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COMMENTS OF TENDRIL NETWORKS, INC.

Docket No. 09I-593EG

*In the matter of the investigation of security and privacy concerns
regarding the deployment of smart-grid technology*

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Tendril Networks is pleased to provide these comments to the Colorado Public Utility Commission in response to the current investigation in Docket Number 09I-593EG. We applaud the Commission's proactive investigation into the important questions surrounding smart grid implementation and privacy that have implications for Colorado and the nation.

Tendril Networks develops solutions that enable smart energy options for today and tomorrow. Tendril's technology, products and services establish a rich, often automatic and invisible dialogue, between consumers their energy providers. The Tendril Residential Energy Ecosystem (TREE) is an open, extensible and standards-based energy management system that connects and manages "smart" consumer devices (such as thermostats and outlets), emerging "smart" appliances (such as refrigerators, washers and dryers) and an exciting new generation of "smart" consumer products including plug-in electric vehicles, smart televisions and smart phones.

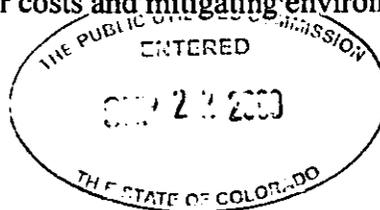
As a result, the TREE solution enables smart energy options for utility consumers. It enables the possibility to understand and to manage – even automatically, but at consumer discretion and control – the energy within their home. The solution also enables utilities and system operators the ability to manage disparate home energy loads as a dynamic resource that can be deployed to implement smart grid functions such as demand response and peak load reduction.

General Remarks on National Policy

Development of a "smart grid" has forcefully emerged as a national priority. Tendril offers a standards-based, secure platform that maximizes consumer discretion and consumer choice. The platform directly engages residential customers, the customer class described in the June 2009 FERC National Assessment of Demand Response Potential as representing "the most untapped potential for demand response." In March 2009, the Federal Energy Regulatory Commission issued a proposed policy statement and action plan that noted, "Ultimately, the Smart Grid will facilitate consumer transactions and allow customers to better manage their energy costs."

The Energy Independence and Security Act of 2007 established that, "It is the policy of the United States to support the modernization of the Nation's electricity transmission and distribution system to maintain a reliable and secure electricity infrastructure that can meet future demand growth..." This national policy includes, "provision to consumers of timely information and control options." This policy of smart grid development was reinforced through funding provisions of the American Recovery and Reinvestment Act of 2009.

We believe that providing information tools to the consumer is consistent with national policy. Improving system efficiencies, reducing consumer costs and mitigating environmental impacts



all depend upon the provision of detailed energy usage information directly to the consumer. Open, non-proprietary consumer access to usage information is a guiding principle for development of policies governing smart grid technologies. We also believe that such access will accelerate technology innovation and help the consumer realize additional benefits. Moreover, providing consumers with greater transparency and control over how their information is used in the smart grid environment will build consumer trust and confidence in this developing technology. Such increased consumer trust will in turn promote public adoption and acceptance of smart grid systems and solutions, which are not ends in themselves but means to achieve policy objectives of clean energy, reliable and secure energy infrastructure, and market-based options for the consumer.

General Remarks on Privacy Concerns

At the same time that the smart grid is emerging as a national economic and environmental priority, it is recognized that the detailed information required for and generated by the many smart grid technologies and applications will allow far more raw and granular data regarding individual and aggregate energy usage across populations. Such a change raises obvious and non-trivial privacy concerns that we discuss in more detail in these comments.

In balancing these concerns, regulators and policy makers are tasked with the question of how to make the grid both “smart” and “wise.”

It is precisely the availability of data that underpins all robust analysis. Thus, perspectives regarding both individual and aggregate energy consumption and generation patterns that enable the grid to become “smarter” depend upon these fundamental inputs. Such data is required for achieving national and regional goals such as energy efficiency, peak load reduction, integration of intermittent renewable resources and distributed resources such as electric vehicles.

While detailed information will enable public policy goals and system operations, this new information raises many concerns regarding individual privacy and consumer protection. Tendril believes that addressing these privacy concerns early on will increase consumer trust of these new technologies. This trust is an essential component of engaging consumers in the successful transformation of the nation’s electricity systems.

