NEW HAMPSHIRE PUBLIC UTILITIES COMMISSION

AFTER ACTION REVIEW

DECEMBER '08 ICE STORM

FINAL REPORT

DECEMBER 3, 2009

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I. Introduction

In the aftermath of the December ’08 Ice Storm, in which approximately two-thirds of the State’s households and businesses lost power, some for as long as 14 days, the New Hampshire Public Utilities Commission (PUC or Commission) undertook a review of utility emergency preparedness and response. As part of its review, the Commission considered information collected and analyzed by its Staff with the help of an outside consultant, as well as information provided by New Hampshire’s four largest electric providers and two largest incumbent telecommunications providers. The Commission also conducted a series of public hearings and received hundreds of public comments through its website.

The following report is based on the information and analysis compiled during the past several months, as well as the direct experience of PUC personnel working with utilities and the State’s emergency response team throughout the storm response and restoration efforts. It assesses emergency protocols, communications channels, and management decisions regarding resource deployment. The report sets forth a number of observations and actions to remedy key operational and management weaknesses revealed by the ice storm. These are found at the end of each section and summarized in Appendices A and B.

While the December ’08 Ice Storm may have been unprecedented in its scope and damage, severe weather that can result in widespread impacts to utility customers is not uncommon in New Hampshire. Accordingly, the state’s utilities must have in place the protocols needed to meet their obligation to respond to customers quickly and effectively.

A. Background

On December 11 and 12, 2008, the most damaging ice storm in recent New Hampshire history swept across the southern half of the state, bringing wintry mix precipitation and large amounts of ice build-up throughout the state. In the wake of the ice storm, power outages in 211 of the State’s 256 municipalities and land grants left more than 400,000 electric customers without power, some for a matter of hours and some for up to two weeks. Telephone customers, including those with cable telephony powered by electric modems, were without service as well. Uprooted trees and fallen limbs were commonplace throughout the storm footprint, bringing

down power lines and utility poles, and blocking access on over 350 segments of state and local roads. Many businesses lost power and remained closed for days.

New Hampshire's four major electric providers, Public Service of New Hampshire (PSNH), Unitil Energy Systems (Unitil), National Grid, and the New Hampshire Electric Cooperative (NHEC), were hit with historic levels of outages and widespread damage to their distribution systems. During the first 24 hours, the number of meters without power was massive: PSNH - 322,438 meters (65 percent), Unitil - 37,800 meters (51 percent), NHEC - 48,230 meters (61 percent) and National Grid - 24,164 meters (60 percent). 432,000 out of a total of 685,000 electrical meters (representing 808,667 citizens – 63 percent of the state's population) lost electrical power due to downed power lines, broken electrical poles, and debris. Public utilities have reported more than $80 million in damages and restoration costs for utility infrastructure throughout the state. Others estimate an additional $70 million in economic impacts, including private business losses, personal and commercial insurance claims, and federal assistance to municipalities and non-profit organizations.

Governor John H. Lynch declared a state of emergency on December 12, 2008, at 9:20 a.m. The Bureau of Emergency Management, within the Department of Safety's Homeland Security and Emergency Management Division (HSEM), had begun operating its emergency operations center (EOC) on a 24-hour basis on the evening of December 11. The EOC was staffed by personnel from the HSEM, the PUC, the Department of Transportation (DOT), the Department of Health and Human Services (HHS), the Department of Safety (DOS), the Office of Information Technology (OIT), the Department of Environmental Services (DES), the Department of Resources and Economic Development (DRED), the National Guard and other supporting agencies. The EOC served as an emergency operations hub, providing situational updates; support in the form of goods and services for local emergency centers; problem solving; and coordination, command and control of specific storm-related tasks requested by municipalities.

A record number of local emergency operations centers (81), as well as a record number of shelters (51), were opened during the ice storm. Nearly 450 schools were closed due to loss of power or because they were serving as shelters for local communities. In meetings with utility officials and municipal and state government officials, it quickly became clear that the magnitude of the December '08 ice storm overstretched the resources of New Hampshire public

utilities, requiring extensive assistance from outside utilities and contractors. Although most utilities had emergency plans in place, they had never needed to implement those plans on such a scale in New Hampshire. As a result of the scope and scale of the ice storm damage, power and telephone outages lasted much longer than in previous storm events and weighed heavily on the citizens of the state.

B. After Action Reviews

The PUC and the HSEM conducted separate after action reviews of the December ice storm. HSEM identified potential improvements to the State Emergency Operations Plan as well as action items to provide further support for emergency operation centers located in municipalities. The PUC reviewed utility emergency preparedness and response, and identified needed improvements to utility plans and procedures.

The PUC launched its review with a series of public statement hearings, collection of public comments, and retention of a consultant with the expertise to assist in the review of utility procedures and practices. PUC Staff issued over 500 information requests to electric, telephone and water utilities concerning their storm preparation and restoration response. The PUC hired NEI Electric Power Engineering, Inc. (NEI) to assist in assessing utility emergency plans and related management and operations practices. NEI conducted numerous interviews, issued further information requests, conducted field surveys, and researched industry best practices in order to assess the pre- and post-storm performance of New Hampshire's four largest electric providers and two largest telecommunications providers. The result of NEI's review is presented in NEI's "December 2008 Ice Storm Assessment Report" (NEI Report), available at www.puc.nh.gov.

During the spring of 2009, PSNH, Unitil, NHEC and National Grid conducted self-assessments of their actions prior to, during and following the storm. Each electric utility has since implemented steps to improve its preparedness and response procedures for emergency events and widespread outages of this magnitude.

The NEI Report assesses New Hampshire utility experiences, procedures and lessons learned from the December '08 ice storm and recommends improvements for each utility with respect to preparations and response to weather emergencies. Utilities were invited to comment on a draft of the NEI Report. As a result, NEI made a number of changes to its draft report. The

utilities, however, further commented that the final NEI report addressed very few of their specific concerns and they assert that the report does not adequately reflect areas in which all of them performed well in the aggregate or some of them performed well relative to the others.

The NEI Report has been carefully reviewed and it provides a useful starting point for developing and prioritizing specific action items. The utilities' responses to the NEI Report and the steps that each utility has implemented since the December '08 ice storm have also been considered. While an important part of the after action review, the NEI conclusions and recommendations are not endorsed or adopted in their entirety, and the Commission acknowledges the utilities' larger point that a review of such a large body of data can result in over generalizations in some respects.

Close attention was also paid to comments provided at the public meetings held by the PUC and Homeland Security and Emergency Management (HSEM) during March and April 2009, as well as the nearly 200 comments posted on the PUC website in response to the Commission's ice storm survey and the approximately 500 calls made to the PUC's Consumer Affairs Division regarding the ice storm.

C. Focus

The utilities' storm response entailed tremendous effort, unprecedented coordination and dedication from every utility employee. Utility employees worked long, hard days in very difficult conditions to restore power to the citizens of New Hampshire in as short a timeframe as possible without compromising safety. The intent of this report is not to diminish or disregard any of the multitude of actions that were performed efficiently and effectively but, primarily, to identify *prospective* improvements regarding emergency planning, storm response, resource acquisition and allocation, vegetation management, and communications. This review also evaluates areas where utilities may not have prepared or responded consistent with reasonable expectations, thus providing a basis for *retrospective* investigation.

The Commission's observations and actions in response are found at the end of each section and summarized in Appendices A and B.

II. EMERGENCY PREPAREDNESS

As the NEI Report notes, "emergency planning forms the basic underpinning of any company's ultimate performance during an emergency." A utility's preparedness in the event of an emergency such as the December '08 ice storm and its aftermath depends on a number of factors. Based on the after action review, as well as experience working with utilities and other state and local officials during the ice storm, it is clear that the following elements are critical to effective emergency preparedness on the part of public utilities in New Hampshire:

- Emergency response plans;
- Vegetation management;
- Outage management systems; and
- Mutual aid agreements.

Each one of these elements plays an essential role in a utility's efforts to prepare for a major emergency. In this after action review, an examination was performed of the extent to which each element was used by each utility, and where improvements could be made.

A. Emergency Response Plans

Emergency response plans must be comprehensive in scope, accessible to employees, and up-to-date. The contents of a utility's emergency response plan should be consistent in structure with those used by public officials within national, state and local governmental jurisdictions to allow all entities, public and private, to effect an overall efficient response to any type of incident. A utility's emergency response plan should be modeled after the well-established Incident Command System (ICS), one of three cornerstones of the federal National Incident Management System. New Hampshire's State Emergency Operations Plan is based on the ICS system and follows the framework established in the National Incident Management System. Use of this model would allow a core set of concepts, principles, terminology and organizational processes to facilitate effective, efficient and collaborative incident management.

