurisdictions. For example, in some jurisdictions, tarrifing regulations and practices may provide a means to define the bounds of a utility's liability, but not those of authorized third-party service providers.[47]

How should consumers be educated about which complaint procedures apply when third-party access to CEUD has been authorized? Many states authorize Public Utility Commissions, ("PUCs"), to receive and adjudicate consumer complaints about investor-owned electric utilities. But state PUCs generally have jurisdiction over investor-owned electric utilities—not third-party service providers authorized to receive CEUD, who may now be regulated only by more general laws, like state consumer-protection laws often administered by a state's Attorney General. Consequently, jurisdictions deploying Smart-Grid technologies will have to carefully consider both the adequacy of existing remedial processes and how to ensure that consumers understand whether to direct concerns or complaints to a PUC or to other

[44] Id. SDG&E also discusses its Customer Energy Network, an application that allows SDG&E customers to view their energy use data through authorized Internet content-providers.
[45] Oncor at 4-5, 11 (noting that the Public Utility Commission of Texas is now studying online authorization). Commenters also recognized that Smart Grid technologies could borrow security architectures used in other industries, such as online banking, internet shopping, and wireless communications to ensure the authenticity of such authorizations, as well as the protection of consumer data, *See, e.g.*, DRSG at 7; EnerNOC at 5; Tendril at 6.
[46] EEI at 14.
[47] *See* Xcel at 4; *See also* NRECA at 11-12.

officials. At least two commenters suggested that independent ombudsman services might provide a means to minimize potential consumer confusion.[48]

What data should utilities have to disclose to authorized third parties? Most commenters agreed that utilities should be required to disclose to authorized third parties at least data used in billing, and some retail energy-price data. Most commenters also supported disclosure of raw meter data, though some voiced concern over consumer confusion that could result if raw data differed from data validated by the utility and used in billing.[49] Nevertheless, the set of data thus defined may vary depending upon what data a given metering technology provides, and how a given customer is charged for energy used. As a result, Google may have best summarized the consensus position when it argued that "consumers should have access to timely, useful, and actionable information about how much energy is used, and what it costs."[50]

Beyond that, there was little consensus about what, if any, other types of energy-usage and price data utilities ought to be required to collect and disclose to customers and authorized third-party service providers. Some commenters favored very broad data-collection-and-disclosure requirements.[51] Utilities, however, tended to stress that jurisdictions need the flexibility to balance the inarguable costs of imposing particularly broad or highly granular data-collection-and-disclosure obligations upon utilities against the potential benefits of narrower and less expensive collection and disclosure obligations.[52]

Moreover, no clear patterns or trends have yet emerged from existing disclosure practices. For example, California has promulgated a regulation prescribing relatively detailed and extensive data-disclosure obligations.[53] Texas has taken a somewhat different approach that requires consumers to be able to access their meter's 15-minute interval data for the previous day and historic data through a common web portal called the Smart Meter Texas Portal.[54] DTE advocates the use of pilot programs to generate data that will help jurisdictions assess the relative costs and advantages of various disclosure requirements and the extent to which they promote desired changes in conservation and consumption behaviors.[55]

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[48] *See, e.g.*, Tendril at 4; CPower at 2.

[49] *See, e.g.*, DRSG at 9-10; Elster at 4; EnerNOC at 6-7 (all supporting the provision of raw data). *But see* EEI at 33-36 and EEI Reply at 25 (raising concerns over consumer confusion if raw data, as opposed to verified data, is provided). *See also* NRECA at 14-16.

[50] Google at 1.

[51] *See, e.g.*, CEA at 7 (asserting that there should be no artificial caps on the amount or type of information that consumers could request from a utility); NASUCA at 26-28; Tendril at 8-9.

[52] APPA at 14-15; EEI at 35-36 and EEI Reply at 22-24; NRECA at 14-16.

[53] See SDG&E at 17 ("With respect to the protection of customers' privacy interests, the California Commission has continued longstanding California policies requiring the utilities to protect a customer's energy information, allowing disclosures only with the prior written consent of the customer. [A]ccess to that information, where authorized by the customer, must be provided to third parties via the Internet, and in real-time or near-real-time by the end of 2011" (citing *Rulemaking to Consider Smart Grid Technologies Pursuant to Federal Legislation and on the Commission's Own Motion to Actively Guide Policy in California's Development of a Smart Grid System,* Decision 09-12-046 in Docket R.08-12-009, at pp.51, 65, 78).

[54] Oncor at 2.

[55] DTE at 6.

While comments and public discussions revealed only a narrow and general consensus on some aspects of this question, analysis of the principal points of disagreement among the interested parties identifies four particularly important issues that jurisdictions should assess when crafting disclosure obligations.[56]

First, commenters often disagreed about the extent to which utilities should have to collect and provide highly granular or near-real-time consumption or pricing data. Utilities often observed that even when advanced meters actually supply consumers with near-real-time energy-usage data, the costs that utilities would incur were they forced to collect and manage such data might exceed any conceivable benefits to consumers, utilities, or the management of the electrical generation and transmission system.[57] The example of Southern California Edison, cited below, serves to clarify some of the issues surrounding near-real-time data.

Second, commenters disagreed about whether or to what extent utilities should have to provide *historical* energy-usage data (other than the data already provided for billing purposes) to consumers and third-party service providers.

Third, utilities strongly objected to claims that they should be required to disclose to third-party service providers any CEUD-containing data other than that used in billing a particular customer, once that data has been validated, enhanced or aggregated by the utility for its own business, network management, or regulatory purposes.

Fourth, commenters disagreed about the extent to which utilities should be required to disclose data in standardized, machine-readable formats. Device producers and third-party service providers argue that CEUD should be provided in standardized, machine-readable formats.[58]

DOE concludes that these disputes reveal some important, if unresolved, policy questions that States should carefully consider. On the one hand, very broad data-disclosure requirements could facilitate the development of a broader range of Smart-Grid-based third-party business models. But on the other, broad requirements could distort and increase the apparent costs of electric power by requiring utilities to collect and provide data not needed to provide electrical

[56] It may be important to note that potential providers of third-party services often did not make it entirely clear whether they were advocating that certain data should be available from either the consumer or the utility, or from the utility itself. The difference between these two sourcing options can be significant. *See* SCE Reply at 1-2 (noting that third-parties can obtain near-real-time energy-usage data by providing consumers with a device that can interoperate with its customers' smart meters, but that SCE itself does not backhaul and collect near-real-time usage data).

[57] EEI Reply at 22-24 ("EEI believes that calls for access to such data in real, or close to real time do not take account of the costs involved, or the limited benefit to consumers. The cost can be substantial. The cost for providing this level of granularity is disproportionate to the benefits"); NRECA at 17 (noting the usefulness of data provided at intervals other than real-time); UTC at 17-18 ("Converting [the process of transmitting data] into a 'real-time or near real-time' process would require major overhaul of the utility infrastructure that would seriously undermine any value created with potentially significant cost implications."); *but see* Tendril at 9 (noting that certain energy consumption data is "likely to fluctuate in real-time and therefore must be presented to the consumer in order to be actionable"); CEA at 7 (noting that broad availability of real-time energy data "will lead to the development of products and services that are beneficial to consumers and empower them to make informed decisions regarding their energy consumption.").

[58] CEA at 6; *but see* EEI Reply at 19.

utility services. Consequently, such debates should be carefully assessed by State and local officials in light of local conditions.

The case of Southern California Edison (SCE) shows why there is no clear, all-purpose argument for imposing more demanding access requirements. SCE's smart meter program uses meters that can provide raw near-real-time energy usage data that can be accessed not only by the consumer, but also by interoperable devices implementing an appropriate security protocol over a HAN. But SCE itself does not collect that real-time data: Instead, it backhauls usage data from meters at hourly intervals. This data is then validated and processed to produce the "revenue quality interval usage data" that SCE uses for billing and providing utility services, and provides to consumers on a next-day basis through SCE's web portal.[59] Therefore, although SCE's smart meters do provide near-real-time data to consumers, SCE warns that it would need to re-engineer its smart-meter system were *SCE itself* required to provide third parties with near-real-time energy-usage data, or "revenue-quality" interval-usage data on other than a next-day basis.[60] SCE makes similar points about the expense of any requirement that would require it to provide near-real-time retail-price data, when the needs of customers exploiting the retail-pricing options available in its jurisdiction can be adequately met by day-ahead retail price signals.[61] Moreover, it is far from clear that real-time access (in the minute-by-minute sense) is necessary to enable many (or even possibly most) of the benefits from a Smart Grid architecture.[62]

This example illustrates a potentially critical point. Utilities can promote the innovation that Smart Grid technologies enable by serving as least-cost providers of a potentially vast array of data including current and historic CEUD that they actually collect and maintain. But to the extent that utilities are required to collect or retain data exceeding that required to provide efficient electric power generation, transmission and delivery services to their particular customers without charging for such access, this requirement threatens to distort the cost of electric power vis a vis that of third-party services.[63] To similar effect, when utilities pursue their own business purposes by expending resources in order to backhaul and "enhance" raw CEUD already provided to consumers beyond what is necessary for billing, similar issues could arise if utilities were required to disclose that "enhanced" data to third parties at no additional cost.

Nevertheless, States should encourage transition towards standardized, machine-readable formats for transferring CEUD to authorized third parties. In particular cases, utilities may have valid arguments for continuing to use legacy formats during an appropriate transition period. After any such transition, however, the benefits of standardized, machine-readable formats are

[59] SCE Reply at 1.
[60] SCE Reply at 2.
[61] SCE Reply at 2-3.
[62] This issue is why some suggest it is open question whether the installation of new advanced metering infrastructure is necessarily a more cost-effective strategy than the use of existing automated meter reading technology. The NSTC Subcommittee is evaluating the merits of this "smart enough grid" analysis through an RFI recently issued by DOE's Office of Electricity Delivery and Energy Reliability (75 FR 57006, Sept. 17, 2010).
[63] *See, e.g.*, EEI Reply at 22-24. But note that a similar concern could also arise if charges or requirements imposed upon third-party access provided a means through which excessive fees or restrictions could be imposed upon would-be-rivals, thus potentially undermining full and fair competition in the market for electric usage monitoring services.

significant. DOE thus concludes that given the compelling advantages of machine-readable formats, State laws should be designed to ensure a prompt transition toward machine-readable formats that provide for very low-cost access.

In summary, States regulating the deployment of advanced metering technologies will have to resolve debates about the extent to which utilities should be required to disclose to third parties data exceeding (1) the "raw" data actually collected in order to provide services efficiently, (2) any verified data actually used in billing a given customer, (3) "actionable" energy-price data, and (4) any other data as to which there is broad agreement that utilities should provide when authorized by a consumer.

When resolving these important debates about the extent to which they should require utilities to disclose additional data, States should consider, in addition to the factors noted above, three core principles grounded in sound competition policy. First, to the extent that utilities are *required* to disclose data that is either reasonably available from consumers, in excess of that required to provide optimal electric-utility services, or utility-"enhanced" data not used in billing, a cross-subsidy may occur—at least if utilities cannot charge fees for third-party access to such data. *Second*, States confronting the highly contested issue of letting utilities charge for third-party access to CEUD should carefully consider two sets of concerns: On the one hand, if utilities cannot recover costs incurred to provide third-party access to CEUD this could distort the costs of providing electrical power; on the other hand, if utilities can impose unnecessary charges or undue requirements related to accessing such data, that could distort or otherwise undermine competition in the adjacent market of managing the use of electric power.[64] *Third*, because it is not clear whether consumers or utilities will be identified as the long-term lowest-cost provider of any given type of additional data, States should consider designing disclosure obligations in a competitively neutral manner. In particular, they might seek to ensure that relevant laws or regulations do not define the data that utilities are required to disclose to consumer-authorized third-party service providers in an unduly narrow manner so as to limit that range of entities that could operate effectively as consumer-authorized third-party service providers.

DOE notes that further analysis of the debates about the costs and benefits of access to real-time or near-real-time data is being conducted by the Office of Science & Technology Policy of the Executive Office of the President. It is also worth noting that providing consumers with near-real-time access to usage data through a route that does not involve the utility is highly consequential from a privacy perspective. If consumers receive this data through a route that is entirely local, e.g., via a HAN gateway that connects to an in-home display or other in-home device, then it may be the case that neither a utility nor a third party will have access to this data. On the other hand, if other means of sending near-real-time data (e.g., transmitting data over a home Internet connection or cell phone) are under consideration, then third parties are in the picture, and as discussed above, the attending privacy issues require careful consideration.

Can utilities charge a fee for providing third-party access to CEUD? Commenters disagreed about whether utilities should be able to charge a fee—either cost-based or costs-plus-return—before disclosing CEUD to authorized third parties. Predictably, utilities and potential third-

[64] For a discussion of this concern, see http://www.ftc.gov/bc/international/docs/smartgrids_usa.pdf.

party users of CEUD disagree on this point, and both raised valid policy concerns. Potential third-party users of CEUD argue that if utilities are required to provide CEUD to their customers without further charges, then the same principle should apply when customers authorize a third party to act on their behalf. Utilities argue that processing third-party authorizations and providing data imposes costs in excess of those associated with providing electric power, and that these costs should be borne by third-parties seeking access to such data for their own business purposes.[65]

At the end of the day, the relevant question may be this: Is it more appropriate to spread the costs associated with providing third-party access to CEUD among all utility customers, or only among those customers who authorize third-party access to CEUD?[66] Jurisdictions reaching the former conclusion may encourage the development of third-party services, because the cost is spread over all consumers. Jurisdictions reaching the latter conclusion may keep electricity rates slightly lower for all customers (by imposing the costs of available CEUD-based services only on those customer who use such services), but only if the costs imposed on those seeking access to CEUD are caused by making such CEUD available, Sound economics and public policy suggest that an entity causing particular costs should pay for those costs so that these entities do not demand the good without appreciating its true cost. At the same time, there should be no artificial barriers imposed on other firms that wish to gain access to that information and use it for other purposes. Thus, States should be alert to the risk that overestimates of such costs could distort competition in the market for third party electricity management services.

Should authorized third-party service providers be required to obtain further informed consent before disclosing CEUD or CEUD-generated customer data, particularly for purposes of marketing? Many states prohibit utilities from sharing or selling CEUD or other customer-identifying data to third parties. For example, Washington state law prohibits a utility from disclosing or selling private consumer information to affiliates, subsidiaries or third parties for the purpose of marketing services or products to customers not already subscribing to them without first obtaining the customer's written consent to the disclosure.[67] Many commenters identified this as an area of particular concern to consumers.[68]

Should states and localities impose some sort of "certification" requirement upon third-party service providers that wish to be authorized to receive CEUD? If third-party service providers must use CEUD only for authorized purposes, maintain its security, and assume liability for its improper disclosure or use, then questions arise as to whether jurisdictions should impose requirements that would help consumers and utilities determine whether providers

[65] *See, e.g.*, EEI at 5 ("Parties who undertake the risk of providing capital necessary to capture and manage energy usage data should have rights to the economic value of that data.") and 30 ("The mechanisms for the delivery of CEUD to third parties may involve costs that should not be borne by utilities."). *But see* BOMA at 3; Google OSTP comments, at 2 (noting that authorized third parties, along with customers, should not have to pay extra for to access consumption data).

