Written Testimony of

ADRIAN TUCK
Chief Executive Officer
Tendril Networks, Inc.

"Improving Energy Efficiency Through Technology and Communications Innovation"
Senate Committee on Commerce, Science and Transportation, Subcommittee on Communications, Technology and the Internet

February 23, 2010

Introduction

Good morning, my name is Adrian Tuck, and I am the CEO of a smart grid technology startup based in Boulder, Colorado, called Tendril Networks. As a newly minted American citizen, it is an honor to be asked to participate, in however small a way, in the development of federal policy. I wanted to thank Chairman Kerry, Ranking Member Ensign, and the Members of the Subcommittee for allowing me to testify this morning.

Tendril's sole reason for being is to provide the devices and software that allow consumers and utilities to better manage their energy consumption. Our platform works by linking residential customers with their utilities, and we do so by enabling the utilities to provide their consumers with simple-to-use devices such as smart thermostats and home energy monitors that allow consumers to manage their energy use. Numerous studies confirm that this kind of "energy awareness" prompts consumers to reduce their consumption. Our software allows our partners – such as General Electric – to make smart appliances that can react to prices and environmental signals to modify their energy usage.

Our technology communicates with homes in two ways:

1) It utilizes new 2-way communicating "smart meter" networks being deployed by utilities in many states, and
2) It also utilizes commercial broadband networks for the approximately 60 million American households equipped with "drive-by" meters that chirp out a one-way signal of the meter's read.

In this setting, we use broadband capability and the internet to create a two-way communication link, making the smart grid come alive by using meters that are in the field today and broadband technology that is well understood. We've also found this approach to be viewed favorably by many state regulators who are responsible for identifying cost-effective solutions.

Using a platform like Tendril's, consumers benefit by consuming less energy, and thus saving money and emitting less carbon dioxide. Utilities are better able to optimize loads on the grid, and plan for the future by accommodating renewable generation, electric vehicles and smart appliances. Our studies show that every 1 million homes equipped with a system like Tendril's will reduce carbon emissions by over 200,000 tons and save consumers $75 million or more annually.

In our view, energy efficiency is best measured across at least two dimensions. On the one hand, we can and must focus on improving the throughput efficiency of the electric system and the buildings it serves, including programs to fund improvements in insulation, caulking and

replacing appliances. On the other hand, we must also consider the real-time market and environmental information that can drive true transactional and behavior changes. The impacts of these changes can drive tangible energy efficiency and environmental benefits.

A recent Department of Energy Report ("The Smart Grid: An Estimation of the Energy and CO_2 Benefits", January 2010) concluded that the development of a smart grid can lead to reductions in carbon emissions of 18% by 2030 through direct and indirect effects. The largest single mechanisms include "Conservation Effects of Consumer Information and Feedback Systems." It is clear that engaging the consumer with information technology is a vital component of an effective carbon mitigation strategy.

Reducing peak loads on the grid also has a powerful economic benefit. A report issued by the Government Accountability Office ("Consumers Could Benefit from Demand Programs, but Challenges Remain", August 2004) observed that, "Although the 100 highest priced hours of the year account for only about 1% of the hours in a year, they can account for 10-20% of the total electricity expenditures for the year." It is clear that providing solutions to reduce peak demand can provide enormous economic benefits and avoid or defer the need to build new power plants.

We believe the transformation of the energy economy will be every bit as great as the transformation of the information and communication economy we have witnessed over the past 20 years. We see similar sustained wealth and job creation opportunities for the nation if we seize the initiative. We believe Google-sized businesses will emerge in this transition, and we're working hard to make Tendril one of them. In our own small way, we have contributed to job

creation. We've added approximately 100 well-paid jobs in the last 12 months with plans to add several hundred more in the next couple of years. Indirectly, our systems will support thousands of new and retained jobs as we deploy more of them.

Smart Grid is a National Priority

Development of a "smart grid" has forcefully emerged as a national priority, and it was firmly articulated with the enactment of the Energy Independence and Security Act of 2007 (EISA). This Act 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" (emphasis added). This policy of smart grid development was reinforced through funding provisions of the American Recovery and Reinvestment Act of 2009.

We highlight the connection between the provision of "timely information" and "control options," because it suggests that Congress, in passing this legislation, considered information to be a key enabling factor of consumer control. In this context, the provision of information is important *not only* for historical analysis of energy consumption patterns, but also to enable real-time, automated functions by consumers.

This legislative intent is further supported by the EISA's references in this same section to "digital information and controls technology", "deployment of 'smart' technologies (real-time,

automated, interactive technologies that optimize the physical operation of appliances and consumer devices)", and the "integration of 'smart' appliances and consumer devices".

This legislation was amended in the American Recovery and Reinvestment Act to establish conditions upon any federal funding provided to smart grid projects that, "The Secretary [of Energy] shall require as a condition of receiving funding ... that demonstration projects utilize open protocols and standards...."

In June 2009, the Federal Energy Regulatory Commission (FERC) released *National Assessment of Demand Response Potential*. This report described the residential customer class as representing "the most untapped potential for demand response." Earlier, in March 2009, FERC 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." This policy was finalized in a July 2009 FERC order.

We highlight these FERC statements and policies because we believe these policies suggest FERC's anticipation of information being used by consumers to facilitate real-time market transactions. This is highlighted further by statements accompanying the adoption of this policy by several FERC Commissioners, including Commissioner Marc Spitzer who said, "Equally important, this policy statement is a step toward smarter rates that will enable customers to control their personal use of electricity."

Tendril believes 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, economic development, and market-based options for the consumer.