1. *National Standards for Incident Management and Command*

The National Incident Management System (NIMS), developed by the U.S. Department of Homeland Security and released in March 2004, is a standardized approach to incident management and response for use by emergency responders at all levels of government. NIMS

consists of five key components: Preparedness; Communications and Information Management; Resource Management; Command and Management; and Ongoing Management and Maintenance. The model "Command and Management" function encourages the use of the Incident Command System (ICS), which contains the following five elements: Command; Operations; Planning; Logistics; and, Finance and Administration.

Using the NIMS principles and the ICS structure facilitates the coordination of emergency planning and response across jurisdictional boundaries, including among government entities, as well as between government entities and private entities such as public utilities. Through the public-private coordination of emergency planning, utilities and municipalities can ensure more effective response in times of emergency.

Each of New Hampshire's 234 municipalities is required to appoint an emergency director and to establish an emergency organization.[1] A municipal emergency organization must be developed in accordance with the State's emergency management plan, which incorporates the ICS as the principal incident command system. Although state statutes do not require municipalities to have emergency plans, they are expected to do so to be eligible for federal assistance through FEMA in the event of a federally-declared disaster. Most, but not all New Hampshire municipalities have emergency response plans.

Every public and private school in the state is required to have an emergency plan.[2] Many schools coordinate their emergency planning with the Bureau of Emergency Management through HSEM's Comprehensive Emergency Management Planning for Schools.

Most local responders, including most fire departments and some police departments, follow an ICS system for emergencies. Although not required to adopt the ICS structure for emergency management, municipalities are wise to adhere to the principles set forth in both NIMS and the ICS.

Given the volume of complaints that the Commission received concerning poor communications between utilities and municipal officials during the December ice storm, the Legislature may want to consider statutory requirements for municipalities to implement emergency response plans that incorporate NIMS and ICS. Toward that end, the Legislature may want to amend RSA 21-P:39, as appropriate, to encourage each municipality to prepare an

[1] *See* RSA 21-P:39.
[2] *See* RSA 189:64.

Emergency Response Plan and to update such plans on a regular basis. Such a step would ensure smoother interaction among municipalities and utilities through integrated emergency plans, common response frameworks, common terminology, and a public perception of a coordinated and seamless response.

2. *Utility Emergency Response Plans*

Each of New Hampshire's three investor-owned electric utilities and the electric cooperative has an emergency response plan in place. Those plans vary in size and scale from utility to utility. The NEI Report identifies 33 elements that should be contained in a well written plan.[3]

Emergency Response Plan - PSNH. PSNH's emergency plan, updated just prior to the December ice storm, is 231 pages long and comprehensive. The plan contains the five functional elements of an ICS, as well as detailed descriptions of command staff responsibilities and objectives. It also sets forth the organizational structure of PSNH's Area Work Centers located throughout the state. Most of the 33 elements identified by NEI are included.

Emergency Response Plan - National Grid. Last updated on October 31, 2008, and 218 pages long, National Grid's Emergency Plan is also comprehensive. Written from a corporate-wide perspective, the plan follows the ICS framework and has detailed descriptions of objectives and responsibilities. Most of the 33 elements enumerated by NEI are addressed. The plan is not customized to fit New Hampshire's service territory, as it was written to cover a broader area within both New Hampshire and Massachusetts. While emergency response plans must provide flexibility and a degree of discretion on the part of the company, National Grid should customize its plan to New Hampshire customers. For example, the plan should recognize that the company's service territories in New Hampshire are in two distinct areas of the state, approximately 90 miles apart.

Emergency Response Plan - Unitil. As noted by NEI, the plan that Unitil had in effect in 2008 was inadequate for the severity of the ice storm and the amount of damage experienced.[4] Unitil recognized the substantial shortcomings of that plan and completely rewrote it to incorporate the standard ICS organizational structure as of October 30, 2009, and adopt procedures adequate for handling a large scale emergency such as the December '08 ice storm.

[3] *See* NEI Report at III-6.
[4] NEI Report at III-13.

The revised plan is over 300 pages and comprehensive. The new plan accommodates all types of emergencies, including one as severe as the December '08 ice storm, and appears to sufficiently represent the service territories found in New Hampshire with references to the localities it serves.

Emergency Response Plan - NHEC. NHEC's emergency plan is brief and serves more as a checklist of basic procedures in the event of an emergency situation. The plan does not contain specific references to the five functional elements of an ICS (command, operations, planning, logistics and finance and administration), although it does in a general way cover appropriate substantive areas. The plan also does not contain detailed descriptions of command staff responsibilities and objectives. NHEC intends to upgrade its emergency plan to formalize some of its current procedures in a more detailed, organizational approach. NHEC should make its plan more compatible not only with other electric providers, but with the municipalities it serves. At a minimum, NHEC's plan should include the five functional elements of an ICS.

3. *Emergency Planning and Response Organizational Structure*

PSNH, Unitil and NHEC each designate a New Hampshire emergency contact and include such a position within their emergency response plans. National Grid does not assign New Hampshire its own district designation for Emergency Planning purposes, but rather combines New Hampshire and portions of Massachusetts. Emergencies within New Hampshire service territories are typically handled by National Grid from out of state unless the emergency is caused by an event that occurs solely within New Hampshire service territories. During the December ice storm, restoration efforts in New Hampshire were handled from North Andover, Massachusetts.

National Grid's ERP should reflect the same organizational structure as the company's operations plans. That is, there should be personnel clearly designated and responsible for managing emergency operations in New Hampshire service territories and communicating with State officials. While neither National Grid's field response plan nor its communications at the customer and municipal level were negatively affected by the lack of a New Hampshire-based position, the designation of such a position would improve the company's plan.

Observation:

A New Hampshire emergency contact should be identified within each utility. The inclusion of such a position in each utility's ERP will facilitate efficient and effective communications.

***Action Item*:**

1.1 National Grid should designate a New Hampshire emergency management contact and incorporate into its ERP at least one position based in New Hampshire that can serve as an effective contact at a decision-making level. The ERP should incorporate language that clearly allows flexibility in determining the emergency response levels applicable for New Hampshire territories and recognizes that the company's service territories are in two distinct areas approximately 90 miles apart.

Observation:

Currently there is no rule requiring electric utilities to file Emergency Response Plans with the Commission.

Action Item:

1.2 The Commission will amend section Puc 300 of the Administrative Rules to require electric utilities[5] to file Emergency Response Plans annually with the PUC. Plans should be consistent with NIMS and ICS standards. Utilities should review and update plans at least once each calendar year. Plans with employee names and cell phone numbers redacted would be sufficient and may be filed electronically.

Observation:

Currently there are no statutory or regulatory provisions that require municipalities to maintain Emergency Response Plans, although they are required to establish emergency response organizations. This makes it difficult for utilities to integrate their emergency response procedures with those of the municipalities, because written plans are not always available. This gap can be easily eliminated to ensure coordinated response efforts.

[5] Pursuant to RSA 362:2, II, NHEC is not a public utility but it is regulated by the PUC in certain respects. There is some dispute about the extent of the PUC's regulation regarding safety, which the Legislature may wish to clarify.

Action Item:

1.3 Each utility should work with the municipalities in which they provide service to integrate their Emergency Response Plans to ensure emergency response efforts are coordinated for maximum effectiveness.

Observation:

Some of the utilities' current storm drill procedures do not include participation by state and local governments, mutual aid partners, first responders, telecommunication companies or other utilities.

Action Item:

1.4 Each electric utility should expand emergency readiness drills to include in-house employees as well as outside participants typically involved in emergency response efforts. Each electric utility should conduct drills at least bi-annually that are coordinated with other electric and telecommunications utilities, mutual aid organizations, cities and towns, the State's Homeland Security and Emergency Management organization and the Commission. As part of their drill procedures, utilities should document attendees, topics and drill assessments.

B. Vegetation Management

New Hampshire is a heavily forested state, and ice storms bring about tremendous damage as limbs fall and entire trees are uprooted. It is no surprise, therefore, that an ice storm of this severity would bring down so many power lines. Utilities routinely trim the trees in proximity of their facilities, and each utility has a vegetation management program scrutinized by the Commission.

Although the damage caused by fallen trees was extreme, it does not appear that the tree trimming practices of the utilities are at fault. Much of the damage was due to trees or limbs from outside the trim zone. Unless we substantially increase the area around utility lines, a high level of damage will always be likely in an ice storm of this magnitude.

