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House Committee on Energy and Commerce
Hearing on "Blackout 2003: How Did It Happen and Why?"
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Mr. Chairman, Members of the Committee, I am happy to be here today as you examine what happened in the electricity blackout on August 14, 2003, and most importantly, what to do to strengthen the nation's power grid in the future. We believe there is an answer for the future, and that answer is a self-healing, 'smart grid' based on 21st century technologies.

I am T.J. Glauthier, President & CEO of the Electricity Innovation Institute, an affiliate of EPRI, the Electric Power Research Institute. I am here today representing both organizations.

EPRI is a non-profit research institute sponsoring R&D in the public interest in technologies and systems related to the generation, delivery, and use of electricity in our society. EPRI was created 30 years ago, in the aftermath of the 1965 Northeast power blackout. EPRI was formed with the support and legislative approval of the Congress, and with the support of the States and their regulatory commissions.

EPRI has more than 1,000 members in the electric utility industry, including investor-owned companies, public power organizations, coops, federal power systems and others. Its members produce and deliver more than 90% of our nation's electricity.

The Electricity Innovation Institute (E2I) was formed two years ago by the EPRI Board of Directors as a separate, but affiliated organization. It is also a non-profit, 501 (c)(3), public-benefit research institute, and its focus is to sponsor longer-term, strategic R&D programs through public-private partnerships. E2I's Board of Directors, is primarily composed of independent, bi-partisan public representatives.

E2I is already active in modernizing the electricity grid. For example, with technical support from EPRI, it began 18 months ago a public-private R&D partnership to design and develop the system of technologies enabling a self-healing, 'smart grid.' This partnership involves a number of public and private utility companies, the Department of Energy, several states, and the high tech industry. It has one multi-million dollar contract underway with a team that includes GE, Lucent Technologies and others, to design an 'open architecture' for the smart grid.

EPRI and E2I actively support the dialogue on national energy legislation by providing objective information and knowledge on energy technology, the electricity system and related R&D issues.

Support of the August 14th Outage Investigations

EPRI is actively supporting the bi-national US-Canada Joint Task Force on the Power Outage of August 14th, working with DOE and NERC. EPRI has staff in the region now, and is lending its experience and expertise to the overall effort to learn exactly what did happen on August 14th, and what the root causes were for that event. EPRI will work through that team, and does not expect to issue any independent evaluation of the outage events or its causes.

Report: *Electricity Sector Framework for the Future*

Last week, EPRI released a report on the current challenges facing the electricity sector in the U.S., outlining a Framework for Action. The report, the *Electricity Sector Framework for the Future* (ESFF), was completed prior to the August 14th outage, and had been developed over the past year, under the leadership and direction of the EPRI Board of Directors.

EPRI engaged more than 100 organizations, and held a series of regional workshops, including a diverse group of stakeholders—customers, suppliers, elected officials, environmentalists, and others. That dialogue has provided valuable insights into the causes of problems, such as the disincentives for investment and modernization in transmission facilities, which have become much more widely recognized since the August outage.

The ESFF report lays out a coherent vision of future risks and opportunities, and of a number of the issues that must be dealt with in order to reach that future. It is also notable that this report reflects viewpoints widely shared by the broad electricity stakeholder community who contributed to its development. That future will be based on a transformed electricity infrastructure that is secure, reliable, environmentally friendly, and imbued with the flexibility and resilience that will come from modern digital electronics, communications, and advanced computing.

To arrive at that future, many parties must take action. The report calls upon Congress to take action in a number of areas, such as establishing mandatory reliability standards, clarifying regulatory jurisdictions, and helping to restore investor confidence in the electricity sector so that needed investments can be made.

We are submitting a copy of the full report to the Committee, as part of the record for this hearing. We have already sent announcements and electronic links to the report to all the Members of this Committee, to your staffs, and to the Members of other, relevant committees in the Congress. We hope the report will be helpful to you as you deal with the various dimensions of these issues in the final energy bill – and we are happy to offer our assistance in whatever ways will be most helpful.

The 21st Century Transformation of the Electricity Grid

The August 14th outage served to again remind us of the absolutely essential nature of electricity service. It is the lifeblood of our nation's economy and quality of life. As such, the modernization of the electricity system is an essential investment in our nation's continued

prosperity. This investment is particularly urgent in the face of today's rising security and societal demands on the nation.

The modernization of the electricity infrastructure described in the report is toward a 'smart grid' – a self-healing, intelligent and digital electricity delivery system to meet the social and economic needs of the 21st century. This represents a fundamental upgrade of the current system—the first one in at least 50 years--comparable to the creation of an interstate highway system 50 years ago. Increasingly, leaders are becoming aware of the urgency of this need. For example, the bi-partisan Energy Future Coalition made the smart grid one of its six areas of principal emphasis in its June, 2003 report.

This smart grid, which encompasses both the long distance transmission system and the local distribution systems, must incorporate ubiquitous sensors throughout the entire delivery system and facilities, employ instant communications and computing power, and use solid-state power electronics to sense and, where needed, control power flows and mitigate disturbances instantly.

The upgraded system will have the ability to read and diagnose problems, and in the event of a disruption from either natural or man-made causes, it will be 'self-healing' by automatically isolating affected areas and re-routing power to keep the rest of the system up and running. It will be alert to problems as they unfold, and able to respond at the speed of light.