As noted in the materials accompanying this proceeding, we agree that information control regimes that centralize smart grid information disclosures will likely hamper innovation. Rather, the individual consumer must be the origin of control with regard to the use and disclosure of their personal information. While utilities can achieve greater system efficiencies in matching the supply and demand of energy with more data about consumption, this does not imply consent on the part of the citizen for other secondary uses (marketing, for example). Nor does this access to detailed information imply that the utility is the sole arbiter of information use and disclosure. Ultimately, consumers must be empowered to have access to their information and to determine what personal information they share and with whom.

Data Access Rights and Responsibilities

The question of ownership of personal data is common in discussions about privacy and consumer protection. However, this focus on concepts of "ownership" may inadvertently create unnecessary limitations in discourse where either the customer "owns" the information or the utility "owns" it. These rights are then perceived to be mutually exclusive. In practice, it may be more accurate and perhaps more constructive to consider overlapping rights (and accompanying responsibilities and duties) with regard to access to personal information.

For example, the utility requires access to information necessary for billing and systems operation. Accompanying this right of access is the duty to protect the information from theft or unwarranted disclosure. The customer also has the reasonable expectation that this information will be used for the intended primary purposes of utility operations and will not be used for secondary purposes without customer choice.

The consumer also has a right to access information about their individual energy usage. The policy established by the Public Utilities Commission of Texas illustrates a potential model to govern the provision of timely and actionable information directly to the consumer. At their discretion, consumers may elect to share this information directly with energy service providers or other businesses. Those businesses would be bound by similar responsibilities to protect the information and use it in accordance with the consent granted by the consumer. The Pennsylvania Public Utility Commission issued a similar policy in June 2009 establishing the fundamental right of consumers to have direct access to their usage information.

Several public policy objectives may also require disclosure of information beyond individual energy usage. For example, integration of renewable energy resources and reduction of peak load are accelerated by disclosure of real-time system information to consumers. We encourage the Commission to consider whether smart grid technologies can be leveraged to accomplish other public policy goals. For example, should consumers be provided with real-time access to information about the carbon content of the energy being delivered to them? Might consumers use that information to modify their behavior to reduce their carbon footprint?

Commission Questions

In response to the specific questions posed by the Commission in the Order dated August 12, 2009, we offer the following comments:

1. *What concerns surrounding the collection and analysis of detailed electricity usage information should the Commission consider as it establishes policies governing access to and use of this information?*

For the smart grid to realize its full potential, consumers must trust that their information will be used in a manner consistent with their expectations. By earning consumer trust in how their information is used consumers will be more likely to adopt and support smart grid technology. Accordingly, we respectfully encourage the Commission, in assessing concerns about the collection and analysis of detailed electricity usage information, to consider privacy issues that impact consumer trust. In considering such privacy issues we suggest consultation of the following fair information practice principles that have

been widely accepted and adopted by government agencies and industries in the U.S. and globally.

Access. Access is a core fair information practice principle and one that is key to successful smart grid deployment. Access refers to an individual's ability both to access data about him or herself and to take action to ensure the accuracy and completeness of that data. Accordingly, smart grid policies should promote consumer access to detailed and actionable information about their energy usage and conditions affecting the electric system. In 2008, the Public Utilities Commission of Texas put forward a policy on advanced metering and home area network (HAN) data. In particular, we note that under this policy an advanced metering infrastructure (AMI) must provide consumers with direct, real-time access to electricity usage data, that data must be stored on the meter in a form that complies with nationally-recognized non-proprietary standards, and that AMI must be capable of communicating with other devices on the premises, such as monitoring devices, load control devices, and prepayment systems. Further, the Texas legislature established that consumers shall not be required to pay an additional fee or have to obtain special permission to view their data.