That being said, there are a number of areas in which tree trimming practice can be improved to minimize damage where possible and allow for a more uniform approach to vegetation management.

Simply to hope that a storm of this magnitude will not recur and thus we need not reevaluate vegetation management protocols would be irresponsible. Extreme weather events

have been on the rise, as noted by NEI[6]. More importantly, the actions identified herein should be beneficial in smaller scale, more routine, weather events which we can be certain will occur.

1. *Tree Trimming Statutes*

NEI notes that New Hampshire's vegetation management laws pose a constraint on the utilities' ability to implement aggressive tree trimming practices. State statutes have historically made it difficult for utilities to trim or remove trees on private property without explicit consent from the landowner, even where the affected trees are located in the public right-of-way or pose an immediate hazard to the power lines. Legislative changes promulgated in 2009 have alleviated those constraints to some extent.[7] The constraints of existing statutes, however, do not obviate a close examination of vegetation management practices. The heavy vegetation found in New Hampshire logically points to the need for robust vegetation management, and should be taken into account in emergency planning.

2. *Tree Trimming Practices*

Tree trimming practices are routinely addressed in proceedings before the Commission, including reviews of utility reliability enhancement programs and, to the extent baseline funding of tree trimming is concerned, rate cases. Trim cycles vary from utility to utility, as indicated in the NEI Report. In light of the widespread effects of the December ice storm and the direct and widespread impact on customer electric service, it is appropriate to consider standardized trim cycles and trim zones[8].

The prominence of vegetation as a significant factor in the December '08 outages warrants closer monitoring by Commission Staff of utility vegetation management practices. This could include spot-check reviews by utilities or the Commission Staff of specific circuits, streets and customers where the public at large can be directly affected by both safety violations and poor tree trimming performance. More detailed and frequent reporting of vegetation management progress would facilitate such monitoring. For example, photographs of trees that have been trimmed could be included through hyperlinks in utility filings made under enhanced monitoring requirements.

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[6] NEI Report, Appendix D
[7] *See* RSA 231:145 and RSA 231:172.
[8] Utility responses to Staff Data Request 1-33 and 1-34. Trim zones vary from utility to utility and are approximately 6 to 10 feet from either side of the electric conductor. Vertical trim zones typically range from 10 to 15 feet above the conductor.

Given the existing statutory framework concerning tree trimming and utility complaints that the laws are too restrictive, it is also important to monitor the utilities' efforts to obtain landowner consent to trim trees, and how closely they work with their tree contractors in discussions with landowners concerning tree trimming.

Vegetation Management - PSNH. PSNH is undertaking a number of actions to improve the reliability of its distribution system in accordance with its Reliability Enhancement Program (REP), a five-year plan in place since July 2007. PSNH's REP includes an additional $5 million per year in rates for shorter cycles for planned vegetation maintenance on distribution circuits of various voltages and increased removal of danger and hazard trees. With just under 13,000 miles of distribution lines, PSNH now expends approximately $11 million a year to trim 2,300 miles of lines, up from approximately $6 million in 2003.

PSNH's REP is updated and reviewed annually with Commission Staff. Actions such as increasing hazard tree removal, shortening trim cycles and increasing mid-cycle trimming will directly improve system reliability. The December '08 ice storm occurred at a time when the increased tree trimming that PSNH performs under its REP program was still at an early stage of a multi-year program. That said, according to Staff's analysis, since the majority of damage to power lines during the storm resulted from trees and limbs falling from *outside* the trim zone, it is unlikely that PSNH's increased budget for vegetation management would have materially affected the number and severity of outages resulting from the ice storm.

Regarding its transmission operations, PSNH maintains several ongoing multi-year programs for inspection, maintenance and replacement of various pieces of equipment. In addition, PSNH has identified and addressed issues that arose with the transmission system during the storm.

PSNH has a pending distribution rate case before the Commission (Docket No. DE 09-035). As part of that proceeding, PSNH has requested changes in the components and funding of its REP to allow for augmented vegetation management, some additional equipment replacement, and the establishment of a five-year program to implement a Geographic Information System (GIS). Hearings are scheduled for April 2010, with a Commission decision expected by June 2010.

Vegetation Management - National Grid. National Grid has a multi-year Reliability Enhancement and Vegetation Management Program (REP) in place as a result of Docket No. DG

06-107. National Grid's REP contains the same elements as PSNH's REP in terms of addressing system reliability and operations through vegetation management, danger and hazard tree removal, system maintenance and inspection, and equipment replacement through distribution circuit feeder hardening. As with PSNH, the details of National Grid's plan are reviewed and discussed with Commission Staff on an annual basis.

For fiscal year 2010 (April 1, 2009 – March 31, 2010), National Grid's proposed REP included a base operations and management (O&M) budget of $1.36 million, with an additional $100,000 for enhanced hazard tree removal and $500,000 for capital investments to improve the reliability of the system. Those funds would allow National Grid to trim 176 of its 898 miles of overhead distribution lines and remove 1,040 hazard trees. Based on Staff's review of the proposed budget, the final proposed O&M budget was increased slightly from $1,360,000 to $1,372,000 and the proposed capital budget for REP was increased from $500,000 to $620,000 to allow for additional reliability-related expenditures.

National Grid's distribution circuit tree trimming and hazard tree removal programs are part of National Grid's corporate goal to improve reliability and safety to the public in its New England and New York service territories. Overall vegetation management activities are managed by two National Grid groups: one develops the yearly work plan and budget; the other implements the plan. The implementation group includes an arborist responsible for the plan's implementation in New Hampshire who oversees all contractor work.

The base trim cycles are set for all National Grid companies based upon the growing season and type of vegetation in each state in which National Grid operates (New Hampshire, Massachusetts, Rhode Island and New York). In New Hampshire, National Grid uses a 5-year average trim cycle for its circuits. To improve circuit reliability, entire circuits are trimmed in the same year based on a probabilistic trimming approach that seeks to maximize reliability within the trim cycle period. National Grid utilizes contract crews for all its line clearance work.

Vegetation Management - Unitil. Unitil maintains approximately 1,200 miles of overhead distribution lines.[9] It expends approximately $780,000 per year on distribution trimming, an amount fairly level since 2002. However, the number of miles trimmed has

[9] This includes 330 miles of 34.5 kV sub-transmission lines. Unitil trims approximately 14 miles per year at an average cost of $80,000 per year.

decreased significantly over the past seven years.[10] In 2003, Unitil trimmed 175 miles at an expenditure of approximately $794,000. In 2007, Unitil trimmed 82 miles at a cost of approximately $854,000; in 2008, Unitil expended slightly over $778,000 to trim 87.5 miles. Unitil's recent reliability metrics are mixed. Commission Staff will monitor closely to determine if a reliability enhancement program is appropriate.[11]

While it is difficult to quantify how much damage to the Unitil system might have been avoided during the ice storm through more extensive trimming, mixed reliability metrics and a review of storm damage data provide a sufficient basis for re-examining Unitil's vegetation management practices.

Vegetation Management - NHEC NHEC maintains approximately 4,500 miles of primary line. As the NEI Report states, NHEC trims its right-of-way (ROW) areas on a 7-to-10 year cycle; however, NHEC has moved to a reliability-based 3-year trim cycle on all 3-phase circuits that emanate from system metering and station points. NHEC also clears its ROW "ground-to-sky,"[12] which, in NHEC's view, balances financial interests with the benefits of more frequent trim cycles.

For years, NHEC's vegetation management has incorporated danger tree removals from outside the trim zone, in accordance with easement language that allows NHEC to remove dead and weak trees from outside the trim zone if they are tall enough to fall on wires. While NHEC's outside-the-trim-zone practices are to be commended, there nevertheless remains a concern about the length of NHEC's current trim cycles.

Observation:

In view of utility compliance with existing vegetation management requirements and the fact that the majority of the trees responsible for downed poles and wires fell from outside existing trim zones, utility tree trimming practices do not appear to have been a material contributing factor in the extent of the December '08 ice storm outages. Nevertheless, there are areas for potential improvements.

[10] Approximately 5-10 percent of utility tree trimming budgets goes toward municipal police services, in accordance with municipal regulations.
[11] In the cases of PSNH and National Grid, REPs were developed in connection with rate proceedings and in recognition of declining reliability statistics.
[12] "Ground-to-sky" trimming eliminates all vegetation at all levels within a trim zone.