Another advantage of the smart grid is that it will be able to support a more diverse and complex network of energy technologies. Specifically, it will be able to seamlessly integrate an array of locally installed, distributed power sources, such as fuel cells, solar power, and combined heat and power systems, with traditional central-station power generation. This will give the system greater resilience, enhance security and improve reliability. It will also provide a network to support new, more energy efficient appliances and machinery, and offer intelligent energy management systems in homes and businesses.

The enhanced security, quality, reliability, availability, and efficiency of electric power from such a smart grid will yield significant benefits. It will strengthen the essential infrastructure that sustains our homeland security. Moreover, it will reduce the cost of power disturbances to the economy, which have been estimated by EPRI to be at least $100 billion per year – and that's in a normal year, not including extreme events, such as the recent outage. Further, by being better able to support the digital technology of business and industry, the smart grid will also enable a new phase of entrepreneurial innovation, which will in turn accelerate energy efficiency, productivity and economic growth for the nation.

The economic benefits of the smart grid are difficult to predict in advance, but they will consist of two parts: (1) stemming the losses to the U.S. economy from power disturbances of all kinds, which are now on the order of 1% of U.S. GDP, and (2) taking the brake off of economic growth that can be imposed by an aging infrastructure. The first part alone could yield a five-to-one return on the investment required to build and implement the smart grid.

Recommended Congressional Action

The current legislation contains some good provisions in support of technology development, but the national transformation of the grid is so important that it requires stronger action and support

from the Congress in the energy bill. There are four key areas of technology policy that the energy legislation should address, as described below:

1. Establish the 'Smart Grid' as a national priority

First, the Congress can provide real leadership for the country by establishing the 'smart grid' as national policy and as a national priority in the legislation. By articulating this as national policy and offering a compelling vision for the country, Congress can increase the pace and level of commitment to the modernization of the electricity grid.

That action itself will help to focus the attention of the federal and state agencies and the utility industry and others in the private sector. By making the smart grid a national priority, Congress will be sending a clear message that this modernization is critically important in all sectors and in all regions of the country, and that deployment should be undertaken rapidly.

2. Authorize increased funding for R&D and demonstrations of the 'Smart Grid'

To carry through with the priority of the smart grid, the legislation should include significantly increased development funding. In particular, it should contain authorization for significant additional appropriations over the next five years for programs managed by the Department of Energy, working in partnership with the private sector.

The Administration has taken some steps in this direction in its earlier budgets, but this demands even stronger, more targeted action by the Congress. Support is needed in two areas. One is more extensive R&D in the relevant technologies, needed to provide all the components of the smart grid. The other area is to support an aggressive program of technology demonstration and early deployment projects with the states and the industry, to prove out these components, and to refine the systems engineering which integrates all these technologies in real-world settings.

EPRI estimates that this research and demonstration program will require increased federal funding for R&D on the scale of approximately $1 billion, spread out over five years, with the private sector contributing a significant amount of matching funding. These R&D and demonstration funds represent an investment that will stimulate deployment expenditures in the range of $100 billion from the owners and operators of the smart grid, spread out over a decade.

3. Recognize a public/private institutional role for the R&D

It is vitally important that the legislation recognize that this R&D and demonstration program should be carried out in partnership with the private sector. The government can sponsor excellent technical research. However, it is the industry that will ultimately be responsible for building, maintaining and operating the electricity system to keep the lights on and the computers humming. And as we've just seen, there is little tolerance for error—it has to work all the time—so this is more than a "research" program, it is an engineering and operations program on which the country will rely.

DOE is the lead agency for the federal government in this area, and its new Office of Electricity Transmission and Distribution should have the lead responsibility on behalf of the federal government for directing the program. To succeed, DOE needs a partner that can effectuate the

involvement of the private sector and other stakeholders in carrying out this program. This should be an organization that can work collaboratively with DOE on the management of the program, and that can receive and manage matching funds from both the public and private organizations. Congress should formally recognize the importance of this type of public/private partnership in the energy bill.

One potential vehicle for this role is the Electricity Innovation Institute. It was with these strategic goals in mind, that the EPRI Board of Directors sponsored the creation of this new organization in 2001, with the strong support of its Advisory Council composed of state utility regulators, academics, and representatives of business and public interest organizations.

4. Develop an approach to the long-term funding for deployment

A national approach is needed to fund the full-scale deployment of the smart grid throughout the country. The scale of deploying the technology, and doing the detailed systems engineering to make it work as a seamless network, will require significant levels of investment, estimated at $100 billion over a decade.

These implementation costs for the smart grid will be an investment in the infrastructure of the economy. This investment will pay back quickly in terms of reduced costs of power disturbances and increased rates of economic growth.

Nevertheless, this is a substantial challenge for an industry that is already under financial strain, and is lacking investment incentives for the grid. It's a challenge, too, because this investment must be new and additional to what the industry and its customers are already providing to keep the current systems operating. A business-as-usual approach will not be sufficient.

We need a national financing approach or mechanism that will be effective, fair, and equitable to all parts of society. This will require agreement among the industry, state regulatory commissions, customers and other stakeholders as to how that should be carried out.

The answer to this will undoubtedly take extended discussions with the various stakeholder groups. Rather than rush to judgment on one or another specific approach, we urge that Congress include language in the energy bill to direct the Administration to develop an appropriate recommendation. The Administration should work with the industry, the states, customers, and other to develop its recommendation and report back to Congress at a specific time, no later than one year after enactment.

As noted earlier, the cost of developing and deploying the smart grid for the country should be thought of as an investment in the future – in a secure, reliable, and entrepreneurial future – that will pay back handsomely over many decades to come as the energy backbone of the 21st century.

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Thank you.