These recommendations are summarized (with supporting references) in the “Public Utility Commission Report to the Legislature on Advanced Metering (September 2008.)” This report is accessible from:

http://www.puc.state.tx.us/electric/projects/34610/Commission_Report_on_Advanced_Metering_2008.pdf

Similarly, the Pennsylvania Public Utility Commission established a policy in June 2009 regarding Smart Meter Procurement and Installation (Docket No. M-2009-2092655) in which they directed that “all covered EDCs [electric distribution companies] must provide at least the following access to their smart meters and data:

1. Non-discriminatory access for retail electric suppliers and third parties, such as EGSs [electric generation supplier], and conservation and load management service providers;
2. Open, non-proprietary two-way access for electric suppliers and third parties, such as EGSs, and conservation and load management service providers; and
3. Full electronic access to customers and their representatives to meter data upon customer consent.

These policies illustrate potential models whereby consumers have direct access to usage information in a manner that enables them to take action. Further, they can ensure the integrity and accuracy of their information and engage service providers to use information for purposes benefiting the consumer.

Notice. Another core principle to consider is “notice.” Consumers expect to be given notice about who is collecting their information, what information is collected about

them, what their information is used for and with whom it may be shared. With notice, consumers are empowered to make informed decisions about the use and disclosure of their personal information. In considering forms of notice, flexibility should be permitted to allow industry to employ means that do not unduly burden the consumer experience while providing a level of conspicuousness appropriate to the sensitivity of the consumer data.

Choice. The ability to make informed decisions compels “choice” to be another core tenet of the fair information practice principles. Choice in the privacy context means giving consumers options as to how their personal information may be used. Where information is used beyond what is necessary to provide services or it is provided to an entity other than the one that initially and dutifully collected the information, consumers expect to be given option to choose whether to allow such uses and disclosures.

Security. Another widely accepted principle is data security. Data controllers must be encouraged to take reasonable steps to safeguard data from loss and unauthorized access, destruction, use or disclosure. Such safeguards, however, should not be so overly stringent that consumers have unnecessary hurdles to accessing their own data. Moreover, we respectfully suggest that rather than develop regional smart grid data security standards that the Commission instead refer to NIST to develop security standards that will apply nationally to the energy sector. Regional development of security guidelines separate from NIST is likely to result in a patchwork of laws that potentially conflict and create potentially burdensome compliance obligations for industry.

Enforcement. Enforcement is the final core principle of privacy protection. To ensure that fair information practice principles are followed there must be a robust mechanism to enforce them. Alternative enforcement approaches should be considered, including industry self-regulation, legislation and regulatory schemes. Before considering supplementing existing regulations, laws and best practices regarding consumer privacy protections, such additions should be evaluated cautiously so as not to stifle the public benefits smart grid technology might offer in the first place.

2. *What, if any, are the trade-offs between protecting privacy and promoting innovation with regards to smart grid technology?*

We believe that protecting privacy and promoting innovation need not be mutually exclusive propositions. We believe that both innovation and privacy goals can be advanced simultaneously. Privacy concerns can be addressed in a manner that protects consumers but does not unduly hamper industry or stifle innovation. However, we observe that the pace of technology innovation (with its associated benefits) is likely outpacing the evolution of privacy norms.

With regard to privacy, the development of a smart grid infrastructure from traditional electrical systems resembles the development of social networking and “Web 2.0” business models out of former, less interactive Internet platforms. The evolution of Internet applications followed a path from the one-way provision of information to a two-way “conversation,” with consumers deriving benefits by actively providing user-

generated content rather than merely acting as passive recipients of information. Previously, individuals viewed generally static content delivered by others. Under Web 2.0, for example, individuals have become much more actively engaged by posting their own content in forms such as YouTube videos, blog journals, and Facebook postings in which they interact and collaborate with others. With the rapid development of Web 2.0 applications, online services have increasingly encouraged users to place more of their information in the hands of others and to be publicly displayed. As a result, new privacy issues and incidents have arisen for which social networking services have not always been fully prepared. These incidents have resulted in demand by regulators and consumers for more control over how private information is used. By responding to these privacy concerns, social networking services have been able to gain trust by giving users more control over their information and profiles. By building this trust, many believe consumers have become more comfortable in using and engaging with these services and the technology has, in turn, resulted in greater success of these platforms in advancing consumer-driven innovations.

