UNITED STATES SENATE
COMMITTEE ON ENERGY AND NATURAL RESOURCES
TESTIMONY ON WEATHER RELATED ELECTRICAL OUTAGES
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From October 11, 2001 until February 1, 2012, I served as Chairman of the New Hampshire Public Utilities Commission. In that role, I had the responsibility to ensure that public utilities provided safe and adequate service at just and reasonable prices.

My focus this morning is on my experience in New Hampshire during the past several years with electrical outages from four separate extreme weather events, each of which far surpassed any previous storm in state history in terms of the number of customers who experienced electrical outages. I am hopeful that New Hampshire's experience with these events will prove useful to your consideration of weather related electrical outages.

In December 2008, approximately 430,000 customers, nearly two-thirds of New Hampshire's 690,000 residential and business electric customers, were without power, some for as long as 14 days, as the result of an unprecedented ice storm that affected 211 of the state's 256 municipalities and land grants. The effects of the ice storm were concentrated in the southern part of the state and also heavily impacted northern Massachusetts. The '08 Ice Storm, which saw up to an inch of ice accumulation on power lines and tree limbs, caused in excess of $150 million in reported damages. Storm recovery was highly labor intensive, with over 1,000 field crews working during peak restoration hours, due to the sheer number of downed lines and broken poles and the resulting need to rebuild entire sections of some distribution lines.

In February 2010, a wind storm with gusts in excess of 60 mph over a wide swath concentrated in the more densely populated southern portion of New Hampshire caused outages to 360,000 customers. Restoration took six days, much less than experienced during the '08 Ice Storm, largely because the damage was more sporadic and did not require rebuilding of lines.

In August 2011, Tropical Storm Irene moved up the east coast affecting 12 states, the District of Columbia and three Canadian provinces, leaving about 7 million customers without power. The storm diminished somewhat in intensity as it moved northward towards New Hampshire and veered from the originally anticipated course. Nonetheless, 160,000 customers lost power and torrential downpours caused flooding in the northern and western parts of the state. Restoration took four days, involved in excess of 800 crews and was aided in part by favorable summer weather conditions.

In October 2011, an early season snowstorm, or Nor'easter, dropped more than two feet of wet, heavy snow on trees still in full foliage. As a result, more than 300,000 customers in New Hampshire and approximately 2 million customers in New England suffered electrical outages. Restoration took six days and involved nearly 1,000 crews.

Prior to these four very different events, the single largest outage in New Hampshire occurred during a snow storm in December 1996, affecting roughly 100,000 customers. While the four events were distinguishable in terms of meteorological causation, the results were the same in that ice, wind and wet snow all brought trees and branches into contact with power lines, causing widespread outages. The obvious question in such instances, the one asked by customers and public officials, and the one that was a primary focus of the New Hampshire Public Utilities Commission's After Action Review of the '08 Ice Storm is: Are the electric utilities paying sufficient attention to vegetation management?

The issue of electric utility vegetation management is not a new one as the Committee knows. On August 14, 2003, a tree in northern Ohio made contact with a high voltage transmission line causing the line to trip off and triggering a cascading event that affected 50 million people in the U.S. and Canada. In response, Congress passed the Energy Policy Act of 2005, which authorized the Federal Energy Regulatory Commission to create an electric reliability organization (ERO) and provided that reliability standards would be mandatory and enforceable. One outcome of that effort was the certification by the Federal Energy Regulatory Commission (FERC) of the North American Electric Reliability Corporation (NERC) in July 2006 as the ERO for the United States. Among other things, NERC, as part of 102 proposed reliability standards filed in 2006, adopted a Transmission Vegetation Management Program. More recently, in December 2011, NERC filed a revised transmission vegetation management standard with FERC designed to minimize encroachment from vegetation located adjacent to rights-of-way.

Just as Congress conducted a reappraisal in the aftermath of the August '03 blackout, individual states took a close look at the status of vegetation management practices. As a result, in New Hampshire the Public Utilities Commission (PUC) approved reliability enhancement programs that increased the funds annually spent by electric distribution utilities on tree trimming, and encouraged shorter trim cycles and larger trim zones.