***Action Items*:**

2.1 Standardized trim zones and cycles should be considered for statewide application. A single statewide standard would alleviate confusion for municipal officials, as well as utility customers, as some franchise boundaries cut across municipal lines.

2.2 Staff will meet with PSNH, Unitil, National Grid and NHEC and submit recommended trim cycles and zones by April 2010, to be promulgated in the Puc 300 rules. The following should be considered as a starting point for this review: all sub-transmission circuits (34.5 kV – 69 kV) to be trimmed on a cycle not to exceed 48 months, and all distribution circuits be trimmed on a cycle not to exceed 60 months; all 3-phase distribution circuits to have clearances of 10 feet below, 8 feet to the side, and 15 feet above; and, single phase circuits and those 3-phase circuits with Hendrix cable to be cleared 10 feet above and below and 8 feet to the side. Though considerably more expensive, "ground-to-sky" trimming should be considered, as should the use of chemical treatments as part of an integrated vegetation management program.

2.3 Each utility should incorporate as standard practice the inspection of 100% of circuit miles trimmed and all hazard tree removals, a practice currently used by PSNH and National Grid. In addition, a detailed report compiling the results of inspections with mapping depictions should be submitted annually to the Commission. The inspection should be conducted by an arborist or forester unaffiliated with the entity providing the tree trimming services. Currently, PSNH and NHEC employ in-house arborists or foresters. National Grid uses arborists or foresters employed by its affiliated service company. Unitil relies on unaffiliated arborists included in tree trimming contracts.

2.4 Commission Staff will monitor tree trimming on a more systematic basis, with an emphasis on identifying potential violations of the NESC safety code and utility integration of GIS with vegetation management practices. Rulemaking will be initiated to amend existing rules accordingly. The Commission will consider retaining an arborist to inspect and report on utility tree trimming practices.

2.5 Commission Staff will conduct a review of Unitil's vegetation management and distribution hardening practices and associated budget levels, and report its findings to the Commission by June 2010.

2.6 Commission Staff will conduct a review of NHEC's tree trimming policies and practices and report by April 2010.

2.7 Utilities should improve communications with customers concerning the importance of hazard tree removal and maintenance trimming.

2.8 Utilities should record each time a homeowner does not provide consent to trim or remove a tree where such consent was requested, as well as details of interactions with the homeowner. Utilities should file such record with the Commission on an annual basis by June 30 each year.

3. *Undergrounding Utility Facilities*

Following the December '08 ice storm and in light of the extensive damage caused by ice-laden trees and branches falling into overhead electric lines, some customers have asked whether such widespread destruction could be avoided by replacing existing overhead electrical transmission and distribution systems with underground facilities.[13]

NEI gathered information from the electric utilities regarding the estimated costs and other requirements involved in placing overhead facilities underground. In its report, NEI concludes that undertaking a wholesale replacement of transmission and distribution lines would be cost prohibitive. Undergrounding transmission and sub-transmission lines is estimated to be as much as 20 times more costly than overhead installation; undergrounding distribution lines can cost up to 10 times as much. Based on information provided to NEI, undergrounding the State's entire distribution system would cost in excess of $40,000 per customer and would take 40 years or more to complete. Each customer would see an increase in their monthly electric bill of 110 to 150 percent for decades into the future.

The geography and terrain of New Hampshire make undergrounding of existing lines generally impractical as well as costly. In Appendix B to its report, NEI notes a number of other concerns that can arise with the undergrounding of utility facilities, such as the difficulty in accessing underground conduits for maintenance and repair purposes, and the vulnerability of undergrounded facilities to flooding.

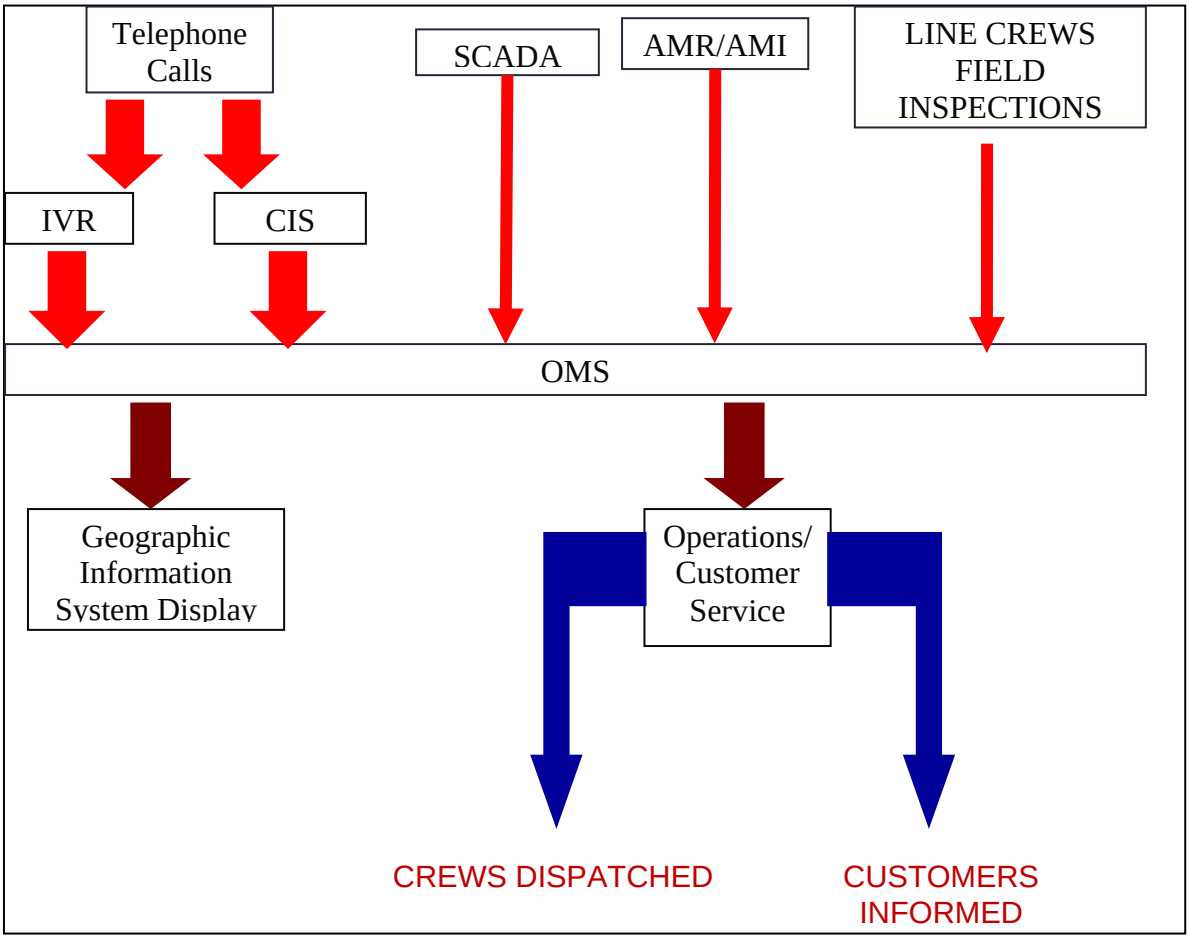
At the same time, certain limited underground installations, such as new development construction or facility replacements in designated areas, could be beneficial; in fact,

[13] As part of this discussion, NEI researched the issue and made a presentation to the Science, Technology and Energy Committee of the New Hampshire House of Representatives on June 9, 2009. The presentation can be found on the Commission's website at: http://www.puc.nh.gov/2008IceStorm/ST&E%20Presentations/NEI%20Underground%20Presentation%2006-09-09.pdf

undergrounding is often used in new developments and required by many municipal planning boards in New Hampshire. Consequently, undergrounding of utility facilities is best considered on a case-by-case basis in accordance with the specific circumstances of particular projects, rather than through a general policy proposal.

C. Outage Management Systems

An Outage Management System (OMS) is an integrated communications system that allows a utility to identify and respond sooner and more effectively to outages occurring on its system. By integrating a utility's various systems, an OMS enables the utility to identify and locate outage problems, prioritize restoration efforts, and provide accurate and timely information to the public. The informational flow of an OMS is shown below: [14]



[14] Source: NEI. A detailed description of Outage Management Systems and their uses is contained in Appendix G of the NEI Report. System acronyms are defined as follows: SCADA- Supervisory Control and Data Acquisition; AMR- Automated Meter Reading; AMI - Advanced Metering Infrastructure; CIS - Customer Information System; and IVR - Interactive Voice Response.