[66] *See, e.g.*, EEI Reply at 24 (arguing that all utility customers should not be required to cross-subsidize the use of third-party services).

[67] *See* Avista at 4.

[68] NW Energy, PTR at 13-14; EEI at 9; SMUD, PTR at 14-15, CO OCC, PTR at 11-13.

claiming to have these capabilities actually do.[69] In somewhat analogous contexts, states have used diverse means to provide such signals or assurances. Such means may include registration, licensing, bonding, or approval by one or more third-party certifying bodies. For purposes of further discussion, we will collectively refer to these examples of an even wider array of legal options as "certification requirements."

Many participants addressed the issue of whether some certification requirement should be imposed upon third-party service providers, but their views on it often differed substantially. Utilities generally favored the extra certainty that such requirements conferred upon them and their customers. Providers of third-party services generally opposed any requirements that threatened to become significant barriers to entry and competition.

All sides in this debate raise valid concerns. "Opt in" systems for demonstrating consumer consent certainly can be and have been misused, and such misuses could increase if jurisdictions begin authorizing the on-line opt-in processes favored by third-party service providers.

Given the use of certification requirements in analogous contexts, this appears to be a critical area in which proactive coordination efforts among states, localities, utilities, and third-party service providers could generate significant long-term benefits. If certification requirements become widespread and needlessly diverse, third-party service providers and would face serious barriers to entry and competition that could arise from a maze of certification requirements that could vary not only from state to state, but from locality to locality.[70]

Consequently, federal policymakers may wish to carefully monitor the evolution of the law in this area to ensure that certification requirements do not become *needlessly* divergent and localized. Proactive measures such as coordinating overall approaches, or developing a standard or relatively consistent application processes or certification criteria could significantly reduce paperwork and regulatory burdens that certification requirements might impose upon third-party providers of energy-management services. To that end, this is a promising area for federal-state cooperation as part of broader partnership efforts with the National Association of Regulatory Utility Commissioners and others to advance Smart Grid policy.[71]

[69] *See, e.g.*, EEI at 10-11 (advocating mandatory state certification processes to ensure that entities authorized to receive CEUD have implemented appropriate safeguards and monitoring and compliance programs and have the financial, technical, and managerial resources to continue doing so); NASUCA at 24 (same).

[70] EEI at 11 ("Customers and electric utilities would benefit from a consistent method for state-certified third parties to prove the validity of their state authorizations.")

[71] With regard to technical certification, DOE understands that within the NIST SGIP, the Smart Grid Testing and Certification Committee (SGTCC) members have reached agreement on the foundational elements to be established for Smart Grid technology and technical standards compliance testing and certification programs. The SGTCC is engaging with industry certification organizations to pilot and refine its approach, which may serve as a model for evaluating privacy compliance when considered as a system. The SGTCC is also expanding its collaboration with the CSWG to integrate security testing within its programs.

To promote further cooperation and dissemination of information about practices relating to the regulation of the privacy and data-protection aspects of smart-grid technologies, a web portal should be created to act as a "clearinghouse" for such data.

As the above summary suggests, the Smart Grid technologies that form an important component of a long-term national energy strategy raise important concerns about privacy and the regulation of entities with access to energy-consumption data—concerns that have historically been regulated primarily at the state or local level. Moreover, there are many reasons why the historical primacy of state and local control may be indispensible to the long-term success of the deployment of Smart Grid technologies.

Nevertheless, the relevant law and the available data relevant to federal, state, and local officials is likely to evolve quickly as the pace of deployment of advanced metering technologies quickens, and the coordinating and information-dissemination functions performed by the federal agencies appear to have been useful means to promote thoughtful assessment of the issues, and avoid duplication of effort or needless inefficiencies.

As commenters noted, a central "clearinghouse" for relevant regulatory data, implementation strategies, and studies would be broadly useful not only to federal, state, and local officials, but also to all private and public entities affected by the privacy and security implications of Smart Grid technologies like advanced metering.

DOE will investigate options for a web-portal that can serve all these parties as a "clearinghouse" for available information about the regulation of the privacy and security implications of Smart Grid technologies. The portal could be created as a sub-site of either SmartGrid.gov (www.smartgrid.gov) or the recently created Smart Grid Information Clearinghouse (www.sgiclearinghouse.org), depending upon a needs assessment. We envision that such a portal will include collections of enacted and proposed state laws, relevant federal and private resources, and analyses of pilot programs or ongoing deployment efforts. The assembly of such a collection is well underway as a result of this proceeding, and by updating it, DOE can help avoid duplication of effort and direct interested parties toward the most relevant information about trends in regulatory practices, and better identify areas in which federal agencies can usefully assist the private parties and public officials who will be indispensible to the overall success of the deployment of Smart Grid technologies that will promote the development of a more efficient, interactive, and robust electrical grid.

SUMMARY OF PUBLIC COMMENTS AND INFORMATION

The National Broadband Plan (the "NBP"), authored by the Federal Communications Commission ("FCC") at the direction of Congress, seeks to ensure that every American has access to broadband capability.[72] The NBP also includes a detailed strategy for achieving affordability and maximizing use of broadband to advance consumer welfare, civic participation, public safety and homeland security, health care delivery, energy independence and efficiency, education, entrepreneurial activity, job creation and economic growth, and other national purposes. As part of this strategy, the NBP sets forth a number of recommendations for Federal agencies, including the Department of Energy ("DOE"). In particular, the Plan recommends that DOE consider consumer data accessibility policies when evaluating Smart Grid grant applications, report on the states' progress toward enacting consumer data accessibility and develop best practices guidance for states.[73] Based on this suggestion and the responses to its RFI, DOE set forth its key findings in the preceding section of this report.

In this section, DOE reviews public comments received that provided support for these key findings for states to consider in developing Smart Grid privacy and data collection policies. In so doing, DOE recognized the significant effort that utilities and state regulatory commissions have and continue to put forth to safeguard the privacy of consumer data, as well as the efforts of other federal agencies in developing guidelines for the protection of such data.

To develop the Recommendations and Observations presented in this report, DOE not only conducted its own research, it also sought and received substantial public input from a wide range of interested parties. DOE first published a request for information ("RFI") in the Federal Register, in which DOE sought comments and information from interested parties on current and potential practices and policies for states, as well as other entities such as municipalities, public power entities, and electric cooperatives, to empower consumers through access to detailed energy information in electronic form. Such information could include real-time information from metering technology, historical consumption data, and pricing and billing information. (75 FR 26203, May 11, 2010). In the RFI, DOE also asked interested parties to report on state efforts to enact Smart Grid privacy and data collection policies; individual utility practices and policies regarding data access and collection; third party access to detailed energy information and the role of the consumer in balancing benefits of access and privacy; and policies and practices that should guide policymakers in determining who can access consumers' energy information and under what conditions. In addition to the request for comment in the RFI, DOE provided an opportunity for the submission of reply comments in order to foster discussion of the issues. As a result of the significant number of comments and amount of information received, DOE extended the period for reply comments. (75 FR 43727, July 22, 2010). To gather

[72] The Plan, developed pursuant to the American Recovery and Reinvestment Act of 2009 (P.L. No. 111-5), was issued on March 16, 2010 and is available at http://www.broadband.gov/plan/.

[73] The Plan also recommends that DOE, in collaboration with the FCC, study the communications requirements of electric utilities to inform federal Smart Grid policy. DOE addresses this recommendation in a companion report, *Informing Federal Smart Grid Policy: The Communications Requirements of Electric Utilities*, available at http://www.gc.energy.gov/1592.htm.

additional data, DOE also published a notice in the Federal Register announcing a public meeting to discuss the issues presented in the RFI. (75 FR 33611, June 14, 2010). The public meeting, held on June 29, 2010, provided another forum in which interested parties could provide comments and information, as well as engage in constructive dialogue with other interested parties.

In its RFI, DOE presented a number of questions on issues of data privacy and the Smart Grid that had been raised in both public and private forums, including DOE's long-standing investment in Smart Grid technology through Smart Grid Investment Grants and Smart Grid Demonstrations projects; the Office of Science and Technology Policy's Smart Grid Forum blog, entitled "Consumer Interface with the Smart Grid"; and the National Broadband Plan. Each of these questions is set forth below, and comments and reply comments provided in response are presented. DOE also sought comment on any other issues of data privacy identified by commenters as related to the Smart Grid. Information received on these additional issues, as well as at the public meeting, is integrated into the discussion below.

REQUEST FOR INFORMATION – QUESTIONS PRESENTED

Question 1: Who owns energy consumption data?

A number of commenters indicated that the central issue, rather than data ownership, was the right to control data access. Other commenters offered three distinct viewpoints on the issue of data ownership. Some argue that the consumer owns the data. Others argue that the utility owns the data. Still others argue that the consumer and the utility co-own the data. Nevertheless, all of the commenters noted the importance of access to energy consumption data, and these differing perspectives seemed to reflect the application of a single underlying principle: Rights of access flow from ownership.

As stated above, a significant number of commenters believed that the issue of access was more critical to a discussion of Smart Grid privacy issues than the issue of data ownership. *See, e.g.,* BG&E at 2. Of these, many stated that an approach to Smart Grid data access based on property rights and ownership interests will be problematic given that ownership varies by jurisdiction and is governed by individual state laws. EEI at 4-5; EEI Reply at 4-6; FPL at 3; Idaho Power at 4; NRECA at 3; Oncor at 2; Pepco at 1; Southern at 3; Tendril at 2-3; UTC at 3-6. Many of these commenters also noted that states and other regulators have historically been able to effectively address privacy regulation of customer data without answering the question of ownership, and utilities have developed their own privacy policies consistent with state law. Within this framework, these commenters agreed that customers should have access to their own customer-specific energy usage data ("CEUD")[74] and be able to share, or allow their utility to share, this data with third parties. In addition, to effectively render services, maintain safety and reliability, and carry out other business purposes, utilities and their service providers should have access to and control over all CEUD, as well as operational data, including aggregated customer

[74] Idaho Power used the term customer-specific energy data, or "CSED". A more detailed discussion on the definitions of different types of data is presented in response to Question 3.

data. Further comments on the issue of data access, including third party access and access by governmental jurisdictions, are provided below.

Other commenters stated that the consumer owns his or her individual energy consumption data. CEA at 2; Joint Consumer Comment at 8; Elster at 1; EnerNOC at 2; Honeywell at 1; NASUCA at 7, 16 (arguing that the consumer pays for the infrastructure by which the utility obtains access to the data, which can reveal personal information about the consumer); NASUCA Reply at 2-5 (arguing that utilities may be authorized users, but consumers own their data); NW Energy, PTR at 40-41; Oncor at 2; SDG&E at 3; Sawnee, PTR at 40; Tendril at 2-3; Whirlpool Corporation ("Whirlpool") at 2. Consumers take the actions that actually generate their individual data, which could reveal significant private information about their energy consumption and related habits. Consumers also provide for the growth and maintenance of the utility's infrastructure through payment of their utility bills. Many of these commenters noted that while the consumer owns detailed consumption data, utilities and their service providers should have access to the data for billing purposes. Utilities also need energy consumption data to provide safe and reliable service and to meet various accountabilities. For example, the data is used in critical infrastructure audits, and more porous data would result in more risk. Energy consumption data is also needed to comply with various state law requirements. In addition, consumers typically ask the utility what the data means and how to interpret the data to bring value to the consumer.

Offering a specialized view of ownership, the Building Owners and Managers Association International ("BOMA") and the Real Estate Roundtable ("Roundtable") clarified that property owners own energy consumption data generated for properties that they own, except where the data is separately metered. In those cases, the individual tenants own the data. BOMA at 1; Roundtable at 3. NASUCA stated that property owners have the right to review aggregate building data to comply with regulatory mandates such as LEED certification and for capital investment purposes, but not individual data unless the customer has provided written permission. NASUCA Reply at 5.

Other commenters asserted that the utility collecting the energy consumption data owns the data. Avista at 1; DTE at 2; Exelon at 2; SCE at 1; Xcel at 3; Xcel Reply at 3. These commenters argued that the utility installs, maintains and operates the infrastructure by which the energy consumption data is generated and thus owns the data. In addition, as stated above, the utilities have a need to access this data for billing, planning and other business purposes. Of these, all but one acknowledged explicitly that consumers should have access to their usage data.

Some commenters argued for a middle-ground approach, under which energy consumption data should be co-owned by the utility and the consumer. APPA at 4-5; CPower at 1; DRSG at 1-2; Silver Spring at 1-2; TIA at 2. A number of these commenters clarified that personally-identifiable, individual data was owned by the consumer, though some believed that such data was also owned by the utility for operational purposes. These commenters agreed that aggregate data was owned by the utility. Some further noted that governmental entities should be co-owners of aggregate data produced within their jurisdiction.

Question 2: Who should be entitled to privacy protections relating to energy information?

Commenters generally agreed that the consumer should be entitled to privacy protections relating to individual consumption data and personally identifiable information. AARP Reply at 4; APPA at 5; Avista at 1; BG&E at 2; Cleco at 1-2; CEA at 2-3; Joint Consumer Comment at 8; CPower at 1-2; DRSG at 2; EEI at 8-11; EEI Reply at 6-7; Elster at 1; EnerNOC at 2; Exelon at 2; FPL at 4; Google at 1; Honeywell at 2; Idaho Power at 4-5; Joint Center at 11-12; NASUCA at 8-9; NRECA at 7; Oncor at 3; Pepco at 1; SCE at 1; SDG&E at 4; Silver Spring at 2; Southern at 3-4; Tendril at 3; US Telecom at 1-3; UTC at 6-7; Verizon at 1-3; Whirlpool at 2; Xcel at 4; Xcel Reply at 4. Some commenters noted that data privacy is particularly important to non-residential or industrial customers because release of the data could result in competitive harm. Avista at 1; EEI at 9; EEI Reply at 6-7; NRECA at 7; SDG&E at 4. Consistent with its comments on data ownership, the Roundtable clarified that at the facility or building level, the consumer who pays the energy bill would be entitled to privacy protections and be able to determine who has access to that data and under what conditions. Particular building tenants are entitled to privacy protections as against the public and third parties, but not the building owner. Building owners need this information to make capital investments and initiate programs to address whole-building energy performance. Roundtable at 3.

To illustrate the importance of privacy protections for consumers, a number of commenters referenced surveys that revealed significant concerns about the privacy of consumer data. A survey commissioned by EEI found that consumers place a very high priority on privacy. Forty-six percent of respondents believe that it is "very important" for their electric usage data to be kept confidential, and 29 percent believe it is "somewhat important", while 79 percent believed that only utilities and customers should have access to smart meter information. In addition, seventy-two percent of respondents felt the utilities and electric companies do a good or extremely good job with protecting data privacy. NW Energy, PTR at 13-14; EEI at 9. NW Energy also noted that in Montana, a stakeholder group discussion on privacy expectations indicated that this is an important issue to work through. NW Energy, PTR at 13-14. SMUD stated that it had conducted focus groups prior to its Smart Grid roll out that revealed that customers care a great deal about privacy and expect SMUD to maintain data in a very secure manner. SMUD, PTR at 14-15. The CO OCC also noted that energy consumption data raises the potential for Fourth Amendment concerns. CO OCC stated that consumers view Smart Grid efforts as government or industry to control their energy use and know what is going on inside their homes. CO OCC, PTR at 11-13. As a result, privacy protections for consumers' energy consumption data would be very important to consider.

