Prepared Testimony of Jon Wellinghoff, Commissioner
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Good morning, Mr. Chairman, Ranking Member Hastert, and Members of the Subcommittee. My name is Jon Wellinghoff, and I am currently serving as a Commissioner on the Federal Energy Regulatory Commission (Commission).

I would like to thank you for inviting me to appear before you to discuss a vitally important issue: the potential of a "smart" electric transmission grid that employs advanced communications and control technologies to enable and utilize bidirectional flows of information. Before addressing that issue, however, I wish to indicate that I am speaking only on my own behalf and not on behalf of the Commission. By way of background, I have 32 years of experience in the field of electric utility regulation and electric system analysis and oversight. I authored the nation's first comprehensive integrated resource planning statute for electric utilities (enacted in Nevada in 1983), as well as one of the nation's first electric utility portfolio standards that combines renewable energy and energy efficiency in a single portfolio (enacted in Nevada in 2005). A copy of my biography is attached to my testimony.

The electric transmission grid in the United States is one of the largest and most complex machines in the world, capable of carrying over 850 gigawatts of energy. Unfortunately, a decades-long decline in transmission investment and a precipitous decline in investment in demand response, primarily in the last decade, now threaten to impair the reliability of that machine and cause billions of dollars in congestion costs.

This large and complex machine and our associated energy infrastructure are in desperate need of improvement. However, it is essential to recognize that we cannot

simply build our way out of these problems. The primary impetus of change in the past, and no doubt, of change that we will see in the future, is technology. Therefore, as we invest in new energy infrastructure, we must spend smartly. We must spend efficiently. We must promote investment in efficient transmission facilities and state-of-the-art transmission technologies, as well as facilitate demand response and distributed generation, in order to address the nation's energy challenges and ensure the greatest benefits for consumers. As an example, if we could make the electric grid even 5 percent more efficient, we would save more than 42 gigawatts of energy: the equivalent of production from 42 large coal-fired power plants. Those are plants that we would not need to build and emissions that we would not produce.

In the Energy Policy Act of 2005 (EPAct 2005), the Congress emphasized many of these same principles. In particular, the Congress required the Commission to promote reliable and economically efficient transmission and bulk power markets by, among other things, encouraging deployment of advanced technologies. Indeed, in Section 1223 of EPAct 2005, the Congress provided the Commission with guidance as to types of technologies to encourage, including, among others, controllable load such as demand response; distributed generation, including fuel cells, microturbines, and photovoltaic energy systems (like the one now under construction at Nellis Air Force Base in Nevada); energy storage devices; and enhanced power device monitoring.

The Congress recognized the benefits of these technologies and emphasized the need for their wider deployment. These types of distributed resources can discipline peak

market prices, provide a hedge against volatile fuel prices, alleviate congestion, improve reliability, and potentially be a cost-effective means to complement or defer transmission expansion or improve the efficiency of transmission upgrades.

Benefits of Demand Response

I would like to focus first on demand response, which the U.S. Department of Energy (DOE) defined as follows in a February 2006 report to the Congress:

> Changes in electric usage by end-use customers from their normal consumption patterns in response to changes in the price of electricity over time, or to incentive payments designed to induce lower electricity use at times of high wholesale market prices or when system reliability is jeopardized.

The Commission's Staff has reported that the total level of demand response reductions achieved by independent system operators (ISO) nationwide on peak days during the summer of 2006 was approximately 8,800 megawatts. These reductions represented between 1.4 and 4 percent of ISO system peaks, with reductions in load pockets such as Southwest Connecticut approaching 6 percent. The corresponding reductions in wholesale market clearing prices were between $100 and $300 per megawatt hour. These price reductions mean that consumers saved hundreds of millions of dollars last summer alone due to the use of demand response by the ISOs in these wholesale markets. The benefits of demand response are also the subject of a study that Dr. Ahmad Faruqui of The Brattle Group presented at last week's National Town

Meeting on Demand Response, which found that just a 5 percent reduction in U.S. peak demand is worth $31 billion (NPV) over a 20-year period, based only on avoided costs.

We should not underestimate the power of consumers to drive smart-grid technologies. The more that consumers see economic benefits of demand response, the more they will want demand response opportunities and the more they will support investments in the smart electric grid that makes more demand response possible. Thus, not only does a smart grid enable wider use of demand response, but demonstrating the benefits of demand response to consumers also brings us more rapid implementation of the technologies necessary to enable a smart grid.

Commission Action on Demand Response and Other Advanced Technologies

The Commission has taken to heart the Congress's directive to encourage wider deployment of demand response and other advanced transmission technologies. Over just the past eight months, the Commission has taken several steps to develop a platform to support a smart electric grid. For example, in February of this year, the Commission reformed its open access transmission policies to, for the first time, put demand response and other distributed resources on equal footing with other resources in directly contributing to the reliability and efficient operation and expansion of the electric transmission system. The Commission's Order No. 890 provides that demand response and distributed generation may provide a variety of ancillary services when they are capable of doing so. The Commission also found that when such resources are capable of

performing needed functions, they should be permitted to participate on a comparable basis in open, transparent transmission planning processes, and that stakeholders should have a forum to come forward with demand response project proposals that they wish to have considered in development of a regional transmission plan.