An effective OMS is a valuable tool for efficient data management. Tied into a Geographic Information System (GIS), an OMS can be a powerful aid in storm restoration. A GIS uses mapping software and database systems to manage, analyze and display geographically referenced information, such as electric meter and utility pole locations.

To reap the benefits of an OMS, a utility must integrate its systems and its employees to the OMS, especially for utilities that historically have used other ways to prioritize and restore power during outages. Even a well integrated OMS is limited by the quality of the information it receives and can become overwhelmed or unreliable if other systems are damaged. No OMS will guarantee flawless reports on the number of customers out of power, the extent of damage to the system or when customers will be restored. Nonetheless, a modern, integrated OMS is the current standard for system operators to respond more effectively to outages.

Outage Management System - PSNH. NEI notes that PSNH is the only New Hampshire electric utility without a state-of-the-art OMS or plans to implement one. PSNH uses an Outage Analysis and Reporting System (OARS) to assist in assessing, coordinating and restoring its system during outages. According to PSNH, OARS contains a predictive modeling component that shows outages on the distribution system at the protective device level. Although PSNH has stated that the OARS is highly accurate, NEI notes that PSNH performs the functions of outage management by having employees manually perform the calculations and analysis that would be performed under an OMS by a computer. In fact, PSNH's OARS did not function during the first 48 hours of the ice storm and State officials, including Commission Staff, had difficulty in getting reliable outage information from PSNH throughout the storm response.

PSNH does not currently have a GIS, a critical component of an effective OMS. In PSNH's pending distribution base rate case (Docket No. DE 09-035), the company proposes implementing a GIS as part of a multi-step process. PSNH has not proposed implementing an updated OMS as part if its rate case. The development and installation of a GIS will be examined in the PSNH rate case.

In its comments on NEI's draft report, PSNH stated that it "believes that its customers' money would be better spent to help prevent outages, rather than to manage them differently in

the rare circumstance of another event of this magnitude."[15] Whatever the cause of a major outage, having the proper systems in place that are capable of utilizing high quality, timely data to manage such events will ensure that outage durations are no longer than necessary. An effective, state-of-the-art outage management system is vital to ensuring public safety and public confidence in the reliability of the electric system. Prevention and management of outages are not mutually exclusive; it is critical that options for both, including cost considerations, be taken into account in future planning decisions.

Outage Management System - Unitil, NHEC, National Grid. As NEI noted, Unitil did not have an OMS at the time of the December '08 ice storm, but is now in the process of installing it for operation in December 2009. Both NHEC and National Grid had an OMS at the time of the ice storm, although National Grid has since decided to upgrade to a more powerful system. Thus, NHEC, Unitil and National Grid have implemented the latest in OMS systems within their overall strategy of developing a distribution management software framework. This leaves the state's largest electric provider as the only one that cannot provide its customers with the benefits of a state-of-the-art OMS.

Outage Management System - Telecommunications Companies. In a similar vein, telecommunications companies should analyze the extent to which automated line testing could improve restoration efforts in widespread outages. The ability to identify pockets of telephone outages through such a mechanism before electricity is restored could improve prioritization efforts and shorter restoration time. In addition, if telecommunications providers were to use automated line testing to identify outage areas without solely relying on calls from customers, the inefficiencies caused by staggered calls from customers returning after power is restored could be alleviated. Outages could be identified for an entire area and dispatched efficiently, rather than going to the same street multiple times when individual customers report problems. Furthermore, automated messages at repair centers or information releases provided via a website that identify exactly where the telephone system is out could greatly reduce calls to the repair center.

Observation:

The lack of integrated GIS and OMS systems or automated line testing may have hindered restoration efforts; such tools could be useful in widespread outages in the future.

[15] PSNH Response to NEI Draft Report at 3.

***Action Items*:**

3.1 The Commission will consider, as part of PSNH's pending rate case, the adequacy of PSNH's outage management system.

3.2 Telecommunications companies should analyze the extent to which automated line testing could improve restoration efforts in widespread outages and report their findings to the Commission by June 2010.

D. Resource Procurement in Emergency Situations

Effective restoration in the wake of large-scale emergency events such as the December '08 ice storm requires, above all, personnel on the ground, often at levels many times greater than a utility has available within its own corporate structure. In such large-scale emergencies, utilities seek additional field crews as well as damage assessors to assist in restoration efforts. Such assistance can be critical to efficient restoration of power.

1. *Mutual Aid Options*

Electric utilities have a number of options for requesting outside resources and assistance.

a. Affiliated companies directly to seek their assistance

Utilities typically call upon their own affiliates to provide emergency restoration services. Affiliated companies report to the same parent company and enjoy an existing relationship with the requesting company. Both PSNH and National Grid called on affiliates and relied on their larger corporate organizational structures for assistance during their storm restoration efforts. Unitil's affiliate, Fitchburg Gas and Electric, was in no position to send any workers – an issue addressed below. NHEC does not have affiliates to call upon, however, it reached out through existing cooperative networks, as noted below.

b. Regional mutual assistance organizations to request help from New England companies

As NEI outlined in its report, electric utilities may sign up with regional mutual assistance organizations through which utilities share crews and resources in times of need. The regional organization receives requests for assistance, coordinates resources and dispatches crews from member companies. In New England, utilities may join the Northeast Mutual Assistance Group (NEMAG), which was established in 2007 by a group of New England and Canadian electric utilities to facilitate the sharing of crews during emergencies. PSNH, National Grid and Unitil all belong to NEMAG, which recently expanded to include electric cooperatives.

Electric cooperatives also may join a similar mutual aid organization comprising electric cooperatives, the Northeast Public Power Association (NEPPA). NHEC belongs to NEPPA.

During the December '08 ice storm, the electric utilities called upon NEMAG and NEPPA, with various levels of success, depending on when requests were made. NEMAG is a first-come/first-served system and, at times, all mutual aid crews were deployed either in their home service territories or elsewhere in New England.

c. Mutual assistance groups (MAGs) beyond New England

NEMAG resources were exhausted quickly because all member utilities were affected by the storm. By Day 2 of the storm (Friday, December 12), all New Hampshire electric utilities except NHEC were reaching out to the Mid Atlantic MAG (MAMA) and NY MAG. Again, because the storm was so widespread, out-of-region MAGs were not able to provide significant assistance.

d. Non-utility contractors through predefined contracts

Utilities may also retain outside crews on a contract basis that allows for the right of first refusal. All of New Hampshire's electric utilities secured non-utility contract resources.

An important advantage to non-utility contracts is that, unlike the resources made available by utility contractors, they are not prone to being recalled, as utility contractors often are to assist their home utilities. Another advantage of such contracts is that they can be lined up ahead of time, long before a major weather event occurs, although such an approach may entail significant costs.

e. Unaffiliated utility companies outside New England

Utilities may also contact unaffiliated electric utility companies across the country to seek assistance. All the electric utilities did so in the wake of the December '08 ice storm because resources were not available through regional assistance organizations.

f. National organizations

Electric utilities may also contact national organizations such as Edison Electric Institute (EEI) to secure emergency restoration firms based beyond the East Coast. None of the New Hampshire electric utilities called for such assistance.

2. *Utility Resource Procurement Practices*

In the wake of the December ’08 ice storm, certain electric utilities have extended their use of mutual aid and contractual arrangements, while others maintain that their existing arrangements are sufficient.

Resource Procurement Practices: PSNH. According to PSNH, it secured hundreds of tree and line crews outside of the mutual aid process.

Resource Procurement Practices: National Grid. National Grid maintains contractor crews from outside the area that are ready to travel to New Hampshire in advance of a storm and that, in relation to the December ’08 ice storm, it had positioned crews prior to the storm.

Resource Procurement Practices: NHEC. NHEC has access to line contractors on a right of first refusal basis. In addition, NHEC can access crews through NEPPA, NEMAG, the Northeast Association of Electric Co-ops and over 600 electric cooperatives nationwide.

Resource Procurement Practices: Unitil. Since the December ’08 storm, Unitil has expanded its pool of potential emergency response crews by making arrangements with major line contractors as well as joining Edison Electric Institute’s “Restore Power,” an organization that will provide access to hundreds of mutual aid utilities and contractors.

3. *Damage Assessment Resources*

Effective management of resources, including requests for outside assistance, depends on comprehensive knowledge of the damage to be addressed. Each utility conducts its own damage assessments in the wake of a weather-related outage event such as the December ’08 ice storm. Such assessments typically involve sending out trained crews who follow designated circuits to identify where the system has been compromised. Reports are then relayed to a home base, where operations management directs resource deployment and requests for outside assistance.