A number of commenters also stated that utilities should have privacy rights with regard to certain types of data. Cleco at 2 (modified, augmented, or value-added CEUD to the extent not provided in customer billing statements); DTE at 3 (utility proprietary information, including business and marketing plans, sales and marketing data, and financial and operating data); EEI at 9 and EEI Reply at 7 (aggregate data, enhanced or validated individual data, or technical functions of meters and supporting communication infrastructure); UTC at 6-7; Xcel Reply at 9. Xcel noted that releases of aggregate data that could compromise system security should not be made. For example a request for information about loading in a particular neighborhood supplied by limit feeders could result in an indication of the importance of a specific feeder or

substation to the distribution of electricity in an urban area. Utilities should also not be forced to disclose data for purposes other than those for which the utility collected the data, creating additional burden on the utilities. NRECA at 7; Southern at 3. DTE believed that only the utility should have privacy expectations in energy consumption data, including individual consumption data. DTE at 2-3. In DTE's view, the owner of the usage data would be entitled to privacy protection. For energy consumption data, DTE stated that the utility that generated the data should own the data and therefore be entitled to privacy protections for that data. The consumer should, however, be entitled to privacy protections for data such as consumers' personal information. The utility could use such data only for business purposes.

Question 3: What, if any, privacy practices should be implemented in protecting energy information?

Comments provided in response to this question are presented below as discussion on three interrelated topics – definitions of energy and other information identified as having privacy implications in the Smart Grid context, potential privacy principles that could be used to develop more specific policies to protect Smart Grid data, and potential state certification and authorization procedures for third party service providers.

Definition of Energy Information.

A number of commenters indicated that a definition of "energy information" was critical to any discussion of Smart Grid issues, including a discussion of what, if any, privacy practices should be implemented to protect that information. In general, three types of data were discussed: personally identifiable information ("PII"), consumer-specific energy usage data ("CEUD"), and aggregate data. All such data can also be enhanced by utilities for business purposes.

One commenter defined PII, as it relates to energy consumption data, to typically consist of an individual's name and address. State privacy laws may include other information as PII, such as Social Security numbers and banking and medical information. The commenter also noted that the definition of PII could vary based on regional understanding. Silver Spring at 1-3. Another commenter added that personal information could also include mailing addresses if different from a service address, personal identifiers such as social security numbers, telephone numbers, and payment history. Avista at 5. NASUCA cited the NIST report on Smart Grid Cyber Security Strategy and Requirements for the proposition that "comprehensive and consistent definitions of [PII] do not typically exist at state utility commissions, at FERC, or within the utility industry," and that the lack of consistent definitions and privacy policies needs to be addressed.[75] NASUCA at 4.

Customer-specific energy use data ("CEUD"), which also pertains to the individual, would according to several commenters include all data specific to an individual customer's energy use, such as total and time differentiated energy and capacity use). EEI at 3; Cleco at 2 (using the

[75] The final draft of this document, NISTIR 7628, is entitled, "Guidelines for Smart Grid Cyber Security", version 1.0, and is available at http://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGrid/NISTIR7628v1July2010 (last visited August 10, 2010).

term "customer energy usage data"). Silver Spring used the term "granular consumption data" to mean data that provides detailed information about the energy use of a specific individual or household. Such information could include energy use by time interval, and could also correlate with types of devices in the home such as an electric vehicle. Silver Spring at 1. DTE classified such information under the term "energy consumption data", which it defined as only the amount of consumption of electricity or gas as registered at the meter. DTE at 2-3. Another commenter referenced the efforts of the North American Energy Standards Board ("NAESB") to develop definitions for energy usage data in concert with NIST Smart Grid activities. Elster at 2.

Some commenters appeared to combine the definitions of PII and CEUD. DTE at 2-3; Avista at 5. DTE defined the term "energy information", which could include not only energy consumption data, but also personal information, utility-created information (which could contain proprietary business information), and information that a utility could obtain about a consumer or group of consumers from a third party. Avista referenced the Washington Administrative Code ("WAC"), section 480-100-153(2), which defines "private consumer information" to include the customer's name, address, telephone number, and any other personally identifying information, as well as information related to the quantity, technical configuration, type destination and amount of use of service or products subscribed to by a customer of a regulated utility that is available to the utility solely by virtue of the customer-utility relationship.

Silver Spring commented that aggregate data is assembled by the utility from multiple individuals or households that provide information about energy consumption on a neighborhood or other regional level. Aggregate data does not include PII and cannot be associated with any individual or household. Silver Spring at 2. Another commenter used the term "operational data", which includes data related to the operation of electric utility systems that is not customer-specific but that includes aggregated customer energy usage data. EEI at 6. Aggregate data was defined by other commenters as data recorded by psyncrophaser units ("PSUs"). CPower at 1; DRSG at 1.

Privacy Practices to protect PII, CEUD and aggregate or enhanced data.

A number of commenters noted existing utility policies for the privacy protection of customer information and stated that these policies could expand as Smart Grid technologies develop. These commenters also emphasized that state regulatory commissions have historically had regulatory responsibility in this area. Avista at 3; EEI at 11-12, 19-20, EEI Reply at 7-8; Exelon at 3; FPL at 4-6; NARUC "Resolution on Smart Grid" at 1-2; Oncor at 6; Idaho Power at 5-6; NW Energy, PTR at 13-14; Pepco at 1-2; SCE at 1, 4; SDG&E at 4-5, 10; Southern at 4-5; UTC at 8-9; Xcel at 4; Xcel Reply at 4. NRECA provided further information on state-specific privacy laws, noting that 46 states have laws pertaining to breach notification, and stated that utilities need flexibility to accommodate these state requirements. NRECA at 11.

Many commenters also provided examples of existing and well-established privacy principles that could be adapted for use with Smart Grid. These principles contain consistent and often complementary provisions and include the Federal Trade Commission ("FTC") Fair Information Practice Principles ("FIPPs"), the FIPPs used by the Department of Homeland Security ("DHS"),

NIST's Smart Grid Cyber Security Strategy and Requirements, developed by the Smart Grid Interoperability Panel Cyber Security Working Group ("SGIP-CSWG"), the Organization of Economic Co-operation and Development ("OECD") privacy guidelines, guidelines used in other industries, in particular the FCC's regulations on the protection of customer proprietary network information ("CPNI"), and a number of other relevant guidelines.[76]

Several commenters believed that the FTC's FIPPs could be used as a starting point to develop more specific Smart Grid privacy policies. CEA at 3; DRSG at 2, 4; EnerNOC at 4; NASUCA Reply at 7-8; Pepco at 4; TIA at 3; Tendril at 3-4; SCE at 1, 4. Xcel at 6. The FTC's FIPPs consist of five core principles of privacy protection: (1) Notice/awareness. Consumers must be notified of an entity's information practices before any personal information is collected from them. (2) Choice/ consent. Consumers must be given options as to how any personal information collected from them may be used, specifically for secondary uses of information beyond those necessary for utility operations. The choice must also be simple to make. (3) Access/participation. Consumers must be able to timely view the data in an entity's files and contest that data's accuracy and completeness through a simple process. (4) Integrity/security. Entities that collect data must take reasonable steps to assure data integrity, such as using only reputable sources of data and cross-referencing data against multiple sources, providing consumer access to data, and destroying untimely data or converting it to anonymous form. Security involves both managerial and technical measures to protect against loss and the unauthorized access, destruction, use, or disclosure of the data. (5) Enforcement/redress. Means of enforcement and redress are critical to ensure that privacy practices are effective.

A number of commenters also believed that the DHS FIPPs would be appropriate for use in developing privacy standards. CPower at 3; DRSG at 5 (also referencing Department of Health Education and Welfare Fair Information Practices (1973), cited in the DHS FIPPs at 2); FPL at 6; NRECA at 9; Xcel at 6. Though the DHS FIPPs pertain only to PII, they are similar to and build on the FTC FIPPs and consist of several core principles pertaining to the collection and use of the data collected: (1) notifying the individual about PII collection, use, dissemination and maintenance; (2) seeking individual consent to the extent practicable and providing means of access, correction and redress; (3) specifying the authority for and purpose(s) of the collection of PII; (4) collecting and retaining relevant PII only as needed to accomplish identified purposes; (5) using PII only for the purposes specified in the consumer notification; (6) ensuring that PII is reasonably accurate, relevant, timely and complete; (7) protecting PII through appropriate security safeguards; and (8) ensuring collector accountability, including training employees who use PII and auditing the use of PII to determine compliance with the FIPPs and other applicable privacy protection requirements.

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[76] The FTC FIPPs and additional discussion and reference sources are available at http://www.ftc.gov/reports/privacy3/fairinfo.shtm (last visited August 17, 2010). The DHS FIPPs are available at http://www.dhs.gov/xlibrary/assets/privacy/privacy_policyguide_2008-01.pdf (last visited August 17, 2010). As stated above in fn 9, the final draft of this document, NISTIR 7628, is entitled, "Guidelines for Smart Grid Cyber Security", version 1.0, and is available at http://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGrid/NISTIR7628v1July2010 (last visited August 17, 2010). The OECD guidelines are available at http://www.oecd.org/document/18/0,3343,en_2649_34255_1815186_1_1_1_1,00.html (last visited August 17, 2010). The FCC regulations can be found at 49 CFR 64.2009-2111.

Others offered the use of NIST's SGIP-CSWG Smart Grid Cyber Security Strategy and Requirements. APPA at 10; CPower at 3; DRSG at 4-5; EEI at 13, 20; EEI Reply at 8; Elster at 2; EnerNOC at 4; FPL at 6; Google at 2; Idaho Power at 6; NRECA at 10; NASUCA 10-13; Pepco at 6; Verizon at 3 (also referencing efforts of the North American Electric Reliability Corporation ("NERC") Smart Grid task force); Whirlpool at 3; Xcel at 5; Xcel Reply at 5. The NIST report makes a number of recommendations. A privacy impact assessment ("PIA") should be conducted before deploying or participating in the Smart Grid to identify privacy risks, as well as updates to the PIA whenever major changes may affect privacy. Formal privacy policies should be developed and documented that: (1) assign staff to privacy policy implementation; (2) notify customers what data is collected and how it will be used before collecting the data; (3) describe customers' choices in data collection and use; (4) ensure that only data necessary for the specified purposes is collected; (5) ensure that customer information is used and retained only as necessary for those purposes; (6) ensure customers' ability to access, update and correct their own data; (7) ensure that customer-specific information is protected from loss, theft, unauthorized access, inappropriate disclosures and other inappropriate or unauthorized uses. Further, privacy use cases should be employed to address identified exposures or problems, consumers should be educated about privacy exposures and protection options, utilities should share solutions to common privacy problems, and data collections by smart appliances and other devices should be limited to data needed for purposes of operation. See EEI at 20-21; NRECA at 10. DTE noted its involvement in the NIST effort and stated that it is important to ensure Smart Grid decisions do not make obsolete existing equipment deployed in the field by the electric industry to provide reliable service. DTE, PTR at 83-84; see also Southern at 5.

Consideration of the OECD privacy guidelines was also suggested. NRECA at 8-9. The OECD guidelines set forth eight principles of privacy protection: (1) limiting the collection of data and requiring that the data be lawfully obtained, with the consent of the individual where appropriate; (2) ensuring relevancy of data for purposes for which it will be used and ensuring data accuracy, completeness, and currency as necessary for those purposes; (3) notifying consumers of the purposes for which personal data is being collected by the time such data is collected and limiting subsequent use to those or compatible purposes; (4) limiting disclosure of personal data for other than specified purposes without prior consent or under authority of law; (5) protecting personal data from unauthorized access, use, modification, disclosure or destruction through the use of reasonable safeguards; (6) operating with transparency about disclosure practices and policies; (7) allowing individuals to know what data is being collected, to access that data, and to challenge the data as inaccurate, incomplete, or subject to other problems; and (8) providing for accountability to ensure the effectiveness of the other principles.

Some commenters stated that the same privacy guidelines followed by other industries, such as banking, telecommunications, and internet commerce, should be looked to for application to Smart Grid privacy policies. DRSG at 2; Elster at 2; EnerNOC at 3; Honeywell at 2 (while noting that such practices should be used only for data, such as billing data, that needs to be stored on a centralized server; energy use data should be transmitted directly from the meter to the customer premises, without transfer to vulnerable exterior networks); Whirlpool at 2. In particular, EEI discussed the potential for use of the FCC regulations for the protection of CPNI in the telecommunications industry as a possible guide for Smart Grid privacy practices. EEI at 14-15. The FCC regulations set forth requirements for telecommunications carriers to establish a

clear system for determining whether a customer has given approval for the use or release of CPNI, including records retention policies and a disciplinary process for employee misuse of CPNI. The regulations also set forth requirements for protecting against unauthorized access to CPNI, which include procedures to authenticate customers who call or go online in order to access CPNI. Notification procedures in the event of a security breach are also set forth in the FCC regulations, which include requirements pertaining to the notification of law enforcement prior to customer notification.[77]

Other commenters referenced various other potential privacy practices for use in protecting energy consumption data generated through use of Smart Grid technologies. A few commenters suggested use of the Privacy by Design concept developed by the Information and Privacy Commissioner of Ontario, Canada, which envisions building fair information practice principles into the design, operation and management of information processing technologies and systems. NASUCA at 13-15; Pepco at 4-5. Privacy Impact Assessments ("PIAs"), privacy evaluations used in developing new systems, can be used by utilities and state regulatory bodies to guide their planning for the protection of Smart Grid data. PIAs set forth questions for applicants to answer related to the collection and storage and encryption of data, as well as consumer consent and notice in the event of a breach. PIAs could also be used in connection with Federal funding for Smart Grid, particularly given that some form of PIA is already used by a number of Federal agencies. NASUCA at 13-15. See also EEI at 20 (referencing PIAs in the context of NISTIR 7628). A few commenters also referenced the Fair Credit Reporting Act, as amended, and the associated Red Flags Rule for preventing identity theft. APPA at 10; DTE at 4; NRECA at 11. Other commenters mentioned the American Institute of CPA's (AICPA) Generally Accepted Privacy Principles (GAPP)[78], draft customer access guidelines developed by EEI, and Gramm-Leach-Bliley Act requirements. NRECA at 9, Cleco at 2-3, Pepco at 4-6.