It is also worth observing in this context the impact of 9/11 on the working relationships among electric utilities, public utilities commissions and state emergency management agencies. In New Hampshire, in response to 9/11 then-Governor Shaheen created an Advisory Council on Emergency Preparedness and Security, which advises the Governor on "issues involving the

state's ability to respond to natural and human-caused disasters, and the preparation and maintenance of a state disaster plan."

The PUC has been an integral member of the Advisory Council from the outset, with a particular focus on critical infrastructure. PUC personnel, including myself, were trained in the Incident Command System, part of the U.S. Department of Homeland Security's National Incident Management System, which takes an all-hazards approach to natural or manmade disasters. In this role, the PUC intersects with the U.S. Department of Energy's Office of Electricity Delivery and Energy Reliability, which, through its Infrastructure Security and Energy Restoration mission, is responsible for coordinating the protection of critical energy assets and assisting state and local governments in executing the Emergency Support Function 12 Energy (ESF-12) established under the National Response Framework.

The PUC works closely with the state Division of Homeland Security and Emergency Management (HSEM) during an extreme weather event because of the critical nature of the electric system infrastructure to public health and safety. Prior to the opening of the state Emergency Operations Center (EOC), HSEM, PUC and electric utility personnel monitor weather reports as a storm approaches and communicate among one another in order to make preparations for response and recovery.

In an extreme weather event, the restoration of power is an end or goal in itself and the means for accomplishing other subsidiary goals. In the early hours of storm response, situational awareness is key to informed decision making by utilities and government officials. For example, it is necessary to identify the location and nature of outages, and ascertain estimated times of restoration at least preliminarily, and to coordinate closely so that state officials can, among other things, identify whether hospitals and other critical health and safety facilities are affected, and make decisions about closing and opening roads, determining where to open shelters, and determining whether to close schools.

The '08 Ice Storm After Action Review, which has served as a template for state and utility management in terms of lessons learned and corrective action, concentrated on a broader set of issues than vegetation management. The review included emergency preparedness and response, emergency planning, outage management systems, weather forecasting, resource procurement, resource deployment, restoration prioritization, and communications, as well as technical issues relating to system protection and line construction and loading, and the feasibility of overhead to underground conversion. At the time, the '08 Ice Storm was viewed as a high impact, low frequency event. That may still be regarded as an accurate assessment when narrowly limited to icing situations but the practical reality is that three other high impact events have occurred in the interim.

I think it is fair to say as a general matter from a New Hampshire perspective that, through actual hands-on experience, both state and local officials and utility management have become more adept at planning for, responding to, and recovering from extreme weather events that cause widespread electrical outages. As a specific matter, I offer no opinions on the actions of New Hampshire's electric utilities during the October '11 Snowstorm inasmuch as the PUC's after action review of that event is still underway. I do, however, offer some observations drawn both narrowly from the impact of the four extreme weather events in New Hampshire and broadly from the impact of the most recent event regionally.

First, public expectations of utility and government action are high when it comes to electric service and all that such service entails. New Hampshire is a heavily forested state so it is reasonable to expect that extreme weather events will damage trees, which will in turn damage power lines, especially distribution lines. Distribution lines are most at risk because they tend to run along streets and roads in close proximity to trees, which is a different case from higher voltage transmission lines where wide rights-of-way are the norm. At the same time, in addition to the traditional power-related amenities of heat and light, the public is more interconnected and reliant on electricity for connectivity for work, recreation and social interaction than in years past. Coincident with this heightened connectivity are heightened expectations. Electric utility customers today are seeking information on a virtually real-time basis about the cause of outages, the geographic extent of outages, the location of crews assigned to repair outages, and the timing of restoration. Public officials have corresponding expectations of utility management, as well as the expectation that utilities will avail themselves of state-of-the-art weather forecasting and modeling tools, outage management systems, and communications media.