National Grid used information supplied by municipalities regarding damage assessments and road conditions to supplement the work of its own personnel. PSNH, NHEC and Unitil relied entirely on their own internal resources to conduct damage assessments.

While the NEI Report recommends pre-positioning damage assessors prior to a major weather event such as the December ’08 ice storm, it does not address or acknowledge the reasons why such a recommendation may be difficult to implement. The utilities point out that it may not be feasible or even reasonable to pre-position personnel prior to a major weather event. Roads may be blocked or otherwise unsafe for driving, for example, and pre-positioned crews

may not be able to reach outage areas at all. However, it does not necessarily follow that there is no value in pre-positioning resources. Crews could be positioned at the utility's work centers, for example, and utilities could work closely with municipal officials to ensure at least a minimum of personnel are distributed across the service territory in the event of a wide scale outage. Such measures might be preferable to relying solely on utility personnel starting out from their homes after an event has occurred.

Observation:

Utilities could have used more crews on the ground at an earlier point in time than occurred in the December '08 ice storm. Additional crews are available through a variety of avenues, including regional and extra-regional mutual aid arrangements, external contracts, cooperative arrangements with municipalities, and other utilities.

***Action Items*:**

4.1 Electric utilities should consider lining up outside contracts that include a right of first refusal in the event of a major storm and reducing reliance on mutual aid arrangements.

4.2 Electric utilities should examine the benefits of contracts with national firms to ensure a wider availability of potential resources in the event of an emergency.

4.3 Each utility should file with the Commission summaries of its mutual aid arrangements (regional as well as extra-regional), external contracts and municipal outreach efforts.

4.4 Each utility should memorialize the expectations of senior management for Emergency Response Actions through the implementation of a clear management strategy for storm restoration to be included in the company's Emergency Response Plan.

4.5 Each utility should establish and incorporate into its emergency plan a standardized trigger-point for resource procurement, based on clear benchmarks.

Observation:

Utilities interact with public officials during the normal course of business; as a result, existing relationships can be leveraged in the event they are needed and available. The benefits to an integrated approach with municipal officials include a more broadly distributed workforce with knowledge of local road conditions and areas within municipatlites that are problematic or hazardous to safety, a workforce that is used to working beyond regular business hours, one that works in and around traffic and is therefore aware of necessary safety precautions, and one that

interacts on a regular basis with the general public and as a result has local knowledge of businesses, at-risk homes and elderly populations.

***Actions Items*:**

4.6 Utilities should explore and report on opportunities to obtain damage assessment assistance from appropriately trained municipal employees, including Public Works Departments, Fire Departments, Police Departments and other Emergency First Responders. Such cooperation would be appropriate for a large-scale disaster classified as a State of Emergency in New Hampshire, rather than for more routine storm events. This concept, if found successful, could be further expanded to include other non-state emergencies requiring an immediate workforce spread over a large geographic area.

4.7 Utilities should train local officials well in advance of an incident, with a focus on the fundamentals of an electric distribution system, safety precautions and safety hazards. Details would need to be worked out as to how such a public/private partnership could operate effectively, but the potential advantages should be explored.

4.8 Electric utilities should consider working with telecommunications companies to cross-train telephone line workers to assess damage, as they will tend to be familiar with territory service geography and line circuits.

III. EMERGENCY RESPONSE

The effectiveness of a utility's response to an emergency outage situation depends on a number of elements. In the case of the December '08 ice storm, accurate weather data was fundamental to informed decision making. Through meaningful analysis of weather forecasts, a utility can make better decisions with respect to resource procurement and deployment. In December 2008, New Hampshire's utilities appear, as a general matter, to have underestimated the potential impact of the ice storm. Once the storm hit, decisions to procure and deploy resources were essentially being made after the damage was done, potentially contributing to the length of outages in many areas. Although each utility labored long and hard on the ground once restoration efforts were underway, opportunities exist for improvement in response planning and implementation.

A. Weather Forecasting and Data Archiving

Timely and accurate weather forecasts are critical to a utility's ability to respond effectively to a major weather event such as the December '08 ice storm. Three of the four New Hampshire electric utilities subscribe to individual weather services, which provide footprint-specific forecast information. NHEC relies on weather forecasts broadcast on publicly available media sources. Although a company-tailored forecasting service constitutes a best practice, NEI's assessment is that NHEC's reliance on public media for weather information does not appear to have been detrimental to its storm response. It is relevant to note, however, that NHEC's service territory, the majority of which is farther north than the major area of ice build-up, did not suffer the magnitude of damage during the December '08 ice storm that the other utility territories did.

For purposes of effective emergency preparedness, weather forecasting must provide a high level of detail and accuracy. The weather forecast is an essential element in determining the classification of the emergency and in deciding when to invoke mutual aid. On Wednesday, December 10, the day before the ice storm hit, professional weather services reported the potential for significant icing, with accumulations of up to an inch throughout southwestern New Hampshire. High wind advisories were forecast as well, with sustained winds of 25 to 35 miles per hour and gusts of 45 to 55 miles per hour expected. At 6 a.m. on Wednesday, December 10,

PSNH received its first forecast of "possible significant icing." On the same day, other utilities started receiving forecasts of a "significant icing event" and a winter storm with potential for significant icing. On Wednesday evening, the National Weather Service forecasted the potential for a major ice storm and "a potentially dangerous situation with long duration power outages possible."

It is currently left to the utility's management discretion to determine the appropriate forecast benchmarks for launching emergency preparations and resource deployment. Based on a review of the forecasts issued by the National Weather Service and the private forecasting services, New Hampshire's electric utilities, although aware of the impending storm, appear to have underestimated the potential scope and magnitude of the impact of the December ice storm. As a result, with the exception of National Grid, each company experienced delayed damage assessments, which resulted in competition for additional resources, and hampered restoration efforts, as discussed in the following section.

Observation:

NEI concluded that New Hampshire electric utilities are not adequately recording weather data or making effective use of forensic weather data**.** As NEI notes, such data can be used to determine why a particular weather event caused the damage that occurred but, to perform this type of damage analysis, accurate weather data needs to be recorded and archived.

As NEI points out, there is a great deal of anecdotal evidence concerning ice loading on trees and utility structures that occurred due to the ice storm, but none of the utilities endeavored to record actual ice levels, where ice accretion occurred, or how ice levels contributed to damage to power line structures.

While existing projection models may still be in a developing stage, as NEI indicates, New Hampshire's electric utilities should consider tracking forensic weather data for purposes of improving their reaction to weather forecasts as well as planning more effective restoration efforts.

***Action Items*:**

5.1 Each electric utility should gather and analyze weather and damage information during and immediately following weather events and develop improved models to predict damage.

5.2 Each affected utility shall file self-assessments with the Commission within 60 days following any State-declared emergency event that implicates utility services. Forensic analyses of weather data should be a part of those self-assessments.

B. Resource Deployment and Restoration Prioritization

Assessment of the December '08 ice storm requires a review of company resources and how each company managed those resources, in particular the field resources used to effect restoration, including line crews, service crews and tree crews. Resource procurement is discussed in the section on Mutual Aid Agreements. The following questions provide a framework for evaluation and analysis:

- Were restoration prioritization practices in place and followed?
- Were resources deployed effectively?
- Were the plans described in the companies' emergency response plans executed in an effective manner?

1. *Prioritization Principles of Emergency Restoration*

In restoration efforts, a utility must identify the types of customers to receive priority treatment and the approach employed in the restoration process (for example, restoration of substations and primary circuits before restoration of individual customer lines).

The standard approach in the industry is to target the restoration of power first to hospitals, critical facilities and critical care customers. That approach is consistent among New Hampshire's utilities and reflected in their emergency response plans. Implementation of restoration prioritization policies, however, can be improved. Toward that end, effective communication with municipal officials is essential. The four electric providers need to continuously update and refine their prioritization lists with municipalities to ensure effective emergency restoration, particularly for vulnerable populations. Prioritization data can be managed more effectively through outage management systems, as discussed in Chapter II, Section C.

2. *Resource Deployment: PSNH, NHEC and National Grid*

NEI concluded is that the tactical responses used by PSNH, NHEC, and National Grid were appropriate for the conditions *once crews arrived*.[16] Some of the effective tactical decisions made during the ice storm include the following:

- As a result of constant awareness and attention to detail, not a single safety incident occurred within New Hampshire regarding contact with downed wires, or internal or external contact with live circuits by crews, field resources or the general public. This was a tremendous accomplishment on the part of all the electric providers.