Other commenters, while not advocating for the consideration of any particular guidelines, set forth principles they believed were appropriate. APPA believed that such policies should include the limitation of data collection, clear disclosure to customers, visible and transparent privacy rules, customer consent for the release of information to third parties, technology and practices that ensure data integrity, customer access to data, notification in the event of security breach or inadvertent disclosure, and security safeguards to protect against unauthorized access. Secure communication technologies should also be used to transfer smart meter data, or the data should be encrypted where secure transfer is not possible. APPA at 6. These policies are consistent with those in the FIPPs and other data privacy principles discussed above. See also Avista at 1-2; DTE at 3; Elster at 1; FPL at 4; Idaho Power at 5; Silver Spring at 3 (all setting forth policies that they believed should be used to safeguard energy information); Xcel Reply at 7 (setting forth the elements of consumer consent: allowable uses of data; duration of time for which consent is valid; and (3) process by which consumer may revoke consent). NW Energy also commented that utilities now shoulder many responsibilities, such as reliability, network

[77] Relatedly, 49 CFR 64.11120(c)(3) sets forth requirements for the verification of orders for telecommunications services governing the method in which carrier change orders can be submitted, conducted, and verified.
[78] The AICPA's GAPP can be found at http://www.aicpa.org/InterestAreas/InformationTechnology/Resources/Privacy/GenerallyAcceptedPrivacyPrinciples/Pages/default.aspx (last visited August 18, 2010).

operation, and renewable energy, but that utilities are uncomfortable with importing parts of the Federal criminal code into reliability for utilities. NW Energy, PTR at 81-82.

Related to the principles discussed above, a number of commenters stated any data privacy practice should hold third parties to the same security standards as the utilities. EEI at 14, 30; Elster at 4; Exelon at 3-4; Oncor at 8; SMUD, PTR at 64-65; Tendril, PTR at 42; US Telecom at 2. Tendril, a third party vendor, also stated that utilities must audit heavily the vendors they use to generate or manipulate data. For its part, Tendril goes through three-week, 20-person security audits with utilities, to make sure that the bits of data Tendril uses are stored correctly and meet the same set of requirements that the utility has to meet for customer data. Tendril, PTR at 42-43. In addition, only authorized third parties should have access to data enhanced by utilities for business purposes. EEI at 33-34; FPL at 10; SDG&E at 3, fn 3.

State Certification of third party service providers and Authorization Procedures.

EEI discussed in detail the importance of state certification of third party service providers[79] to ensure that such providers met certain basic requirements to safeguard the privacies and energy usage information of utility customers. EEI urged the states to consider adoption of such procedures and indicated that DOE could develop guidance to assist the states in issuing their own procedures. Federal agencies could also offer guidance for validating third parties who have received state certifications. EEI at 10-11, 14, 29-32. See also Pepco at 1 and 6; NASUCA Reply at 7. As a related issue, EEI also discussed authorization procedures that could be used to ensure that third party service providers have received appropriate authorization from consumers to access, use or disclose consumer data. To ensure that such authorization is informed, consumers should be provided with clear information on the nature and use of the data to be disclosed. In many instances, electronic consumer consent should be sufficient, and while a "wet" signature would not be required, consumers should be provided the option to authorize data disclosure in this manner. EEI at 10-11, 14, 29-32. In developing any guidance documents on state verification and authorization procedures, DOE should consider the FCC regulations discussed above, as well as NIST's recommendations on third party authentication and authorization. EEI at 10-11, 14, 29-32; EEI Reply at 9.

Question 4: Should consumers be able to opt in/opt out of smart meter deployment or have control over what information is shared with utilities or third parties?

While a few commenters stated that consumers should be able to opt out of Smart Grid deployment, most agreed that consumers should be required to take part in smart meter deployment and allow utilities access to energy consumption data to achieve reliability, environmental, and other benefits. The pace of deployment, however, could depend on a number of factors. Commenters were universal in agreeing that consumers should have control over whether their individual energy consumption data is shared with third parties. Commenters also

[79] EEI defines third party service providers as parties not under contractual obligations with an electric utility to keep customer information confidential and who, therefore, require customer consent to receive such information. EEI at 3, fn. 2; EEI Reply at 3, fn 5. See also DTE at 5.

discussed means to encourage consumer acceptance and use of Smart Grid, noting that education and the provision of tangible, immediate benefits would be important factors.

Consumer Participation in Smart Grid Deployment.

In responding to the issue of whether all consumers will need to use advanced Smart Grid infrastructure if utilities are going to invest in smart meters, or if the nation is going to achieve goals related to renewable energy, or take advantage of things like electric vehicles, most commenters agreed that it does not make sense for only some consumers to use Smart Grid, because the resulting data would be potentially harmfully incomplete data. Utilities need the data for all consumers to understand the load on a transformer, so they can do preventative maintenance, and to know whether the transformer can handle electric vehicle infrastructure. Because electric vehicles, when charging, can consume an amount of energy similar to that consumed by an entire household, it is critical that utilities have access to information regarding electric use of these vehicles. APPA at 7; Avista at 2-3; BG&E at 2; Cleco at 3; DRSG at 3; DTE at 3; EEI at 15-17; EEI Reply at 6, 9-11; Elster at 1; EnerNOC at 3; Exelon at 4; FPL at 4-5; Honeywell at 2-3 (also noting that the consumer should be able to opt out of the collection of detailed consumption data, as opposed to billing data); Idaho Power at 5-6; NASUCA at 15; NRECA at 12-13; Oncor at 3-4; Pepco at 2; Sawnee, PTR at 56; SCE at 2; SDG&E at 5-6; Silver Spring at 3-4; SMUD, PTR at 55-56; Southern at 4; TIA at 3; TechNet, PTR at 57; Tendril, PTR at 21-22; Tendril at 4[80]; TIA at 3; UTC at 9-10; Whirlpool, PTR at 46-47; Whirlpool at 2-3.[81] NW Energy also stated that the utilities need the data to provide safe and reliable service and to meet various accountabilities. For example, the data would be used for critical infrastructure audits, and there would be more risk with more porous data. Data is also needed to comply with state law requirements. NW Energy, PTR at 40-41.

A few commenters argued that consumers should be able to opt-out of the deployment of Smart Grid technologies that are used by consumers—as opposed to those on the utility-side of the meter. CPower at 2 (noting that the ability to opt out of individual metering deployment was the consumer's right); Xcel at 4-5 (noting that because of the benefits of broad deployment, opt-in deployment should be considered as one way to promote smart-meter usage). The Joint Consumer Comment, for example, stated that use of smart meters and time of use pricing should be optional wherever possible. It suggested that an opt-out regime makes smart meters a more appealing option and protects those for whom it is not cost-effective, such as low volume users. Joint Consumer Comment at 5. Sawnee also cautioned that we need to tread carefully with the

[80] Tendril also stated that utilities need whole house, aggregated data to make quick decisions about how much power to generate, or whether to turn on a new power plant or turn down customers' air conditioners (for those customers who have opted in). For the utilities to meet their goals of introducing renewable energy sources, gaining more efficiencies, and managing load demand more efficiently, a system that can measure whole house consumption at approximately 15 minute intervals is needed. Such a system can be created either by putting in new smart meters or using existing automated meter reading (AMR) meters linked to the customer's broadband. As discussed above, however, there is one exception to the utilities' need for aggregated whole house data only – energy data on usage of electric vehicles. Because an electric vehicle, when plugged in, will use more energy than the entire house, knowing how much energy the vehicle needs and when the battery needs to be fully charged allows a utility to optimize how much power is sent to a particular neighborhood to meet those requirements. Tendril, PTR at 20-22, 26.

[81] While not giving an opinion on whether consumers should be able to opt out of Smart Grid deployment, CEA stated that providing such an option would hinder development and deployment of Smart Grid. CEA at 3-4.

idea of not allowing consumers the choice to opt out, because imposing the system on people would result in a challenge. Sawnee, PTR at 28-29. The Roundtable, while stating that individual tenants should not have the ability to opt-out of smart meter deployment, left open the possibility that, if the utility did not install the smart meters, private companies for whom the investment was not cost-effective could opt out of deployment within particular buildings owned by that company. Roundtable at 4-5.

While stating, for the most part, that consumers should not be able to opt out of Smart Grid deployment, commenters acknowledged that varying paces of investment in or adoption of Smart Grid were possible. Some stated that utilities should determine whether and when to deploy smart meters, or that these decisions should be made at the state level by state regulatory commissions. APPA at 7; Avista at 2-3; Cleco at 3 (noting that utilities should be able to recover the costs of deployment); EEI Reply at 11; NASUCA at 15-16; NW Energy, PTR at 48. Sawnee noted that consumer acceptance could also drive the pace of Smart Grid adoption. Individuals need to see that use of Smart Grid is to their own benefit, and it is important to have a culture and environment that supports energy efficiency measures but allows people to move along the continuum at their own pace. Sawnee, PTR at 47. NW Energy acknowledged the continuum, but noted the issue of demands for a particular utility, the vintage of its existing equipment, and other issues that would presumably result in the need for faster movement along that continuum. NW Energy, PTR at 48. TechNet discussed an adoption curve for Smart Grid, where utilities and others make investments in the meters and other equipment, and then consumer adoption catches up over time. PTR, p. 57. Whirlpool also acknowledged that manufacturers need to start making appliances that are Smart Grid compatible because if they do not, critical mass will never be achieved. PTR, p. 58. CO OCC noted, however, that while smart meters cost $5 – $95, the Smart Grid is costing $2200 per household for a trial while there was an alternative display device for use with the smart meter that costs only $250, so a real issue exists over how much utility customers should be required to pay. PTR, p. 58. NW Energy queried when it might sensible to change out a generation of technology, such as AMR to advanced metering infrastructure ("AMI"). It can be difficult to justify a new generation of meters, but NW Energy noted that there is now technology that lets utilities bridge from AMR to something that "looks like" Smart Grid. NW Energy, PTR at 62.

Consumer Ability to Opt-Out of Energy Information Sharing.

On the issue of sharing with third parties energy usage data collected through consumer use of Smart Grid technologies, commenters were universal in the view that consumers should be able to opt-in or opt-out of sharing their individual energy usage information with third parties. APPA at 7; Avista at 2-3; BG&E at 2-3; CEA at 4; Cleco at 2; CPower at 1-2; DRSG at 3; DTE, PTR at 86; EEI at 17; EnerNOC at 2-3; FPL at 5; Google, OSTP Comments at 2; Honeywell at 3; Idaho Power at 6; NASUCA at 16; NW Energy, PTR at 41, 45; Oncor at 4-5; Pepco at 2; SCE at 2; SDG&E at 5-6; Silver Spring at 4; SMUD, PTR at 28, 55-56; Southern at 4; Tendril, PTR at 21-22, 36, 43-44; Tendril at 4; TIA at 3; US Telecom at 1-2; UTC at 10 (noting that policies adopted in the 1990s on the utilities sharing customer data in the context of retail competition could be used in the Smart Grid context as well); Verizon at 2-3; Whirlpool at 2-3; Xcel at 4-5. SMUD elaborated that, in the focus groups they conducted prior to their Smart Grid roll out, a great deal of concern was voiced about who will control the data and what kind of decisions

SMUD would make regarding sharing of the data. Customers indicated that they want to be able to say how their information is used, and they want to be able to tell SMUD how their information can be used. SMUD, PTR at 14-15. Cisco Systems ("Cisco") similarly noted that consumer views on privacy vary widely and the varying views are all valid, so the privacy issue must be viewed from a consumer control point of view. Cisco, PTR at 15-16. Avista further clarified that the consumer should be able to opt out of the collection of information on the energy consumption, or the control of, appliances on the customer side of the meter. Avista at 2-3.

Some commenters offered views on whether consumer control of data sharing should use an opt-out versus an opt-in mechanism. A number of commenters preferred the opt-in mechanism because it would not require affirmative action by the consumer to prevent the sharing of his or her energy consumption data. DTE, PTR at 86; EEI at 17, 24; Honeywell at 3; NASUCA at 16; Oncor at 4; Pepco at 6; Southern at 4; TIA at 3. Two commenters seemed to prefer the opt-out approach, but did not provide specific reasons as to why such an approach should be preferred. Exelon at 2; Xcel at 5. CEA stated that no particular mechanism should be selected at this time to avoid hindering innovation in the development of consumer consent mechanisms and the widespread deployment of Smart Grid. CEA at 4; see also Silver Spring at 4. Tendril, a third party vendor currently collecting energy use data, noted that while its programs dealing with the whole home consumption data shared with utilities may not be opt in, all of its programs that use disaggregated data about what's going on inside the home are opt in. Tendril, PTR at 36, 42-43. Tendril further noted that their next software release will allow consumers to go to the utility website and see what data is being captured and who has access to it. Consumers can then determine what they want to have happen to that data. Because different people have different thresholds or trade-offs for use of their data, Tendril believes that it is important to offer people choices. For example, to save money, Tendril explains that the consumer must allow the vendor to use a reasonable amount of behavioral information, such as when a person is at home and to what temperature the person's thermostat is set, and makes that clear to the customer. Tendril, PTR at 44-45.

A number of commenters also clarified that consumers would not need to authorize utilities to access data or share that data with a third party the utility uses for operational purposes. APPA at 13-14; CPower at 4; DRSG at 8; EEI Reply at 6; EEI at 3, fn 2; Exelon at 2; NASUCA at 25; NW Energy, PTR at 42; Oncor at 4, 8; SCE at 6; SMUD, PTR at 39, 42, and 54; Southern at 4; UTC at 15; Whirlpool, PTR at 46-47; Xcel at 7-8; Xcel Reply at 5. Some also commented specifically that consumers should not need to authorize the sharing of aggregated data, as long as consumers are informed of the practice and appropriate safeguards are in place to prevent the ability to infer PII or individual usage data from the aggregated information. CEA at 2; CPower at 1-2.

Means to Encourage Consumer Acceptance and Use of Smart Grid.

Commenters offered a number of ways to increase consumer acceptance and use of Smart Grid technologies. Education about the benefits of Smart Grid was discussed as a primary means of achieving this goal. Commenters also discussed how to provide consumers with at least some immediate benefits from use of smart meter technologies to further encourage consumers to

accept Smart Grid. Some commenters also believed that allowing consumers to use variable pricing would be a valuable tool.

A number of commenters noted that educating consumers about the benefits of Smart Grid would help increase consumer acceptance and use of Smart Grid. CEA at 4; CO OCC, PTR at 12-13, 32, 53, 102 (also noting that use of inverted block rates would not be very successful because consumers did not understand the concept); NW Energy, PTR at 13-14, 62; TechNet, PTR at 16-17, 31, 99; SMUD, PTR at 29, 48, 97; TIA at 3-4; Tendril, PTR at 58-59; DTE, PTR at 83-84. These commenters also discussed how different technologies could allow consumers to see some energy use data or other information right away, an immediate benefit that would further encourage consumers to use Smart Grid technologies. As examples of such information, Landis and Gyr ("Landis") commented consumers could be provided with an in-home display, such as the displays they are considering offering in Texas to low and fixed-income consumers. How to get the displays into consumers' hands and who pays for them, however, are open questions. Landis, PTR at 89. Tendril noted that being able to look at your bill on your iPad was another example of an immediate consumer benefit. Tendril, PTR at 90. SMUD stated that immediate benefits could also include information on a bill or providing access to the utility's web portal on their utility usage, as well as tips on how to cut energy usage. SMUD, PTR at 97. Consumer education about less tangible or personal benefits could also help to encourage Smart Grid use for some consumers, through the desire to be energy efficient for environmental reasons For example, SMUD referenced its program that allows people to pay more for 100-percent renewable energy and noted that many people use solar even though it is not cost-effective. SMUD, PTR at 52.