The Commission has also taken steps to integrate demand response into new mandatory electric reliability standards, the development of which is one of the most important responsibilities that the Congress placed on the Commission in EPAct 2005 (Section 1211). In March, the Commission issued a Final Rule that found that demand response should be allowed to be used to comply with reliability standards governing contingency reserves, reactive power, emergencies, and planning the reliable bulk power system. The Final Rule also makes clear that demand response must be technically capable of providing the function required by a reliability standard. The Electric Reliability Organization (ERO) will develop the process for determining such technical capability through its standards development process.

Last fall, the Commission and the National Association of Regulatory Utility Commissioners (NARUC) jointly launched a Demand Response Collaborative to explore how to better coordinate approaches to demand response policies and practices. The Collaborative has laid a solid foundation in its initial meetings, and I look forward to further discussions this summer. Initiatives are also underway at the Commission and several ISOs and regional transmission organizations (RTO) under our review to integrate demand response into energy and capacity markets. In addition, the

Commission is conducting a series of conferences to examine the state of competition in wholesale electric markets and to explore the role of demand response in those markets. The Commission is also developing a plan for a new staff unit that will focus on demand response in order to create additional expertise within the Commission on such innovative technologies.

On a related matter, the Congress directed the Commission in Section 1241 of EPAct 2005 to provide incentives for transmission investment that promotes reliable and economically efficient transmission and generation of electricity and to encourage deployment of transmission technologies and other measures to increase the capacity and efficiency of existing transmission facilities. In its rule implementing that directive, the Commission highlighted the importance of investment in economically and technologically efficient transmission infrastructure. I have emphasized in a number of subsequent cases that the Commission should target incentives that increase an applicant's return on equity to investments that provide incremental benefits, such as gains that result from the deployment of best available technologies that increase operational and energy efficiency. Targeting incentives in this manner would encourage the deployment of smart grid technologies.

Further Steps toward a Smart Electric Grid

Thus, the Commission is moving forward in developing a regulatory framework to enable an efficiently designed, smart electric grid. It is my hope that States will examine

how their consumers can benefit most from that framework, including the opportunities for demand response to participate in wholesale electric markets.

There is much more work to do, however, if we are to achieve the full potential of a smart electric grid. For example, widespread deployment of advanced metering technology will empower more consumers to take advantage of opportunities that are available for demand response in the wholesale electric markets under the Commission's jurisdiction. It is my understanding that other witnesses will discuss in greater detail the provisions of EPAct 2005 that address advanced meters, including provisions related to the responsibilities of State regulatory authorities. I would like to highlight briefly an August 2006 report that the Commission's Staff prepared in response to a directive in Section 1252(e)(3) of EPAct 2005. In preparing that report, the Commission's Staff developed a comprehensive national survey on demand response and advanced metering. The report concludes that demand response has an important role to play in both wholesale and retail electric markets, and that the potential immediate reduction in peak electric demand that could be achieved from existing demand response resources is between 3 and 7 percent of peak electric demand in most regions. Unfortunately, the report also found that technologies such as advancing metering that are needed to support significant deployment of demand response resources have little market penetration.

I agree with the conclusion reached by the Commission's Staff that demand response has an important role to play in both wholesale and retail electric markets. I also see that conclusion as reinforcing the need for coordination of federal and state

approaches to this issue. The Demand Response Collaborative launched by the Commission and NARUC marks a promising step toward that goal. It also would be valuable to more formally establish this coordination. I encourage the Congress to establish a federal-state working group through which the Commission and interested state representatives would be tasked with identifying best practices and developing consistent standards for demand response.

Lastly, I would like to highlight two recent projects and an emerging technology that illustrate how a smart electric grid can benefit a wide range of consumers. The two projects are initiatives pursued by Pacific Northwest National Laboratory (PNNL), which I had the opportunity to visit earlier this year. First, the Olympic Peninsula Distributed Resources Demonstration showed that residential, municipal, and commercial consumers equipped with automated control technology took advantage of a virtual real-time market in which they could see real monetary benefits to adjusting their consumption during times of peak demand. These demand response adjustments not only provided economic benefits to particular consumers, but also created wider benefits by relieving congestion. Second, the Grid Friendly Appliance Demonstration showed that smart appliances improved reliability by detecting fluctuations in frequency when the grid was under stress and responding automatically within seconds by turning off some functions for short periods. That automation increases the appeal and the benefits of demand response. These projects, which PNNL conducted with support from DOE and other partners, hint

at the full potential that could be achieved through wider deployment of demand response enabled by a smart grid.

The emerging technology I would like to highlight is a plug-in hybrid electric vehicle with vehicle-to-grid (V2G) capability. Substantial research has been conducted on this technology, and important issues remain to be resolved before these vehicles will be ready for large-scale commercial availability. Nonetheless, the potential of this technology is enormous. Plug-in hybrid electric vehicles could create widespread demand response opportunities and offer emergency power supply through energy storage, as well as smoothing the integration into the grid of renewable resources such as wind generation. With V2G capability, plug-in hybrid electric vehicles would improve efficient grid management by providing a variety of ancillary services and thereby improve power plant efficiency. Because these additional services could also create payment streams to individual vehicle owners that would significantly offset the incremental first costs associated with these vehicles, V2G capability could be an enabler of both plug-in hybrid electric vehicles themselves and the smart electric grid.

In these ways, plug-in hybrid electric vehicles with V2G capability exemplify the benefits of demand response and a smart electric grid. We have only begun to capture those benefits, and doing so is essential to making the complex machine that is our electric grid function in the efficient manner that will bring the greatest benefits to American consumers and address our nation’s energy challenges.