- PSNH mobilized, opened and operated three temporary satellite work centers in the Monadnock region during the course of the storm to minimize travel distances of crews and to locate work centers as near as possible to outages and designated restoration targets.

- Because PSNH owns customer services from the pole to the meter, it contracted for external electricians to help with the service work, freeing up valuable line crews to work on primary circuits.

- PSNH, due to its large service territory and the extensive amount of damage that occurred, undertook the greatest amount of field mobilization decision-making and accompanying logistical planning.

- NHEC and PSNH crews worked cooperatively on both sides of the meter interfaces and substations that supplied the NHEC system in a well-coordinated effort to maximize levels of customer restoration as quickly as possible. As NEI reports, 15 metering points out of 33 affecting 26,293 customers benefited from this cooperation.

- NHEC and National Grid were able to provide resource support to Unitil in the later part of the restoration efforts once they had restored power to their customers in New Hampshire.

- National Grid deployed by far the greatest number of crews per customer without power. This allocation of resources, aided by the geography of its service territory, proved to heavily influence the success of its storm response.

3. *Resource Deployment: Unitil*

NEI generally endorsed Unitil's tactical response. NEI's conclusion about Unitil's response is based on the following four actions as indicative of an adequate response:

- Pre-storm readiness activities occurred in response to weather reports;

[16] *See* NEI Report, p. II-36 (Initial Conclusion of Section D, Chapter II).

- Contract line crews and contract tree trimming crews remained on the system as resources to be deployed;
- Public Service announcements were used to alert customers and warn of extended power outages; and
- Priority lists for restoration were adhered to (*e.g.*, substations, primary feeders).

At the same time, NEI concludes that Unitil's restoration strategy was inadequate.[17] An appropriate restoration strategy will direct crews to those areas where the maximum customers can be restored in the shortest possible time; such a strategy is intrinsically linked to resource deployment. NEI states that Unitil attempted to get all its customers restored at the same time and that such a philosophy may impede the rate at which customers are restored. Furthermore, the data detailed below suggests that crews were deployed away from New Hampshire service territories to assist in the restoration of Massachusetts service territories. Thus, Unitil's resource deployment may have contributed to a longer restoration time frame overall for New Hampshire customers.

The NEI Report also alludes to potential misallocation of resources with high level data displayed in Table II-10 on page II-50.

Observation:

Data submitted in the Massachusetts Department of Public Utilities (DPU) investigation of Unitil's storm response by Fitchburg Gas and Electric in Massachusetts[18] reveal that more crews were deployed in Massachusetts at times when there were greater numbers of customers without power in New Hampshire. This situation may be aggravated in the future by recent legislative action in Massachusetts, which the New Hampshire Legislature may wish to review closely. The following table[19] shows the crew deployment imbalance between Massachusetts and New Hampshire.

[17] See NEI Report at II-48.

[18] *Massachusetts Department of Public Utilities Investigation into the Preparation and Response of Fitchburg Gas and Electric Light Company d/b/a Unitil to the December 12, 2008 Winter Storm.*

[19] "Unitil MA" data is taken from Mass. DPU Docket 09-01-1A, Attorney General Data Responses 1-2 (b) and (c) (March 18, 2009). "Unitil NH" data is taken from the NEI Report (10/28/2009) at Table II-2, p. II-6.

	Unitil MA		Unitil NH		TOTAL		Deployment Ratio		Customers w/o Power	
Date	Field Crews	Customers Without Power	Field Crews	Customers Without Power	Field Crews	Customers Without Power	MA/NH Unitil Crews	NH/MA Unitil Crews	MA/ TOTAL	NH/ TOTAL
11-Dec	14	1,368	23	5,450	37	6,818	38%	62%	20%	80%
12-Dec	40	25,484	20	37,800	60	63,284	67%	33%	40%	60%
13-Dec	80	21,257	24	27,000	104	48,257	77%	23%	44%	56%
14-Dec	102	17,402	39	16,584	141	33,986	72%	28%	51%	49%
15-Dec	114	13,853	39	10,754	153	24,607	75%	25%	56%	44%
16-Dec	114	11,356	74	8,807	188	20,163	61%	39%	56%	44%
17-Dec	115	9,508	74	4,952	189	14,460	61%	39%	66%	34%
18-Dec	133	5,741	76	3,176	209	8,917	64%	36%	64%	36%
19-Dec	234	4,424	76	1,250	310	5,674	75%	25%	78%	22%
20-Dec	235	3,849	83	325	318	4,174	74%	26%	92%	8%
21-Dec	371	2,538	82	36	453	2,574	82%	18%	99%	1%
22-Dec	371	1,173	0	0	371	1,173	N/A*	N/A*	100%	0%
23-Dec	371	433	0	0	371	433	N/A*	N/A*	100%	0%
24-Dec	142	222	0	0	142	222	N/A*	N/A*	100%	0%

** Not applicable since 100% of restoration was completed in New Hampshire by December 22, 2008.*

Unitil strives to restore all customers at the same time, according to its data response to NHPUC Staff 1-47, which included language identical to that contained in Unitil's report to the Massachusetts DPU.[20] NEI noted that "[a] *more appropriate strategy would have been to target resources with the objective of restoring as many customers as possible as soon as possible.*" Unitil's comments on NEI's report discuss this statement only in the context of prioritization listings. NEI was referring to restoration strategy, however, not restoration priority lists.

Observation:

The following data submitted to PUC Staff show the number of Outside Bucket Crews (aka contractor line crews) *decreasing* between December 11 through December 15. This fact is

[20] Unitil Report to Mass. DPU in Docket 09-01-1A (February 23, 2009) at p. 49.

masked within the table referenced above. According to this data, it appears as if contractor line crews were leaving the New Hampshire territory during the initial phase of the restoration plan.

Date	Unitil Bucket Crews	Outside Bucket Crews	Tree Crews	Outside Digger Crew	Other Outside Crews	Total Crews
Dec. 11	11	8	4	0	0	23
Dec. 12	11	5	4	0	0	20
Dec. 13	11	6	5	2	0	24
Dec. 14	11	6	20	2	0	39
Dec. 15	11	7	20	1	0	39
Dec. 16	11	37	20	6	0	74
Dec. 17	11	37	20	6	0	74
Dec. 18	11	35	20	10	0	76
Dec. 19	11	35	20	10	0	76
Dec. 20	11	42	20	10	0	83
Dec. 21	11	44	15	10	21	82
Dec. 22	9	18	5	0	2	34
Dec. 23	9	6	5	0	0	20

Observation:

Among the New Hampshire electric utilities, Unitil had the lowest ratio for crews per number of customers without power during the 4 days between December 12 and December 15. It had the lowest ratio for December 12 through December 16 among the three smallest providers and the lowest ratio for December 11 through December 16 when compared to NHEC, which has a similar number of customers. The following table demonstrates this:

	Customers Without Power per Field Crew		Customers Without Power per Field Crew		Customers Without Power per Field Crew		Customers Without Power per Field Crew		Highest Ratio
11-Dec	PSNH	**388**	Unitil	237	National Grid	349	NHEC	208	PSNH
12-Dec		764		**1,890**		242		1,037	**Unitil**
13-Dec		666		**1,125**		95		450	**Unitil**
14-Dec		337		**425**		39		236	**Unitil**
15-Dec		230		**276**		19		177	**Unitil**
16-Dec		**161**		119		18		118	PSNH

New Hampshire customers reasonably expect to be restored as soon as possible. If resources are inappropriately diverted to assist customers in other states they are, in effect, being penalized. When such deployment of resources occurs, public safety can be compromised and a utility's basic obligation to provide a safe and reliable service is jeopardized.

Action Items:

5.3 The Commission will commence an adjudicative proceeding to examine the reasonableness of the timing of Unitil's response to the ice storm, the priorities of its restorations and the allocation of its resources in New Hampshire and Massachusetts.

5.4 Unitil shall add to its Emergency Response Plan by December 31, 2009, a section that outlines in detail how crews are allocated when simultaneous large-scale events occur in multiple states and jurisdictions.

Observation:

Outsourcing or contracting of crews can lead to a greater reliance on mutual aid arrangements, which are not guaranteed to be available during wide-scale emergency events. While increasing the base number of crews would likely have affected the outcome of the December '08 ice storm only marginally, given the vast influx of foreign aid resources actually deployed, there may be benefits to increasing the number of crews immediately available to reduce restoration times. A study that compares New Hampshire's electric companies to peer companies of similar size and environment throughout the country could prove useful.