Commenters also discussed more detailed programs that could help consumers save money and increase acceptance of Smart Grid. Tendril noted its creation of a point system similar to that used in some recycling programs to give people points for doing things that are energy efficient, and those points are redeemable at Target, Starbucks, and other locations, or can be used to help local schools. PTR, p. 48-50. Cisco provided as another example the GooglePlex, a multi-protocol router that interfaces with all the different energy control systems to identify whether appliances are running efficiently and to turn energy-using devices on and off. Cisco stated that the GooglePlex saved Google up to 40 percent on their energy costs. Cisco noted that these control access systems could be installed in consumers' homes going forward. PTR, p. 50-51.

Commenters also discussed price signals as a way to encourage adoption of Smart Grid. SMUD stated that we need to build pricing so that utilities recover costs, and at some point there could be an environmental adder associated with greenhouse gases. SMUD, PTR at 29. Cisco agreed that it makes sense to do time of day pricing to discourage high cost production, because the marginal cost of additional production at peak time is extremely high, and the cost averaging that is currently used removes the incentive to do anything about this issue. Cisco, PTR at 30. Tendril also noted that we need to use price as a driver. In addition, to make variable price work in a consumer sense, Tendril stated we need devices that can autonomously react – consumers can set up a rule that says if the price goes above X, change my thermostat to Y. If consumers have to do this manually every time, they won't interact with the system. Tendril would push utilities to give people a variable rate along with the flat rate, and they pay the lesser of the two, to educate people in the short term, because everyone can benefit from variable prices. This

would be a good start, to give consumers the choice whether to use the variable pricing. Tendril, PTR at 27-28.

Question 5: What mechanisms should be made available to consumers to report concerns or problems with the smart meters?

Most commenters who addressed this issue indicated that current mechanisms used by utilities to address customer complaints should be used to address concerns with smart meters. APPA at 8; BG&E at 3 (also noting that use of networked devices on the customer side of the network may introduce additional complexities); DTE at 3; EEI at 17-18 (also noting that customers could also use any new, emerging technologies to communicate concerns); FPL at 5; Idaho Power at 6; Pepco at 3; Southern at 4-5; SCE at 2 (also noting that customers should be able to use any new, emerging channels to communicate concerns); UTC at 11. NASUCA stated that utilities should communicate the mechanisms available to address Smart Grid issues to consumers on an annual basis, and that these methods should include a phone and internet service hotline. NASUCA at 17. SDG&E also indicated that customer service representatives specially trained to address matters related to smart meter deployment are available to assist consumers in the event that initial contacts with customer service do not resolve a particular issue. SDG&E customers can also voice concerns in various forums such as public meetings. SDG&E at 7. Many commenters also stated that if a customer's attempt to resolve a concern with the utility is not successful, a state regulatory commission should provide assistance. DRSG at 3; Elster at 5; EnerNOC at 3; Exelon at 2; Honeywell at 3; Oncor at 5; SDG&E at 7-8; Southern at 5; UTC at 11. In addition, Tendril noted that customer concerns with smart meters may be redressed differently than concerns with use of customer data by third parties. Customer concerns with utility practices could be directed to state regulatory commissions, while concerns with third party practices could be directed to state Attorneys General, the FTC, or the FCC, similar to practices in place for other industries. Tendril at 5. Two commenters also believed that an independent ombudsman services could be made available to address consumer concerns with smart meters. CPower at 2; Tendril at 4.

Question 6: How do policies and practices address the needs of different communities, especially low-income rate payers or consumers with low literacy or limited access to broadband technologies?

A number of commenters indicated that Smart Grid data privacy policies should apply equally to all consumers. APPA at 9; DTE at 4; EnerNOC at 4; Tendril at 5. Reponses to this question, however, generally focused on the extent to which the benefits of Smart Grid accrue to low income consumers, as well as on how government entities, utilities, and others could help low income consumers engage in and benefit from the use of Smart Grid technologies through the use of education and financial assistance programs. Many commenters stated that decisions concerning such assistance would be addressed before state utility commissions.

Commenters differed on the extent to which Smart Grid technologies would benefit low income consumers. One commenter specifically argued that low-income residential consumers would

not benefit from Smart Grid because they often have lower energy consumption and therefore fewer opportunities to conserve energy. APPA at 8-9. As a result, APPA argued that time of use rates should be introduced carefully to this customer class, and the use of block tariff rates may be an appropriate way to proceed. The Joint Center for Political and Economic Studies ("Joint Center") argued that insufficient information exists to determine whether AMI benefits or harms low-income consumers. The Joint Center referenced a pilot program conducted by the National Regulatory Research Institute, which showed that lower income consumers reduced electricity demand by lower percentages than higher income consumers, and that there was no universal demand reduction (in some cases, demand increased) during peak periods.[82] Based on this pilot, the Joint Center echoed the APPA's concern that many low-income consumers do not stand to realize Smart Grid benefits because they are already subsisting on bare energy expenditures due to limited incomes, and they are unable to shift such use to take advantage of off-peak rates. In addition, they may live in homes that are less well-insulated or have less-efficient appliances. The Joint Center stated that further studies on AMI use by the low income need to be conducted. Joint Center at 9-10.

Other commenters emphasized that use of smart meters and Smart Grid technologies like direct feedback on energy use would benefit all consumers, particularly those with low incomes, by helping them reduce their energy usage. CEA at 4 (noting that the PowerCents DC pilot program indicated that consumers reduced their demand by up to 50 percent, and low income consumers enrolled at higher rates than other consumers); EEI at 18; EEI Reply at 11; FPL at 5; Google, OSTP Comments at 2; NASUCA at 18; Pepco at 3-4 (discussing the Smart Meter Pilot Program, Inc. which indicated that low-income consumers respond to dynamic pricing signals, thus reducing their electricity costs); Silver Spring at 4; UTC at 12 (referencing a study that revealed that low income customers are responsive to dynamic rates and can benefit even without shifting load, and that they do shift load in response to price signals).[83] The Joint Center also agreed with this general principle. Joint Center at 1. Silver Spring further stated that low income customers typically have flatter load curves than average, meaning that they subsidize consumers with "peakier" consumption patterns and would thus benefit from more efficient cost allocation through dynamic pricing. EEI and a number of other commenters elaborated that benefits such as improved power quality, increased reliability, increased safety, faster service restoration, and increased utility productivity. See also CEA at 4; FPL at 5; Oncor at 5-6; Pepco at 4; Southern at 5.

Commenters acknowledged that low-income communities should be included in any public debates and discussions that occur as Smart Grid strategy is developed, and that any studies or pilot programs relating to smart meter technologies should also include such customers. Joint Center at iii; Exelon at 3; NASUCA at 18; Pepco at 3; UTC at 11-12. In addition, commenters stated that there was a need for flexible assistance programs for low-income persons and other groups. Joint Consumer Comment at 5-6; DTE at 4; Southern at 5. Some commenters indicated

[82] N. Brockway, "Advanced Metering Infrastructure: What Regulators Need to Know About its Value to Residential Consumers", National Regulatory Research Institute (February 13, 2008). http://nrri.org/pubs/multiutility/advanced_metering_08-03.pdf (last visited, August 23, 2008).

[83] "The Impact of Dynamic Pricing on Low Income Customers", IEE Whitepaper, June 2010, prepared by Ahmad Faruqui, Ph.D., Sanem Sergici, Ph.D., and Jennifer Palmer, A.B.

that state utility commissions were in the best position to evaluate and make decisions regarding such programs. DRSG at 4; EEI Reply at 12-13; Southern at 5; Tendril at 5.

Commenters believed that such assistance programs should include education programs for low-income rate payers or consumers with low literacy or limited access to broadband technologies. APPA at 9; DRSG at 4; EEI Reply at 14; EnerNOC at 4; Joint Center at 2, 5-6; NASUCA at 19; CO OCC, PTR at 32; Oncor at 6; SCE at 4; Silver Spring at 4; SMUD, PTR at 29; TechNet, PTR at 16-17; Tendril at 5; Whirlpool at 3. TechNet added that education efforts need to include the HUD housing sectors so that large portions of the population are not left behind in the implementation and use of Smart Grid. Because the knowledge level of these individuals is currently very low, education programs or informational materials would be helpful. TechNet, PTR, p. 31. Education programs should also include persons who do not speak English. DRSG at 4; EEI Reply at 14; EnerNOC at 4; Joint Center at 4; Silver Spring at 4; SCE at 4. SDG&E also discussed its program to train community librarians to assist customers without home internet access in creating accounts to view their energy usage online. See also EEI at 19 and EEI Reply at 14 (noting that education efforts must be made to reach those without access to computers or the internet).

In addition, commenters believed that monetary assistance programs would benefit these consumers. Such programs could include government subsidies, incentives, or other means of assistance. BG&E at 4; TechNet, PTR, p. 31-32; SDG&E at 9-10; SCE at 3. State-mandated assistance programs should also be reviewed and modified to operate effectively alongside use of Smart Grid technologies. NASUCA at 19. Programs underwritten by utilities that provide financial assistance or early access to Smart Grid technology would help low-income customers who pay their own electricity bills recover the cost of increased tariffs associated with Smart Grid. Tendril, PTR, p. 58-61. See also Oncor at 6; Pepco at 3; SCE at 3; Tendril at 5 (discussing programs under consideration by utilities to provide free or low cost in-home energy use monitors). Commenters also stated that reducing operating costs for the roughly 2 million housing units controlled by HUD or a non-profit would also reduce the rent of the individuals impacted by the operating costs for those units (even if these individuals did not directly pay the utility bill), as well as improve the fiscal health of the entity supplying the housing. TechNet, PTR, p. 61; Joint Center at 5-6. One commenter noted that it partners with community action organizations to assist low income consumers with payment of their utility bills, as well as to assist customers with special needs, such as the elderly and the handicapped. Avista at 3. Some commenters cautioned, however, that any financial incentives to low-income consumers should not stifle innovation by picking technological winners and losers. CEA at 5; Honeywell at 4.

In addressing the issue of broadband access by low-income consumers, commenters differed on whether use of broadband would be necessary for consumers to reap the benefits of Smart Grid. Some commenters stated that broadband should not necessarily be required, as other technologies are available that could help such customers lower their energy usage, and thus save money on their energy bills. BG&E at 4; DRSG at 4; Elster at 2; EnerNOC at 4; Exelon at 3; FPL at 5; Oncor at 5-6, 10. Multiple competing ways to receive energy data will help ensure the broadest and lowest cost access to data. Google at 2. Another commenter, however, believed that reliance on broadband technologies to transmit data was inherent in Smart Grid design, and that increased efforts to improve digital literacy and access to public computing centers would be

needed to help low-income consumers learn how to use and manage Smart Grid technology. Joint Center at 2-4.

A number of other views on financial assistance and related issues were also expressed. Other commenters argued that innovation in the free market will provide low-income consumers with cheaper products, financing opportunities and other services. CPower at 2-3; Honeywell at 4. In another commenter's view, low-income persons who install smart meters should not be required to participate in any new program or be subject to any different type of pricing or rate. The relationship of such customers with their utility should continue as before unless consumers choose to participate in any programs to manage their electric bills to lower costs. DRSG at 4. One commenter also voiced concern about the effect of remote disconnection on low-income or elderly consumers, stating that consumer protections from remote disconnections should not erode with the roll out of smart meters, and that health and safety reviews should be required even if technology enables remote disconnection. Joint Consumer Comment at 5-6.

Question 7: Which, if any, international, federal, or state data-privacy standards are most relevant to Smart-Grid development, deployment, and implementation?

Many commenters discussed international, federal, and state data-privacy standards that could be relevant to Smart Grid development, deployment, and implementation in response to Questions 3 and 16. Please see those Questions for discussion on these topics.

Question 8: Which of the potentially relevant data privacy standards are best suited to provide a framework that will provide opportunities to experiment, rewards for successful innovators, and flexible protections that can accommodate widely varying reasonable consumer expectations?

Commenters on this topic emphasized the need for an overarching framework of privacy guidelines rather than detailed standards for the protection of consumer privacy. They also offered views on whether a state or federal standard would be more appropriate, as well as on the use of international standards. Commenters also discussed the level of privacy assurance that standards should provide and highlighted the importance of investing in innovative technologies.

Many commenters stated that a framework setting forth the important elements of privacy protection would foster innovation more readily than prescriptive data privacy requirements dictating specifically how utilities and others would need to protect consumer privacy.[84] This is particularly important because the kinds of applications and software that may be developed are as of yet unknown. Cisco, PTR at 68-69; CPower at 3 and DRSG at 6 (stating that a threshold

[84] We note that the Department of Commerce (DOC) is conducting an inquiry exploring precisely this issue of the relationship between innovation and consumer data privacy. *See* U.S. Dep't of Commerce, Notice of Inquiry on Information Privacy and Innovation the Internet Economy, 75 Fed. Reg. 21226, Apr. 23, 2010. The inquiry covers many of the issues discussed in this section, including the effects of state-level privacy laws and federal sector-specific privacy laws. DOC will issue a report setting forth the findings of this inquiry. The FTC is conducting a similar inquiry and will issue a report discussing the U.S. consumer privacy framework, *See* FTC, Exploring Privacy: A Roundtable Series, http://www.ftc.gov/bcp/workshops/privacyroundtables/.

should be set, like the principles in the FTC FIPPs, with flexibility and innovation encouraged beyond that threshold); DTE at 4 (recognizing the AICPA GAPP and OECD guidelines); EEI at 21-22 (recognizing NISTIR 7628); EnerNOC at 4 (referencing the FTC FIPPs and the NIST Cyber Security Coordination Task Force effort); FPL at 7 (referencing the NIST CSWG forum); Google DOC Comments at 2-3 (referencing the Gramm-Leach-Bliley Act and FTC privacy rules); Idaho Power at 6-7 (recognizing the NIST effort to develop privacy standards); NASUCA (referencing the NIST report and Privacy by Design efforts it discussed in response to Question 3); Pepco at 6; Sawnee, PTR at 95; SCE at 4 (referencing the FTC FIPPs); SDG&E at 10-11 (referencing the NIST CSWG report); Silver Spring at 6 (discussing the need for a threshold beyond which innovation can flourish); Tendril at 5 (referencing the FTC FIPPs). Tendril further noted that within that framework, the market should be allowed to operate. Tendril, PTR at 75-76. Regional diversity could also be supported and flourish within that framework. Sawnee, PTR at 105.

Those in support of state responsibility in this area emphasized that states have traditionally taken the primary role in regulation for the protection of consumer privacy. APPA at 11 (also noting that there may not be much room to experiment with data privacy guidelines given existing state laws); Elster at 3 (noting that political jurisdictions can choose to be more restrictive); Oncor at 6; Southern at 5. Southern noted that allowing states to take the lead in this issue will allow them to act as laboratories of experimentation (citing New State Ice Co. v. Liebmann, 285 US 262, 311 (1932)).