Second, extreme weather events affecting large numbers of customers create a competition for resources, particularly in the form of line crews and tree crews, which has the potential for negative consequences. During the four recent events in New Hampshire, crews were brought in from around the U.S. and Canada to assist in restoration efforts. The various New Hampshire utilities relied on mutual aid arrangements with other utilities, affiliated companies, cooperative arrangements, and contracts with independent line and tree crews. Utilities in New Hampshire and throughout the region have a long history of working together and sharing crews. Extreme weather events that cover a large geographic area and a long time frame, however, tend to absorb resources quickly, making crew acquisition increasingly challenging. Moreover, especially in the context of a storm that is accurately forecasted and that follows a predictable path, the incentive is growing for a utility to tie up resources early in order to respond timely to its customer needs. Inasmuch as these weather events cross state boundaries and often involve multi-state companies, a regional approach among state regulators and policymakers to working with utilities could go a long way to staving off potential negative consequences.

Third, the interconnected electric grid is a complex structure that crosses state boundaries and is subject to shared jurisdiction involving state and federal agencies. Furthermore, utility ownership is divided among public and private entities, the latter of which may involve a number of affiliates and subsidiaries of larger multi-state or multi-national corporations. As a general rule, state utility commissions have jurisdiction over the distribution of electricity while FERC has jurisdiction over the transmission of electricity. On a related note, NERC has responsibility for the bulk power transmission system and the New England Independent System Operator, Inc., a regional transmission organization (RTO), operates the region's transmission system on a daily basis, manages wholesale markets and oversees regional planning. The jurisdictional boundaries between the bodies and among the states, however, may not be bright lines and is complicated by the reality that a number of utilities do business in multiple jurisdictions.

As noted in the PUC's '08 Ice Storm After Action Review, while technically the utility industry differentiates between two systems, i.e., distribution and transmission, in practice there is a sub-transmission system, which operates similarly to a transmission system by delivering power to distribution substations. Sub-transmission systems may operate at voltages associated with FERC regulation but in New Hampshire the sub-transmission system, forming an important part of the backbone system, operates primarily at 34.5kV, which is associated with state regulation. Also, NERC authority with respect to the bulk power system is not fully congruent with FERC jurisdiction. The complexity of the system, the multiplicity of actors, and the differentiation of regulatory roles both by geography and voltage level raise the same challenges faced in the organizational design of every large corporation or agency. Specifically, because of a natural tendency toward subunit orientation resulting from specialized jurisdictions, communications among the states and between the states and FERC, NERC or the RTO can be challenging. When the respective regulatory missions are incongruent, a variety of integrating mechanisms, such as task forces or teams, can be used to ensure that regulatory bodies are working together and not at cross-purposes.

In closing, I have been asked on more than one occasion whether the high numbers of outages experienced in recent years in New Hampshire were less a consequence of the particular storms or more the result of a lack of tree trimming or proper pole and line maintenance by the utilities. Based on the increased emphasis on vegetation management since 2003, and the evidence collected as part of the extensive '08 Ice Storm After Action Review, I am persuaded that the high numbers of outages are linked to extreme weather and not to utility imprudence. I have also been asked about the likelihood that such storms will continue. Public Service Company of New Hampshire indicates that many New England weather experts believe that the cluster of recent storms is part of a pattern that could last several years. As a practical regulator, it was my position that utilities should be prepared at all times to respond to a variety of extreme weather events, which is why budgets for storm response have been increased over time and

mechanisms have been approved to consider utility recovery of expenditures in excess of budgeted amounts in appropriate circumstances.

Regulation often requires a balancing of competing policy objectives, of exercising regulatory oversight but avoiding counter-productive micro-management. Electric utilities have been highly regulated entities for a century as an economic matter because they historically operated as a natural monopoly and as a matter of public health and safety because they were so affected with the public interest by virtue of the fundamental and pervasive service that they provide. Accordingly, it is proper to look closely at the performance of utilities to determine whether they are acting prudently and to hold them accountable to meeting reasonable standards. That is the course the PUC has followed in New Hampshire with respect to weather related electrical outages as exemplified by the After Action Review of the ’08 Ice Storm and continued through subsequent extreme weather events. It is also an appropriate course for FERC and NERC to follow with respect to regional events that impact the electric transmission system.