Observations

I would like to offer up three observations for the Subcommittee's consideration:

1. Real-time information is the key to driving energy savings. Today, there is no consistent policy regarding whether and how consumers can see how much energy they are using in real-time. Three states – Pennsylvania, Texas and California – stand out for their decisions to guarantee consumers the right to see their energy use so that they can take action to save energy. Some of my own employees complain that while they have a smart meter at their house, there is no policy from Congress, the state legislature or the public

utility commission that gives them the right to useful information coming from the meter. Federal policy – a consumer's right to know – can begin to correct that oversight. Only with real-time information can we inform not just how, but *when*, we use energy. Is energy expensive right now? Are there renewable sources available on the grid currently? That information is collected at the wholesale level, but it does not flow down to the consumer in real time.

As noted above, at least three state utility commissions have addressed the provision of real-time information to consumers. Specifically, Texas, Pennsylvania and California have issued decisions in rulemaking proceedings establishing that advanced metering infrastructure (AMI) must provide consumers with direct, real-time access to electricity usage data by delivering that information directly into the home area network (HAN).

In Texas, the Public Utility Commission established a policy through a rulemaking procedure to implement provisions within 2005 legislation HB 2129 and subsequent rulemakings.

In Pennsylvania, the 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 information be delivered via electronic and "open, non-proprietary two-way access."

Finally, we note that the California PUC issued a decision in December 2009 (R.08-12-

009) requiring that all AMI deployment in the state must also provide direct access to usage data.

These state regulations could provide useful models for potential federal legislation addressing the consumer's ability to access energy usage information in real time.

In December, our trade association, the Demand Response and Smart Grid Coalition, joined with leading companies including General Electric and Google to support a Call to Action released during the climate meetings in Copenhagen. These companies called on nations and regulators to ensure access to (1) real-time home energy consumption, (2) pricing information, and (3) carbon intensity information of delivered energy. Together, we concluded that "[w]e can't solve climate change if people are in the dark about how they use energy in their own homes"

I firmly believe that the first step to federal coordination is to establish clear policies that ensure consumers and entrepreneurs have access to the data.

2. <u>The biggest barriers to innovation are not technical, but economic</u>. Much work is underway to adopt standards that enable communication between energy providers and consumers, but most utilities have little incentive to sell you or me less energy. And in most states, we don't have a choice of energy supplier. We think that federal legislation can establish greater coordination and give state regulators more abilities to include national energy priorities within their economic analysis models.

As a general rule, state regulation was not established to encourage innovation. Rather, it was established to manage cost-effective solutions to known challenges of energy distribution. If we hold as a goal the encouragement of innovation, then federal leadership will be a welcome contribution to the industry. Federal leadership – in the form of policy, legislation and funding – will serve to identify national priorities around energy efficiency, renewable energy, reduced greenhouse gas emissions, and the adoption of new technologies, such as electric vehicles and smart appliances. These identified national priorities provide a foundation upon which state commissions can align local rates and regulation.

In addition to federal leadership, we see a benefit from a coordination of federal activity. Currently, many agencies are making significant contributions to the development of the smart grid. NIST is working with industry to accelerate the development of standards. When established, FERC may promulgate rules establishing the standards. FERC is also developing a National Action Plan for Demand Response to reduce peak loads, and it is examining barriers to the integration of variable energy resources, such as renewable energy. The FCC has indicated that its National Broadband Plan will include strategies to encourage innovation and increased energy efficiency. We strongly support the FCC's initial recommendations regarding the National Broadband Plan. In particular, we support the integration of broadband into the smart grid and provisions to ensure consumer access to information. The DOE is supporting research and development, as well as deployment, through the Smart Grid Investment Grant Program and Smart Grid Demonstration Grant

Program funded in the American Recovery and Reinvestment Act. The DOE's smart grid research also received a boost in funding in the President's 2011 budget. Finally, The White House Office of Science and Technology Policy recently initiated an examination of smart grid policy, and Congress has made significant steps toward passing energy and climate legislation that further emphasizes smart grid development.

It is our opinion that all of the efforts will be strengthened by an overarching federal strategy for smart grid that can inform and coordinate each of the individual efforts.

3. Like the telecom revolution, the ultimate driver of change will be the consumer. We, along with partners such as Best Buy and Intel, are offering compelling solutions to consumers as part of utility programs and, where utilities are slow to move, without them. We would like to see a consumer rebate program established that would accelerate the deployment of home energy monitors and energy efficiency technologies. In fact, we proposed such a program as part of the smart grid funding in the Recovery Act.

   Federal consumer rebates have proven effective in other industries to drive consumer adoption. For example, the TV Converter Box Coupon Program helped drive the transition from analog to digital television. Similarly, the State Energy Efficient Appliance Rebate Program is currently being widely promoted by retailers such as Sears as an effective mechanism to drive consumer adoption of more energy efficient appliances. We believe that a similar consumer rebate program that focuses on the deployment of home energy monitoring systems will bring enormous benefit to the nation

in the form of energy efficiency improvements, technology development, and job creation.

Of course, consumer confidence will be reinforced though cyber-security and data privacy protections much like those that enable convenient online financial transactions. I understand that the full Committee will be examining cyber-security and critical infrastructure this afternoon, and I urge the Committee to consider the topic in the context of our future of smart grid capabilities and our national energy efficiency goals.

Conclusion

The consumer market is a powerful force for change. But like all markets, it will only be truly effective when it has accurate and actionable information. Federal policy, supporting entrepreneurs and American competitiveness, can provide that information and support innovation. We and our trade association, the Demand Response and Smart Grid Coalition, stand ready to work with the Committee as it continues to look at this issue.

Thank you for the opportunity to share these thoughts. I look forward to answering any questions you may have.