Other commenters, while acknowledging that privacy concerns have typically been dealt with on a state-by-state basis, believed that standardized data privacy standards are important as we move forward with Smart Grid development. NW Energy, PTR at 94; SMUD, PTR at 64-65; Whirlpool, PTR at 94, 105 (acknowledging that diverse needs exist, but noting that a national standard framework would allow appliance manufacturers to help with demand responsive load leveling); Whirlpool at 4. Tendril stated that the issue is about efficiency, particularly for companies selling products across multiple state boundaries. Because it is difficult to deal with 50 sets of requirements, least best practices should be defined, and then states could deviate if needed. Tendril, PTR, at 72, 93. NW Energy clarified that given that Smart Grid technology is still relatively new, there has been insufficient time for experimentation, and that freezing this experimentation in a single federal standard would at this point be premature. The Federal government could, however, facilitate the development standards. NW Energy, PTR at 74.

A number of commenters explored the idea of a federal minimum standard with states determining whether more stringent standards should be implemented. NASUCA argued that states should be able to be able to implement more stringent than any federal guidelines, but acknowledged that federal privacy regulation may be needed given interconnected nature of Smart Grid. NASUCA at 19-20; NASUCA Reply at 6 (stating that there is a need for a national privacy policy to establish a minimum level of protection, while enhancing the state role in promulgating privacy protection rules). The CO OCC referenced the existing model in use for Consumer Proprietary Network Information when querying whether it would be appropriate to have minimal federal standards and allow states to have more stringent privacy standards. CO OCC, PTR at 94. See also AARP Reply at 5 (agreeing that there should be a Federal floor while states could establish more stringent requirements; Federal action should not stifle State efforts

and discourage policy innovation). See also AARP Reply at 4 (noting that both the federal and state governments must implement policies to ensure that customers' personal and energy consumption data is protected). NW Energy also stated that there is a role for both the states and for the federal government in developing such a standard – perhaps the federal floor and state ceilings would be an appropriate model. NW Energy elaborated that any standards should not be developed by a federal agency through a rulemaking process. Instead, the standard should be industry-driven and respond to customer experience, and utilities should communicate with state agencies. NW energy indicated that standards should be harmonized and technology and commercially driven, noting that companies have internal practices for protecting consumer data that are continually reviewed. NW Energy also believes that it would be a huge mistake for states and federal agencies to get into a jurisdictional fight, particularly because it is likely that the process would not end with the right result. NW Energy, PTR at 94-95.

One commenter indicated that international standards might best foster innovation and flexibility because they must recognize privacy expectations worldwide. Elster at 3. On the other hand, one commenter noted that the inconsistencies between existing international standards may make it difficult to use these standards to develop appropriate privacy policies. Google, DOC Comments at 6-7 (though noting that Asia-Pacific Economic Cooperation ("APEC") Privacy Framework[85] and OCED guidelines could help in the development of effective privacy principles).

In determining the level of privacy assurance that any standard or framework should offer, commenters agreed that while we rightly expect from our utilities a high level of service, in terms of reliability and other factors, the high bar cannot become an inhibitor to progress, or the many benefits from Smart Grid may not accrue. Tendril, PTR at 103. While it is important to deliver cost-competitive energy to customers, we cannot inhibit creativity and innovation to prevent customers from seeing a value proposition in use of the Smart Grid. Sawnee, PTR at 104. One commenter further highlighted the need to provide oxygen to innovation and to continue to drive investment, which would produce jobs. The commenter noted that the federal government can seed investment through stimulus. The commenter also noted the importance of the federal role, to put up a firewall for consumer protection and the safe use of information. TechNet, PTR at 98-99.

Question 9: Because access and privacy are complementary goods, consumers are likely to have widely varying preferences about how closely they want to control and monitor third-party access to their energy information: what mechanisms exist that would empower consumers to make a range of reasonable choices when balancing the potential benefits and detriments of both privacy and access?

Commenters acknowledged that consumer views on privacy vary widely. See, e.g., Cisco, PTR at 15-16; SDG&E at 11. Cisco stated that because the various consumer views are all valid, we need to look at the issue from a consumer control point of view. Because Smart Grid technology

[85] The APEC Privacy Framework is available at http://www.ag.gov.au/www/agd/rwpattach.nsf/VAP/(03995EABC73F94816C2AF4AA2645824B)~APEC+Privacy+Framework.pdf/$file/APEC+Privacy+Framework.pdf (last visited August 18, 2010).

is still new, we have the opportunity to deploy it in a way in which security and the protection of consumer privacy is incorporated in a significant and meaningful way. We can deal with issues of consumer privacy appropriately if we deploy systems intelligently. Cisco, PTR at 15-16.

Some commenters stated that existing utility practices could be used and adapted to allow consumers to control access to their data. APPA at 11; Avista at 4-5; DRSG at 6; Elster at 3; Oncor at 7; SDG&E at 12.[86] APPA stated that existing utility customer internet portals could be used to provide consumers with access to Smart Grid information and choice in determining whether to release their data to third parties. Avista referenced existing Washington state law governing disclosure and notice to customers of its disclosure policy. DRSG also noted that as Smart Grid develops, utilities can look to other industries to examine practices that may be applicable in the Smart Grid context.

Other commenters cautioned that one process should not be mandated at this point in time to avoid stifling innovation. CEA at 5; EEI at 24; FPL at 7-8 (noting, however, that utilities need the opportunity to determine what mechanisms are best); Idaho Power at 7. EEI recommended the use of FCC rules governing access to CPNI as a model, noting that these rules offer useful mechanisms for customers to make informed choices about access to and use of CPNI data. EEI at 23.

A number of commenters acknowledged that flexibility is particularly important given that in some cases, access to data will be made by the utility with consumer consent, and in other cases, access will be granted directly from consumers. APPA noted that other options in addition to utility practices for providing data could be basic in-home energy displays and more sophisticated displays or home energy network (HAN) energy management systems. APPA noted that security and privacy protocols should be incorporated into each access option. APPA at 11; see also EEI at 24 (referencing the possibility of utility-offered HAN solutions, or solutions offered through open market); EnerNOC at 4 (discussing standard mechanisms such as password protections); NASUCA at 21-23 (discussing the benefits of HAN deployment and noting that privacy protections must take into account future developments like PHEVs and unforeseen devices); Southern at 6; UTC at 13.

Some commenters also gave examples of open market solutions. Tendril stated that its next software release will allow consumers to go to the utility website and see what data is being captured and who has access to it. Consumers can then determine what they want to have happen to that data. This approach offers choices to different people with different thresholds or trade-offs for use of their data. For example, the consumer can save money, but in order to do that, the consumer must allow the vendor to use a reasonable amount of behavioral information, such as when a person is at home and to what temperature the person's thermostat is set. Tendril, PTR at 44-45. Tendril also discussed the interactive privacy controls available on Facebook that can be adjusted over time, so that consumers were aware that they were never locked into a particular privacy setting. Tendril at 6. UTC also mentioned the On-Star program, offered by General Motors, that tracks car performance, speed, fuel consumption, location, routes, and other factors, as well as the Apple iTunes Genius Bar that reviews customer music

[86] Offering a different view, CPower stated that these data sharing practices should be left to customer stakeholder groups and relevant governmental entities in the electric industry rather than other market participants. CPower at 3.

selections and makes suggestions about other music the customer may want to purchase. Both of these allow consumers to give up some measure of privacy by sharing data with a third party in return for the resulting benefits. UTC at 3-4.

Commenters also highlighted the importance of consumer education regarding their privacy and access choices. DRSG stated that for residential customers, clear, simple and straightforward guidance was important, and that the models developed by NIST and FERC, with input from DOE, may be appropriate. See also DTE at 5 (stating that educational materials should be provided to customers, and third parties should be required to provide clear and understandable information to consumers about implications of using their services); Tendril at 6; US Telecom at 2. SCE stated that while customers should have control over access to their data, as well as the scope and duration of that access, utilities could educate consumers about the legal obligations of third parties, the importance of transacting with reputable entities, and possible means of redress for third party misuse of data. SCE at 5. In Silver Spring's view, an explanation of the benefits of disclosure should be provided to the consumer, as well as the disadvantage of opting out. Silver Spring at 6 (further clarifying that utilities should make basic information available directly to the consumer, and that third parties could provide more advanced services). Silver Spring also noted the difficulties in striking the right balance between too little and too much control over privacy choices. The company's multi-tiered, highly granular system of privacy controls was widely criticized as being too complex. DRSG clarified that for commercial and industrial customers, individual contracts would work best, with actual adoption, enforcement taking place at state or utility level.

Question 10: What security architecture provisions should be built into Smart Grid technologies to protect consumer privacy?

Commenters listed certain core requirements that should be required to protect the privacy, integrity and accessibility of energy information. Many noted that current utility cyber controls already help prevent such unauthorized access. Such controls could include data encryption and secure maintenance of encryption keys, network segmentation, the separation of operational and other data from customer data, appropriate controls on employee access to data and employee training on proper data handling, clear authorization procedures for third party access to customer data, authentication of Smart Grid devices and users, intrusion detection and prevention, physical security controls, and auditing procedures, among others. APPA at 12; Avista at 5; BG&E at 4-5; DTE at 5; EEI at 25-26; Elster at 3; Exelon at 4 (suggesting required use of the Federal Information Processing Standards for cryptography); Honeywell at 6 (highlighting the need for a direct consumer interface with the meter); Idaho Power at 7-8; NASUCA at 23 and Oncor at 7; Pepco at 7; Roundtable at 5-6; SCE at 5 (recognizing the efforts of the Advanced Security Acceleration Project for the Smart Grid and a related DOE-sponsored working group that produced AMI and absolute digital encoder ("ADE") security profiles, as well as Smart Energy Profile 2.0); SDG&E at 12-13; Silver Spring at 7 (suggesting use of a 20-year threat model); Southern at 6-7; US Telecom at 3 (suggesting that consumer energy data other than aggregate residential use should travel not over smart meter but through a consumer-chosen interface). SDGE noted that security should be commensurate with the value of the data, and SDG&E and Idaho Power also noted a division of responsibility between utility protection of data on utility assets and consumer protection of data residing in customer assets.

Other commenters stated that Smart Grid technologies can borrow security architectures used by other areas of commerce, such as online banking, internet shopping and wireless communication, which include best practices for data encryption, storage, and anonymization. CPower at 3; DRSG at 7; EnerNOC at 5; Tendril at 6. NASUCA commented that regardless of the architecture structure used, open standard protocols should be vendor neutral. NASUCA at 23. Relatedly, Cisco emphasized the importance of developing technology based on protocols like the Internet Protocol ("IP"), where multi-protocol systems can be run and newer systems are compatible with existing systems so that investment isn't stranded. Cisco, PTR at 87-88; see also Google OSTP comments at 2 (suggesting use of open platforms like the Internet to foster application development). FPL agreed, stating the need to standardize on a common communications layer based on IP so that many technologies and products can interact. FPL also stated that standards development organizations should be leveraged to define common messaging formats to enable the exchange of energy information. FPL at 7. Elster recognized that security architecture must be updated as threats change over time. Elster at 3.

EEI noted that the DOE laboratories have done considerable work on technology modeling for security architecture, and industry could benefit from having access to these resources. Integration and equipment certification at independent laboratories, as well as NIST certification, would be useful in moving forward with security architecture development. EEI at 26. As discussed in response to Question 3, a number of commenters also stated that the NIST Smart Grid standards under development could be used as a framework for determining security architecture for Smart Grid technologies. Commenters emphasized that these technologies should be developed using standards that allow for interoperability and innovation as Smart Grid technologies develop. APPA at 12; CEA at 5; CPower at 3; DRSG at 7; EEI at 26; Exelon at 3-4; FPL at 8; NRECA at 13-14; Tendril at 6; Whirlpool at 4.

Question 11: How can DOE best implement its mission and duties in the Smart Grid while respecting the jurisdiction and expertise of other Federal entities, states and localities?

A number of commenters stated that DOE should defer to state jurisdictions on data access issues, because customer privacy expectations and how they relate to Smart Grid will be considered as Smart Grid is developed within each State. Exelon at 4; Idaho Power at 8-9; UTC at 14. Southern added that while states have the primary jurisdictional role in regulating electric utilities in the provision of retail electric service, DOE should continue its work with the Smart Grid Task Force. Southern at 7. In contrast, a few commenters stated that federal programs and standards would be preferred because standards that differ by state make economies of scale, as in the sale of products nationwide, difficult. See, e.g., Whirlpool at 4. Additional comments on the merits of state versus federal standards are provided in response to Question 8.

Other commenters recognized the importance of state-federal coordination, stating that DOE could help to guide the development of Smart Grid data privacy best practices. CEA at 6; CPower at 4; DRSG at 7; Pepco at 8; SCE at 6; SDG&E at 14; Tendril at 6; Whirlpool at 4. Many of these commenters indicated that while states have important interests in utilities regulation and consumer protection, including privacy interests, it was important to have federal guidance in developing data privacy protocols to avoid multiple, inconsistent rules being applied

to Smart Grid. DTE and EEI noted that DOE should ensure that any policies it develops are in concert with existing state laws and regulations, with deference to utility policies and rate structures, to ensure that utilities can meet their obligations in providing service to their customers. DTE at 5; EEI at 27.[87]

Some commenters also believed that DOE could serve a facilitator's role, encouraging dialogue, providing forums, collecting information and providing consumer education on Smart Grid data privacy and other issues. APPA at 12; BG&E at 5 (referencing the Smart Grid Information Clearinghouse that DOE is developing with the Virginia Institute of Technology); CEA at 6; EEI at 27-28; Elster at 3; FPL at 8; Honeywell at 7; NASUCA at 23-24; NRECA at 14; NW Energy, PTR at 74; Oncor at 7; Pepco at 8; SDG&E at 14. These commenters also acknowledged the role of other Federal agencies in developing data privacy protocols, including FERC, NIST, and the FCC. Honeywell stated that DOE should provide guidance to NIST in developing standards that account for data access policies. Honeywell at 7. EnerNOC stated that DOE could help ensure consistency in the development of data privacy standards by funding only activities that conformed to NIST/FERC standards and protocols, and by supporting implementation of the FERC National Action Plan on Demand Response ("FERC NAP-DR") a main component of which are education programs to help consumers understand and accept Smart Grid. EnerNOC at 5; see also DRSG at 7; Honeywell at 7. NRECA also added that DOE should provide leadership in the Administration's cross-departmental Smart Grid subcommittee. NRECA at 14. Other commenters also added that DOE should build on the FERC-NARUC Smart Grid Collaborative, the [NERC] Smart Grid Task Force, and other efforts in creating a national dialogue and avoiding overlapping efforts. APPA at 12; CEA at 6; Tendril at 6; Verizon at 3. Oncor added that DOE could coordinate utility and State viewpoints and represent those views before other agencies and Congress. Oncor at 7.

Honeywell discussed the important of DOE's Smart Grid Investment Grant (SGIG) and Streamlining Departmental Grants Program (SDGP) grant programs, stating that because the DOE funds for these programs will significantly affect Smart Grid architectures, it is imperative that DOE evaluate future grant applications that take into account data accessibility policies and ensure that consumers have access to their data. DOE should also use data accessibility considerations to guide deployments under grants already awarded, to the extent possible. Honeywell at 7 (referencing use of the Smart Grid Information Clearinghouse). See also Pepco at 8; Southern at 7; UTC at 14.

One consumer also suggested that DOE establish an internal entity focused on the ways in which consumers use energy and what policies are necessary to ensure consumer representation as Smart Grid is developed. DRSG at 7.