Similarly, as smart grid systems and services evolve we foresee a corresponding increase in collaboration and engagement opportunities for consumers to share more information with a broader range of entities. Information will no longer flow one-way from the consumer to the utilities. Instead, utilities and consumers will be engaged in a dialogue involving consumers demanding a flow of information to themselves and to service providers with whom they engage. As with the Web 2.0 example, such interactions will likely lead to increased privacy issues and concerns in an industry that, by and large, has not yet faced these “behind-the-meter” privacy issues.

Recognizing these similarities between the Web 2.0 evolution and smart grid, there may be relevant lessons from the online environment that can guide the electric industry to proactively address privacy concerns as the smart grid evolves. By recognizing these privacy concerns early, the smart grid industry will be in an even better position to address privacy concerns and thereby earn consumer trust. This increased trust will only serve to further consumer adoption of smart grid technologies, which will in turn spawn greater innovation in this area.

3. *Should detailed electricity usage information be protected? If so, how?*

Detailed electricity usage information is private information of the consumer and should be protected accordingly. Electricity usage information can reveal data about what time of day a consumer is home, what types of appliances the consumer owns and other information that many consumers would not necessarily wish to have revealed without appropriate protections. Accordingly, this sort of consumer information is deserving of reasonable protections. Such protections should be developed with reference to the fair information practice principles described in response to Question 1.

4. *How do constitutional or statutory protections impact the use of consumers' detailed electricity usage information collected as part of smart grid initiatives? What protections should be put in place even if not covered by constitutional or statutory provisions?*

As stated in other areas of these comments, we believe that engaging consumers requires their access to and control over their individual detailed electricity usage data. Consumer

rights to possession of this information should be considered in light of the potential impact on constitutional rights that can arise when consumer information resides in the hands of a third party. Scholars have argued that constitutional protections preventing the disclosure of consumers' detailed electricity usage contained in third-party business records are limited. In contrast, information in the control and possession of the consumer rather than a third party is believed to be afforded greater protection from government searches and seizures. These potential limits on constitutional protections should also be taken into account as another factor weighing in favor of allowing consumers greater access and control of their information.

As discussed in our response to Question 1, we suggest that the policies of the Public Utilities Commission of Texas and the Pennsylvania Public Utility Commission that give consumers control to share their information directly with energy service providers or other businesses may offer useful models that give consumers control over the use and disclosure of private information.

5. *What are the necessary components of effective privacy regulation of consumer electricity usage patterns? For example, should disclosure of consumer information to third parties be on an opt-in or an opt-out basis, or should the consent-requirement depend on the nature of the party receiving the information?*

As described in response to Question 1, we believe that widely accepted fair information practice principles provide a useful inventory for the components of effective privacy regulation of consumer electricity usage patterns. Specifically regarding disclosure, we believe that the overriding principle that should guide discussions in this area is the expectation that consumers will be the ultimate locus of disclosure consent. Consumers expect to be enabled to share their information with any third party at their discretion. Consumers expect to be protected from entities sharing information with other independent third parties without some degree of notice and consent. The nature of the consent requirement (i.e., whether it is opt-in or opt-out) should depend largely on the nature of the data rather than the nature of the party receiving the information. The more sensitive the data is, the greater the consent requirement should be. For example, sensitive data such as a financial account number typically warrants affirmative opt-in to sharing. In contrast, aggregated data may warrant simple and clear notification. The nature of the party receiving the information is less relevant. Sharing with third-party agents should be permitted, however, so long as those agents agree (1) not to use the data for their own purposes or purposes beyond the scope of their service, and (2) to appropriately safeguard consumer information. Furthermore, consideration should be given to the possible need for entities to share information with government agencies or upon receipt of a subpoena or court order.

6. *How much information about consumer electricity usage do electric utilities and "edge service providers" require to facilitate more efficient network management, load forecasting, asset management, bill control, demand-side load management, efficiency consulting, energy savings contracting, etc.?*

Consumers – whether automatically or manually – must have access to near real-time information within their premises in order to execute the most effective and the most actionable energy management strategies. This information should be provided through standards-based systems. An example of such a standard is the ZigBee Smart Energy Profile. As noted earlier, we believe that the policy of the Texas PUC and the Pennsylvania PUC establish useful model protocols for consumer data access.