[87] One commenter discussed coordination with specific governmental entities, stating that DOE should fulfill its Smart Grid mission in a manner that complements law enforcement efforts, and that standards should be developed to determine what constitutes a valid request for Smart Grid data. Neustar at 3.

Question 12: When, and through what mechanisms, should authorized agents of Federal, State, or local governments gain access to energy consumption data?

Comments on this issue focused on access to aggregate energy consumption data by Federal, State and local officials for regulatory purposes, access to individual data by law enforcement and other government officials, and other specialized questions of access.

On the issue of access to aggregate data by government officials, a number of commenters agreed that government agencies should have access to data within their respective jurisdictions in order to accomplish policy objectives. BG&E at 5; CPower at 4; DRSG at 8; Elster at 4; Oncor at 8-9; Pepco at 8; TIA at 2. DRSG added that appropriate guidelines should be established for how government agencies may aggregate and use aggregated information, where such information does not include personal information of an individual consumer. These agencies must access energy consumption data in accordance with such established policies and applicable laws. DTE at 5; EEI at 29; Exelon at 4, FPL at 9, Honeywell at 8, SCE at 7; Tendril at 6-7; Xcel at 7; Xcel Reply at 7 (also including non-profits seeking information for energy assistance or conservation purposes). NASUCA added that consumer data released to governmental agencies should remain confidential, with certain exceptions. NASUCA at 24.

On the issue of law enforcement access to data, or government access to individual consumer data, commenters indicated that authorized agents of Federal, State or local governments should be able to gain access to energy consumption data consistent with applicable law. APPA at 13; Avista at 5; EEI at 28; FPL at 9; Idaho Power at 9; NASUCA at 24; Neustar at 1, 3, 5 (stating that properly authorized law enforcement agents could use consumer energy data for legitimate law enforcement purposes, and that no data should be off limits for these purposes); Pepco at 8; SCE at 6-7; SDG&E at 15; Silver Spring at 7-8; Southern at 7; Tendril at 7; UTC at 15; Whirlpool at 4; Xcel at 6. Neustar added that energy consumption data may also be subpoenaed in civil proceedings, consistent with applicable process, and that authorities might consider whether notice to the affected consumer should be required before disclosure. Neustar at 1, 4-5; but see Xcel at 6-7 (refusing attorney subpoena, as opposed to a court order). Xcel also noted that entities administering customer-initiated requests for federal or state energy assistance programs or state public-utility approved conservation programs could access individual data with customer consent, and the customer could also ask Xcel to disclose energy to a third party, as long as the customer was acting with informed consent. Xcel Reply at 6.

Some commenters had more specific comments on this topic based on their own particular circumstances. BOMA clarified that government agents should not have access to building-specific data . BOMA at 2. The Roundtable stated that building owner consent is critical so that energy data may be placed in the proper context, meaning that relevant information such as the age of the building may be provided, and building owners have a chance to review and correct the data before it is provided to government agents. Roundtable at 6.

Question 13: What third parties, if any, should have access to energy information? How should interested third parties be able to gain access to energy consumption data, and what standards, guidelines, or practices might best assist third parties in handling and protecting this data?

Commenters stated that with consumer consent, third party vendors could collect consumer data to share with the particular consumer from whom the data was collected. APPA at 14; CEA at 6; Cleco at 2; CPower at 4; DRSG at 8; DTE, PTR at 86; EEI at 30; EnerNOC at 5-6; FPL at 9; Honeywell at 8; Idaho Power at 9; NASUCA at 24-25; Neustar at 5; NW Energy, PTR at 41, 45; Oncor at 8; Pepco at 9; Roundtable at 7 (discussing consent for the release of building-level data); SCE at 6; SDG&E at 16; Silver Spring at 8; SMUD, PTR at 28, 55-56, 67; Tendril, PTR at 21-22, 26, 33-34, 36, 43-44; Tendril at 7-8; TIA at 2; US Telecom at 1-2; UTC at 15; Verizon at 2; Whirlpool at 4; Xcel at 8; Xcel Reply at 7. APPA and EEI added that third parties should obtain consent in a transparent manner and should also disclose their policies on (or require consumer consent for) sharing data with other parties and explain how the data they collect will be used. APPA at 14; Cleco at 2; EEI at 31; FPL at 9. BOMA also noted that building owners should have access to whole building data on a monthly basis, ideally by fuel type. BOMA at 2.

Commenters noted that Smart Grid information could be used for a variety of purposes, but that the scope of the applications and software that may be developed is as of yet, however, unknown. CO OCC, PTR at 22-23; Tendril, PTR at 75. Commenters suggested a few specific third parties who could access consumer electric consumption data. These parties include those providing predictive maintenance programs to consumers to help them manage their energy use. Tendril, PTR at 75; Whirlpool, PTR at 106-107. In addition, SMUD noted that utilities will be able to segment customers much more than in the past, and there will be a bigger variety of programs to offer customers, for both utilities and third parties. SMUD, PTR at 98. In addition, energy service companies that sell smart devices, such as meters that aren't connected to the Smart Grid, should also be given access. NW Energy, PTR at 70. One commenter stated that state regulators should consider whether release to third parties should be limited to public policy purposes, such as furthering conservation of climate change mitigation goals, facilitating energy assistance, or supporting energy policy advocacy. Xcel Reply at 8.

On the issue of appropriate standards for third party access to and handling of data, Cisco noted that this issue is still an open question. For data that is moved around inside the home, there are a lot of network technologies out there, and all of them have different security systems. We are not at a point in this technology where only one of these systems is the right one. There is a lot of technology to be developed in this area, as well as different systems that may work better in different situations for different purposes. Having the data in a standardized format, and having standardized ways of exchanging information and making sure consumer consent has occurred makes a lot of sense. Beyond that, however, consumer choice should be allowed in order to foster innovation. At some point, Smart Grid technologies may spur a consumer driven market independent of third parties working with utilities, or a hybrid of both. A standard for secured transition of information from one device to another might promote such innovation, but it might be deterred or precluded if we tried to define, today, a standard with one permissible means to achieve this result. Cisco, PTR at 68-69. Honeywell noted that privacy standards and guidelines

for medical or financial information could be used as a starting point for establishing guidelines for energy information. Honeywell at 8.

NRECA stressed that because third parties may not be subject to state public utilities commissions or consumer-elected boards of directors like electric cooperatives are, third party data handling requirements and how to impose and enforce those requirements merits further discussion. NRECA at 11-12. Additional comments on third party practices for handling consumer data, including appropriate authorization and certification procedures, are discussed above in response to Question 3.

Liability.

Utilities also commented on the liability of utilities and third party vendors for the improper use of consumer Smart Grid data, stating that as the consumer agrees that data should go upstream to other vendors, those vendors should step into the shoes of the utility in terms of specificity of consent for whatever else may happen with the data, as well as for potential liability. Cleco at 2; EEI at 31; FPL at 9; NASUCA at 17-18; NW Energy, PTR at 40-41, 45; UTC at 9. NASUCA added that consumers should be informed of the appropriate avenues for redress in situations for misuse of data by utilities as well as by third parties. SMUD further noted that the liability issue can be dealt with contractually with the third party vendor. SMUD also referenced legislation is moving forward in California that would make clear that once there is a transfer of Smart Grid data from the utility to the third party, liability shifts to the third party, and California would hold the third party to the same standards as it held the utility. SMUD, PTR at 65-66. This legislation, Senate Bill 1476, was passed on September 29, 2010.

Question 14: What forms of energy information should consumers or third parties have access to?

Commenters responded that authorized third-party vendors could collect specific energy use information with the consent of consumers, for use of the consumer or third parties. Other commenters discussed third party and governmental use of aggregate data.

Many commenters agreed that consumers and authorized third parties should have access to data that pertains to their energy use. BG&E at 6; CEA at 7; CO OCC, PTR at 22-23; CPower at 5; DRSG at 9; DTE at 6; EEI at 34; Elster at 4-5; EnerNOC at 6-7; Exelon at 4; FPL at 10; Honeywell at 8-9; Idaho Power at 9; NASUCA at 26; NRECA at 14-16; Oncor at 9; Pepco at 9; Roundtable at 7 (stating that utilities should provide whole building data to building owners; see also BOMA at 2); SCE at 7; SDG&E at 16; Silver Spring at 8; Southern at 8; Tendril at 8-9; Tendril, PTR at 23, 26, 33-34; TIA at 2; US Telecom at 1-2; UTC at 16-17; Verizon at 2-3; Whirlpool at 5; Xcel at 8-9. Such data would include information generated by the meter, including electricity use by interval. Information corresponding to a customer's current bill and historical usage information are often already made available, and Smart Grid capabilities may allow for these additional types of data, including real-time demand data, pricing and source generation information, peak demand data and rebate information, demand response signals, and disconnect status. Xcel clarified that providing customers with standard usage data, those data elements provided on a customer's bill and any other information available to all customers of

the same class within that jurisdiction, was part of its traditional service. Providing customers and third parties with non-standard, individualized data is not part of this service, and any release to third parties must contain the consumer's informed consent. Xcel Reply at 8-9. CEA asserted that at this early stage, there should be no unreasonable or artificial caps placed on the amount or types of information that a consumer could request from utilities or retail energy providers. CEA at 7. EEI and UTC cautioned, however, that consumer access to raw data, as opposed to verified billing data, could undercut consumer confidence in their usage data if consumers try to estimate their own energy bills and end up with a value different than that provided on the bill by the utility. EEI at 34; UTC at 17.

Some commenters stressed that decisions about when, whether and in what manner utilities should provide consumers with this information should be made locally by States and retail regulators because of the significant cost implications. APPA at 14-15; Avista at 6; NRECA at 15-16; NASUCA at 26; Southern at 8 (noting that consumers should not have access to information not collected by the utility or not related to their energy use rates). More detailed comments on the provision of real-time data are provided below in response to Question 15.

Commenters also offered examples of the way this energy use information could be used by the consumer. Authorized, third party vendors could collect and provide consumers with information via email on inefficient air conditioners or other appliances or other ways they could save money on their energy bill. Thermostats and appliances that can react to price and load control signals to turn on and off load fairly autonomously could also help consumers lower their energy bills. Tendril, PTR at 22, 26; CO OCC, PTR at 22-23. Consumers could also be measured against their own consumption, week to week, year to year, or some other time frame. Consumers could also be measured against their own set of targets, such as a target to save $50 this month versus last month. Consumers could also be measured against a normalized version of themselves – in other words, similar households in the same area. Such information shows consumers how efficient their houses are on a sliding scale and how houses that use less energy are cutting their energy use, including where the thermostat is set, and then lets consumers decide if they want to use the same energy saving measure with a simple click. Tendril, PTR at 33-34. Smart Grid could also allow the use of predictive maintenance programs to help consumers manage their energy use. Tendril, PTR at 75; Whirlpool, PTR at 106-107. In addition, utilities will be able to segment customers much more than in the past, and there will be a bigger variety of programs to offer customers, for both utilities and third parties. SMUD, PTR at 98. Tendril emphasized that the scope of the applications and software that may be developed is as of yet unknown. Tendril, PTR at 75.

Commenters also noted that some of the means identified to help consumers save energy can be done using low-tech solutions in addition to solutions developed through Smart Grid. These include a method of allowing consumers to go online and compare their energy use to similar households in their area, or using smiley and frowning faces to denote low or high energy use in a bill insert. TechNet, PTR at 33. SMUD, PTR at 35. Though information that the consumer gets a month late in his or her energy bill could also be provided in real time, to the consumer's smart phone or via the web. Tendril, PTR at 36.

On the issue of aggregate data, FPL and EEI noted that only utilities should have access to aggregated information unless they authorize a third party to access it. FPL at 10; EEI at 33-35 (noting cybersecurity concerns). Avista, Roundtable and SCE disagreed, stating that the general public and third parties should have access to aggregated data. Avista at 6; Roundtable at 7; SCE at 6. Xcel noted that releases of even aggregate data must include appropriate security concerns. Xcel at 9; Xcel Reply at 9 (also noting cyber security concerns, as explained in the response to Question 2). In addition, as set forth in response to Question 3, some commenters noted that utilities may also enhance data for their business purposes, and only authorized third parties should have access to such data, whether aggregate or individualized. EEI at 33-34; FPL at 10; SDG&E at 3, fn 3.

Question 15: What types of personal energy information should consumers have access to in real-time, or near real-time?

Many commenters agreed that consumers should have access to their energy consumption data in real-time. Avista at 6; CEA at 7; CO OCC, PTR at 22-24; CPower at 5; DRSG at 9-10; Elster at 4; EnerNOC at 7; Google at 1; Honeywell at 9; Joint Center at 9; NASUCA at 27-28; Oncor at 9 (though noting that such data would be provided by a device that interacts with a customer's meter, rather than from a centralized data access point); Roundtable at 7; SDG&E at 16-17; Silver Spring at 8; Tendril at 9; Whirlpool, PTR at 18-19; Whirlpool at 5. Such data would include data on how much energy their air conditioners or appliances were using, in real-time so that consumers could choose to save energy, buy more efficient appliances, and lower their energy bills. Whirlpool, PTR at 18-19. Such data is particularly important if time of use pricing or critical peak pricing is used, so that consumers know when to turn down their air conditioning, heat, water heater or other appliance, and whether their appliances are inefficient and could be replaced. CO OCC, PTR at 22-24.

EEI and others asserted that the cost of real-time data may not be justified, that such data is of limited utility for most consumers, and that the real beneficiaries may be third parties who wish to pass the cost on to consumers. If policymakers decide that real-time access is needed, they should consider the beneficiaries of such access in determining who should pay for that access. EEI at 36; EEI Reply at 3. NRECA agreed that real-time data may not significantly benefit most consumers, and that issues of metering system capabilities, data quality, and cost must be considered. NRECA at 16. Unless a utility uses dynamic pricing, there may be no compelling consumer benefit from real-time energy use data. And it should not be assumed that real-time prices are needed to support home energy services. Id. at 17. *See also* BG&E at 6 (noting that utilities would likely provide day old data because of current technological limitations and the need of utility to validate data; real-time data is currently available on in-home displays.)

Other commenters agreed that provision of real-time data must be reliable and cost-effective before it is delivered to consumers. FPL at 10; Idaho Power at 9-10; Pepco at 9-10; Xcel at 9-10 (all noting that other alternatives, such as devices that can interact with existing meters, should also be considered); UTC at 17-18. APPA stated that whether the utility provides the data in real time may depend on its business plan. Provision of real-time data may be cost-effective to support time-differentiated rates and demand response rates. In some cases, however, the utility

may need to provide consumers data only on a daily or weekly basis to achieve the utility's peak shaving goals, but in those cases consumers could partner with a third party to get real time data. APPA at 15-16. See also SCE at 7 and Southern at 8. Similar to comments made above in response to Question 15, Xcel distinguished between raw data and processed, enhanced usage information. The former was relatively easy to provide, while making the latter available would require an evaluation of the accompanying costs. Xcel Reply at 10 (also noting that other devices like hand-held power meters might offer an affordable approach).

Commenters also discussed real-time data other than usage data that should be make available to consumers. Some stated that price information should be communicated to consumers, though some indicated that day-ahead forecasts would suffice. EEI at 35; Elster at 4; NASUCA at 27-28; SDG&E at 17; Silver Spring at 8; SCE at 7 (while noting that tariff structures may distort price information). Silver Spring stated that consumers are more likely to want to know when to avoid high energy prices than how much energy they are consuming at a given time. Tendril stated that real-time generation source information (including emissions profiles) and demand response event notification should also be provided in real-time. Tendril at 9. DTE noted that pilot projects underway, including DTE's SmartCurrents project and the Pacific Northwest SmartGrid Pilot, could provide information about the types of energy information consumers want, and also the costs of providing that information. Such pilot programs will also help identify the feasibility, costs, and security requirements associated with providing real-time or near real-time data to consumers. DTE at 6.

Third party vendors could also provide those consumers who have opted in with information about how to save money, based on the specific information collected by the vendors. Tendril, PTR at 22. In addition, if the consumer wants to lower energy bills or become greener or be more energy efficient than the neighbors, thermostats and appliances that can react to price and load control signals to turn on and off load fairly autonomously are important, because the consumer is not always going t be present to manage these things. Consumers can set up a rule that says if the price of electricity goes above X, change my thermostat to Y. If consumers have to do this manually every time, they won't interact with the system. Tendril, PTR at 26-28. Utilities could also interact with consumers who have opted-in, to do demand response and load leveling. Whirlpool, PTR at 46-47. See also SMUD, PTR at 39 (referencing third party programs and the utility as the honest broker between third-parties and consumers).

The UTC noted that while giving consumers the data to optimize their own use is important, utilities also need this data to help the customer optimize the grid for everyone. For example, if two electric cars are plugged in, the charge to each would alternate. Such optimization will avoid the need for new infrastructure and the costs associated with it that all consumers will bear. UTC, PTR at 77-78. In response, Tendril commented (and the UTC agreed) that such behavior should be the consumer's choice, and there should be a clear and tangible consumer benefit. Incentive structures are needed to encourage behavior that benefits the utility and grid reliability, such as trade-offs between charging the car and cooling the house. Tendril, PTR at 79-80.

Question 16: What steps have the states taken to implement Smart Grid privacy, data collection, and third party use of information policies?

According to commenters, a number of states have begun to implement Smart Grid data privacy, collection, and third party use policies. The legislatures of California and Texas, for example, have begun to address these issues through laws with which utilities must comply. APPA at 10, 16; Pepco at 10.

More specifically, legislation is moving forward in California that would shift liability to the third party vendor once there is a transfer of Smart Grid data from the utility to the third party. The third party would be held to the same standards as it held the utility. SMUD, PTR at 65-66. (This legislation, Senate Bill 1476, was passed on September 29, 2010.) The California Public Utilities Commission ("CPUC") has also drafted its "Order Instituting Rulemaking to Consider Smart Grid Technologies Pursuant to Federal Legislation and on the Commission's own Motion to Actively Guide Policy in California's Development of a Smart Grid System". CPower at 5; DRSG at 10; Tendril at 9; SCE at 8-9; SDG&E at 17-18 (noting that the CPUC explicitly required investor-owned utilities to provide authorized third parties with access to a customer's real-time or near real-time usage information no later than the end of 2011). Where advanced metering is involved, Texas requires utilities to use industry standards in providing secure access to customer data, as well as to provide customers with ready access to their energy use data. NASUCA at 30; Pepco at 14-15 (also discussing other Smart Grid efforts in California, Colorado and Maine). Colorado has begun a proceeding to investigate security and privacy concerns in the deployment of Smart Grid, Docket 091-593EG "In the matter of the investigation of security and privacy concerns regarding the deployment of smart-grid technology." CPower at 5; DRSG at 10; Tendril at 9. In Michigan, the Michigan Public Service Commission ("MPSC") is creating a collaborative project to discuss issues of privacy, data collection and third party data usage. DTE at 4, 6. Policies and practices implemented by the State of Florida preclude utilities from releasing customer-specific data to a third party without customer consent, except as otherwise provided by Florida or Federal law, or in response to a subpoena. FPL at 11.The Louisiana Public Service Commission also issued a General Order implementing its "Rule for Approval and Cost Recover for Advanced Metering Systems and Demand Response Programs", which contains provisions on the release of consumer data. Cleco at 1, 3.

States are also using more generally applicable laws to address data privacy issues associated with the Smart Grid. For example, states such as California, Pennsylvania and Texas have required consumer consent before utilities can release consumer information to a third party even in the absence of Smart Grid specific legislation. Texas and California also specifically prohibit the sale of customer specific data. NASUCA at 29-30; Oncor at 10-11, Pepco at 11-13 (discussing release of information requirements in the District of Columbia, Maryland, New Jersey, and Delaware); SCE at 8; SDG&E at 17. The District of Columbia limits the use of customer information to the use for which the information was originally acquired unless the customer consents in writing. Id. MPSC rules governing electric and gas utilities generally, as well as Michigan's identity theft protection Act and Social Security Number Privacy Act would also be relevant in the Smart Grid context. DTE at 4, 6. States have also implemented consumer protections against unfair and deceptive practices and privacy protections for customer data in other contexts. Anti-hacking statutes prohibit unauthorized access to computers, including smart

meters. Security breach notification laws that require notification of unauthorized access to personally identifiable information have also been enacted in 45 states, the District of Columbia, Puerto Rico and the U.S. Virgin Islands. EEI at 36-37; Pepco at 11. Southern also commented that the existing regulatory framework is likely appropriate to develop protections for customer data generated through Smart Grid and AMI deployment. Southern at 9.

Neustar noted that states don't appear to have addressed significantly the potential Smart Grid data needs of law enforcement, and that to address this issue, states could look to federal statutes governing privacy of communications data (i.e., the Stored Communications Act). Neustar at 3.

Question 17: What steps have investor owned electric utilities, municipalities, public power entities, and electric cooperatives taken to implement Smart Grid privacy, data collection and third party use of information policies?

A number of commenters indicated that utilities have a long history of protecting customer privacy and have developed, or are working to develop, Smart Grid data privacy policies. APPA at 6; Avista at 4-5; BG&E at 6; DTE at 6-7; EEI at 37-38; EEI Reply at 7-8; FPL at 11 (noting that FPL's current policies to protect customer data and provide for third party access will continue to be used for data generated through the Smart Grid); Idaho Power at 10 and Southern at 9 (also noting that current policies protect customer specific energy data, but acknowledging that these policies may be updated as Smart Grid evolves); NRECA at 17-18; SCE at 8-9; Xcel at 10; Xcel Reply at 10. DTE explained further that utilities are looking at their privacy policies, doing internal assessments, and looking at benchmarking. DTE also noted that as we move into the future of Smart Grid, utilities are determining how their data privacy and confidentiality policies need to change for the new information that would be collected through the Smart Grid. There are no hard and fast rules currently on privacy, and utilities are taking this issue very seriously. DTE Energy, PTR at 86. DTE Energy also noted that it has worked closely with EEI in drafting guidelines on consumer data access and policy, and that many utilities and others are involved in that process. DTE Energy, PTR at 86. Xcel emphasized that its Director of Data Privacy and Customer Data Taskforce monitor and address emerging concerns, and that Xcel will continue to update its policies to reflect evolving customer needs and regulatory requirements. Xcel ultimately intends to file a tariff outlining customer data protections and third party access limitations. Xcel Reply at 10. APPA also noted many that utilities are participating in the NIST and NERC processes to develop Smart Grid data privacy policies, which are discussed above in more detail in response to Question 3.

In addition to the development of data-privacy plans and policies, utilities are taking other steps to protect customer data. These steps could include use of the utility's own proprietary fiber installation to reduce the risk of unauthorized breaches or contracting for wireless networks that use secure transfer protocols. APPA at 16-17; Oncor at 11 (referencing Oncor's secure data provisioning process); SCE at 9 (noting that SCE designed its AMI to include security architectures to safeguard consumer information). Utilities are also implementing pilot projects that include data security elements. Con-Edison has developed a demonstration project involving 1500 customers, 1200 of whom will have web service applications to display energy usage, and 300 of whom will have a Home Area Network (HAN) installed by one of three vendors. As part of this project, Con-Edison is reviewing security measures of each HAN

provider to protect the privacy of energy usage information, and requiring that all vendors have SAS70 certification. Non-disclosure agreements and other contractual safeguards are also in place, and meter usage information is shared with these vendors through a secure file transfer protocol ("FTP"). EEI at 38-39. NW Energy is also engaged in a demonstration project, the Pacific Northwest Smart Grid Pilot, which focuses on distribution infrastructure to enable applications and on investment in technology areas that won't become stranded. NW Energy, PTR at 36-37, 101. In an overview of the pilot, NW Energy indicated that it would promote interoperability and cyber security. NW Energy Pilot Overview Presentation at 7. Many utilities noted that they are also engaged in consumer education efforts concerning data privacy. APPA at 16-17; NRECA at 18-19; SCE at 9, Xcel at 10.

Question 18: Should DOE consider consumer data accessibility policies when evaluating future Smart Grid grant applications?

Commenters who addressed this issue were split on whether DOE should consider consumer data accessibility policies when evaluating future Smart Grid applications.

Many commenters believed that it was important for DOE to consider data-accessibility policies when evaluating future Smart Grid grant applications. APPA at 7; Avista at 7; BG&E at 6; CEA at 7; CPower at 5; DRSG at 11; DTE at 7; Elster at 5 (noting that DOE review of applications already contains a number of assessments, including of cybersecurity); EnerNOC at 8; Honeywell at 10; Idaho Power at 10; NASUCA at 31; NRECA at 19; Pepco at 16; Roundtable at 8; SCE at 10 and Southern at 9 (both noting that DOE should give appropriate consideration to existing state requirements); SDG&E at 20; Tendril at 10; Whirlpool at 6; Xcel at 11; Xcel Reply at 10-11. These commenters stated that it is important to consider data accessibility and privacy protection at the forefront of Smart Grid development. DOE has an interest in maintaining consumer privacy as well as data access and can significantly advance issues of consumer information privacy by making those issues an important part of grant applications. Such considerations should also be central to a review of applications because of the importance of the consumer's right to individual data and the right of certain entities, such as governmental entities and utilities, to aggregate data generated through the Smart Grid. APPA clarified, however, that DOE should not require specific data accessibility provisions but should instead evaluate whether the applicant's policies are suitable. Tendril noted that it was important to develop consistent criteria for the evaluation of accessibility and privacy policies in applications. And in contrast to NRECA, Idaho Power stated that DOE should give preference to applications that demonstrate appropriate consideration and protection of customer privacy and individual energy consumption data.

A number of other commenters believed that DOE should not consider data-accessibility policies when evaluating Smart Grid applications. EEI at 39; Exelon at 5; FPL at 11; NRECA at 19. These commenters indicated that because Smart Grid technologies are still evolving, consideration of data-access policies would be premature and cause needless delay in the consideration of applications and the development of Smart Grid. State privacy policies are also already in place to protect consumers. NRECA further stated that applications for Smart Grid projects that do not address data accessibility should not receive a lower preference for funding if they do not reach the end consumer. Applications for projects to develop consumer-end

technologies that do include consumer data access policies should also not be given a higher preference.

One commenter took a middle-ground approach, arguing that data access policies should be considered only to the extent required by applicable Federal and State law, unless the grant relates to consumer use of data as part of a research and development project. Oncor at 11.

GLOSSARY

Advanced Metering Infrastructure (AMI): Refers to systems that measure, collect and analyze energy usage and interact with advanced devices such as electricity or gas meters, through various communication media either on request (on-demand) or on pre-defined schedules. AMI differs from traditional Automatic Meter Reading (AMR) in that it enables two-way communications with the meter.

Customer-specific usage data (CEUD): Includes all data specific to an individual customer's energy use, including at a minimum individual energy use by time interval.

Customer proprietary network information (CPNI): Information that telecommunications services such as local, long distance, and wireless telephone companies acquire about their subscribers, including services used and the amount and type of usage.

File transfer protocol (FTP): A standard network protocol used to copy a file from one host to another over the Internet or a similar network. FTP utilizes user-based password authentication or anonymous user access.

Home Area Network (HAN): A residential local area network used for communication between digital devices typically deployed in the home, usually a small number of personal computers and accessories, such as printers and mobile computing devices.

LEED certification: LEED stands for Leadership in Energy and Environmental Design and is an internationally-recognized green building certification system. LEED certification is intended to demonstrate that a building or community was designed and built using strategies intended to improve performance in energy savings, water efficiency, carbon dioxide emissions reduction, and other similar metrics.

Machine-readable format: Format of presenting data that can be read by a computer.

Operational data: Includes data related to the operation of electric utility systems that is not customer-specific, but includes aggregated customer energy usage data.

Personally identifiable data (PII): Includes at least utility customers' names and any personal identifiers such as social security numbers, home addresses (including both service addresses and mailing addresses if these differ), telephone numbers, and payment history or any credit card or bank account numbers provided to the utility.

Privacy Impact Assessment (PIA): Assessment required by the E-Government Act of 2002, Public Law 107-347, before an agency develops or procures information technology that collects, maintains, or disseminates information in an identifiable form or initiates a new collection of information that will be collected, maintained, or disseminated using information technology and includes any information in an identifiable form permitting the physical or online

contacting of a specific individual. PIAs must address: what information is to be collected; why the information is being collected; the intended use of the agency of the information; with whom the information will be shared; what notice or opportunities for consent would be provided to individuals regarding what information is collected and how that information is shared; how the information will be secured; and whether a system of records is being created under section 552a of title 5, United States Code (commonly referred to as the "Privacy Act").

Raw data: Energy usage data that is not formatted or processed.

LIST OF ACRONYMS

AICPA: American Institute of CPAs (Certified Public Accountants)
APEC: Asia-Pacific Economic Cooperation
APPA: American Public Power Association
BOMA: Building Owners and Managers Association
CEA: Consumer Electronics Association
CO OCC: Office of Consumer Council, Colorado Department of Regulatory Agencies
DHS: Department of Homeland Security
DOE: Department of Energy
DRSG: Demand Response Smart Grid Coalition
EEI: Edison Electric Institute
FCC: Federal Communications Commission
FERC NAP-DR: Federal Energy Regulatory Commission National Action Plan on Demand Response
FIPPs: Fair Information Practice Principles
FPL: Florida Power and Light
FTC: Federal Trade Commission
GAPP: Generally Accepted Privacy Principles
HUD: Department of Housing and Urban Development
NARUC: National Association of Regulatory Commissioners
NASUCA: National Association of State Utility Consumer Advocates
NERC: North American Electric Reliability Corporation
NIST: National Institute of Standards and Technology
NRECA: National Rural Electric Cooperative Association
OECD: Organization of Economic Co-operation and Development
PUC: Public Utilities Commission
PTR: Data Privacy Public Meeting Transcript
RFI: Request for Information
SCE: Southern California Edison
SDG&E: San Diego Gas & Electric
SDGP: Streamlining Departmental Grants Program, DOE Program
SGIG: Smart Grid Investment Grant. DOE Program
SGIP-CSWG: Smart Grid Interoperability Panel Cyber Security Working Group
SMUD: Sacramento Municipal Utility District
TIA: Telecommunications Industry Association
UTC: Utilities Telecom Council