To be useful as a smart energy enabler, this information must be provided in near real time. Data provided with a delay of hours or days (as is commonly proposed by through Internet portals) cannot be used to implement control strategies within the home. In this context, it is important to distinguish between information that has been validated and authenticated for billing purposes, information that contains pricing signals for demand response and “pulse data” that provide consumers with raw feedback on current usage.

Additionally, electric utilities and “edge service providers” who provide energy-related services should be encouraged to minimize the amount of data they collect to only the information they need and to limit the length of time they keep data to what is necessary to provide services and in furtherance of legitimate business purposes.

7. *How do privacy regulations affect electric utilities and “edge service providers” in their efforts to provide enhanced electricity management services?*

As noted earlier, privacy considerations are a critical concern to the development of an “edge service provider” marketplace. Consumer information must be protected through the adherence to existing regulations, laws and best practices. At the same time, overly burdensome or restrictive regulation will hamper innovation in the smart grid industry and deprive consumers of the benefits of technology innovation. We believe that the appropriate strategy to address this balance is by ensuring that consumers are the locus of disclosure consent.

8. *Who “owns” customer information?*

With regard to privacy and consumer data, we believe that it may be best to consider the application of certain “uses” and “rights of access” (with attendant responsibilities and obligations) rather than ownership. In our opinion, “ownership” implies mutual exclusion of access and use that does not reflect real-world situations. (For example, either the consumer or the utility “owns” the information, but not both.)

In the case of gross energy consumption at the meter level, it is clear that both the utility and the consumer have certain rights of access that are not mutually exclusive. The utility requires access to metering and usage information in order to perform basic functions related to the generation and delivery of energy (billing, reliability, system operations, etc.). This right of access carries obligations to protect that confidential data from inappropriate disclosure or uses that are not related to the primary operation of the electric system. In this respect, utilities are custodians of information and have obligations to treat that information confidentially, responsibly and in accordance with consumer expectations.

Similarly, the consumer requires access to usage information in real time in order to manage their home energy usage and contribute to smart grid functions. Consumers also have rights to control disclosure of information for secondary uses. In light of the fair information practice principles referenced earlier, consumers should be given choice regarding use their information for secondary purposes and regarding disclosure of their information to third parties.

Smart grid technology and applications raise new questions with regard to the new level of detailed information generated by advanced metering technology. In this regard, we believe that the meter provides a useful demarcation point between where the utility has a right to access and where the consumer has a reasonable expectation of privacy.

For example, the data stream available from real-time metering information can be used to identify individual appliances and occupancy patterns of individual consumers. The ability of the utility or any third party to access or use this information does not establish a right to use this information absent consumer choice.

9. *What should be a utility's obligation to "unbundle" metering in homes and businesses?*

We believe that in order to deliver value to consumers and foster innovation, energy usage information must be freely and reasonably accessible to consumers. In our opinion, this means that consumers have the right to their energy usage information in near real-time, on their premises and without any burdensome requirements or costs. We believe that this access to information is entirely consistent with the Federal policy as promulgated in EISA that calls for the, "provision to consumers of timely information and control options." (The inclusion of "control options" in this policy suggests that information must be delivered in near real time.)

As noted earlier, both the Public Utility Commission of Texas and Pennsylvania PUC have issued policies on advanced metering and home area network (HAN) data. In particular, we highlight these policy's emphasis on delivering and storing information "in a form that complies with nationally-recognized non-proprietary standards" and that AMI "must be capable of communicating with other devices on the premises."

We recognize that "unbundling" energy usage information available from the meter raises certain questions with regard to how consumers will be protected from the proper use of that information by service providers. We agree (as noted in the materials accompanying this proceeding) that information control regimes that centralize smart grid information disclosure may limit innovation in energy services available to the consumer. Therefore, we believe that the consumer should be enabled to engage service providers at their discretion in order to implement home energy management solutions.

Tendril appreciates the opportunity to submit these comments and address the important issues surrounding smart grid implementation. We recognize that this is only the beginning of a conversation in Colorado and with relevance nationwide as smart grid technologies enter the market. We appreciate the Commission's dedication to a thoughtful dialogue and look forward to participating in further discussions as these complex issues are explored in more detail.