Action Item:

5.5 Utilities should reassess their base staffing levels of field crews to reconfirm that adequate resources exist locally and report back to the Commission by February 2010. Data assembled within the NEI Report suggest a need to reestablish appropriate crew levels. Utilities in the electric industry continuously review metrics such as these and should be able to share those findings.

Observation:

Utilities tend not to communicate to customers their directional strategy in restoration efforts (*i.e.*, whether resources will be deployed to address restoration needs from East to West within a service territory, or which localities will be restored first). Company communications with customers need to be improved so that the affected population can plan accordingly, whether that means by installing generators, for example, or making arrangements for extended stays away from home.

Action Item:

5.6 Utilities should communicate to regulators, municipalities and the public at large, in real time, where crews are deployed, at the least by municipality and preferably by municipality and street. Such information can be obtained and managed through GIS tools and other electronic software systems. Crew schedules and locations should be electronically available to state and local officials during emergencies.

Observation:

New Hampshire customers could benefit from one or more of the types of trucks outfitted to standards of Hydro-Quebec equipment deployed in the December '08 ice storm restoration effort. The concept of adding a particular piece of equipment with more capabilities than standard equipment has been successfully used within New Hampshire to add mobile transformers to the limited backup equipment resources kept on hand locally, thus enabling utilities to enhance their restoration capabilities. Many municipal officials, local emergency directors and utility employees commented on the noticeable difference between the types of trucks used above the Canadian border and those used in New Hampshire.

Action Item:

5.7 Utilities should consider the advantages and disadvantages of acquiring or sharing more expensive off-road trucks that can be added to local fleets. A whole fleet conversion is not

suggested, but the addition of one or two vehicles, or possible pooling agreements among the New Hampshire electric companies to share the associated costs may be appropriate.

Observation:

PSNH owns the facilities up to and including customer meters, while the other electric providers own the meters and the connection from the pole to the weatherhead. A standardized jurisdictional endpoint could prove beneficial to customers and first responders by eliminating confusion with respect to responsibility for repairing electric service during restoration.

***Action Item*:**

5.8 The Commission will open a docket to consider the establishment of a common jurisdictional endpoint (meter versus weatherhead) for electric providers.

IV. COMMUNICATIONS

Communication with and from utilities was identified as a problem right from the start of the December ice storm event. The NEI Report concluded that electric providers were slow to complete their initial damage assessments and distribute accurate assessments of restoration times; ineffective in their communications with state and municipal officials and first responders; and unprepared in their staffing and activation of call centers. To address these issues, the PUC convened a Communications Task Force to develop improved procedures for situational awareness, resource reporting, expansion of the web-based Emergency Operations Center reporting function, and dissemination of information to the media. The task force included representatives from Homeland Security and Emergency Management (HSEM), the Department of Transportation and the electric utilities, as well as the PUC. HSEM has performed its own, broader after action review of the ice storm and has also found utility communications to be a primary area of concern.

A. Need for Improved Communications

Utility action plans are predicated on communications from customers to determine the quantity of outages as well as location. Information from customers becomes the key input into the formation of restoration plans. Without customer input, utility restoration plans would be ineffective – in fact, they could not even exist. When utilities adopt automatic meter reading in conjunction with more advanced GIS and OMS systems, the need to receive outage information from customers will be diminished.

Conversely, communication of electric restoration plans is vital to the ability of the individual, family or any public organization to establish their own action plans. There are three basic pieces of information all media, customers, town officials, and businesses want and need to know as quickly as possible. Communications must be timely and accurate so that customers can immediately develop their own action plans. Those key pieces include:

- **What is happening in my community?** *Is the school open? Do I make arrangements for day care? Does the day care have power? Is my work place open? Does it have power?* By providing some basic information such as the percentage of the town without power along with a general restoration time specified in days, individuals and organizations can begin to make assumptions and put together an initial action plan.

- **Are there enough resources deployed to correct the power outage?** Armed with information on restoration resources, individuals and organizations, including municipal and state officials, can begin implementing and refining their action plans. Informing municipal public safety officials of what they can expect to see for resources within their town will allow them to make informed decisions on shelter openings, communication messages, wellness checks, regional mutual aid planning and other actions that are required on a continual basis throughout prolonged emergencies.

- **When will power be restored to my home or business?** With accurate restoration times, individuals can more effectively carry out emergency arrangements during an outage.

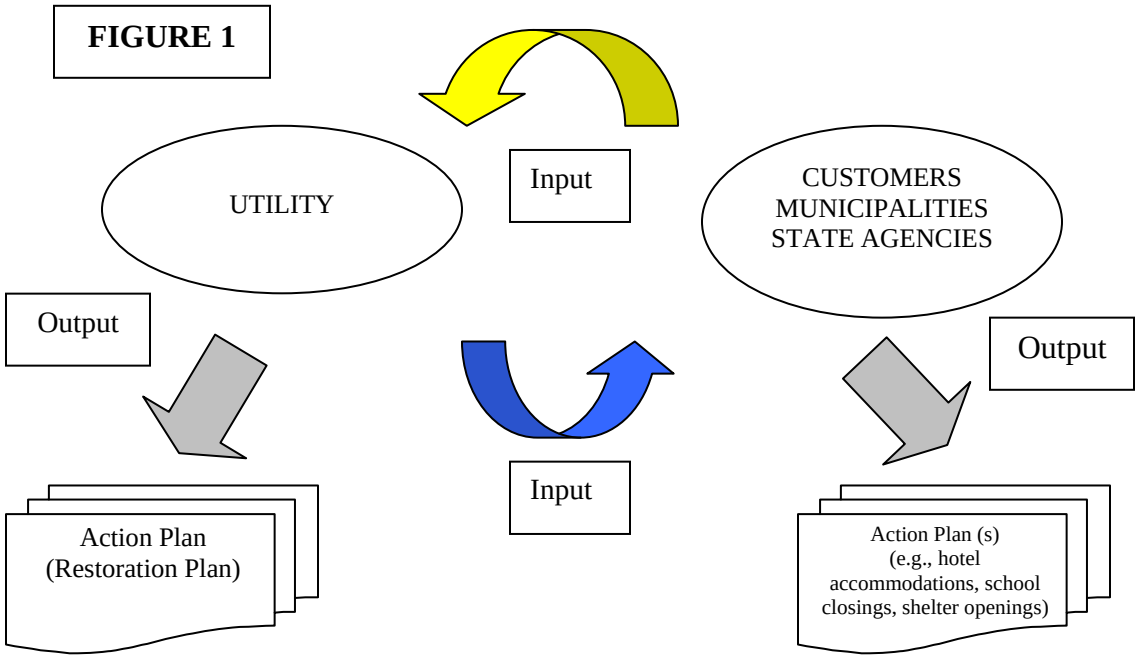


Figure 1 depicts the basic inputs and outputs of information flows described above. Utilities generally are successful in incorporating the flow of inputs from customers, municipalities and state agencies to the utilities into their emergency response plans, as represented in the upper part of the diagram. Where they have struggled is communicating their action plans and progress back to those customers, municipalities and state agencies. Utilities should include the three basic informational elements noted above to develop their action plans and communicate back to the community. The December '08 ice storm revealed and magnified this weakness in information flows.

Each of the utilities is able to provide at least a portion of the three essential information elements but none has been effectively able to communicate all three. Not providing a complete picture of restoration efforts leads to the utilities needing to respond to multiple inquiries through a host of additional communication channels including municipalities, State agencies (*e.g.*, DOT, PUC, HSEM), other utilities, the media and the general public. As a result, valuable utility resources are diverted away from restoration activities in an effort to handle communications. Standardized procedures to compile timely and accurate information and then relay that information in an efficient manner would conserve utility resources and facilitate customer, municipal and state emergency response efforts..

On a further note, utilities should resist using electric industry jargon when discussing outages and restoration efforts with customers. Customers should not have to learn technical utility and equipment terminology during a wide scale emergency. Restoration communications should be relayed in the universal language of physical addresses, e.g., streets, towns, building names, and time periods that the general public understands.

B. Communications Task Force

The December '08 ice storm raised serious concerns about the ability of New Hampshire's electric utilities to communicate effectively with the State, municipalities and customers. The PUC convened the Communications Task Force (task force) to address those concerns. The task force included staff of the PUC, New Hampshire Homeland Security and Emergency Management, New Hampshire Department of Transportation and representatives of PSNH, Unitil, National Grid and the New Hampshire Electric Cooperative.

The goals of the task force were to:

- Create an improved and standardized situational awareness reporting process.
- Establish common availability of restoration resource reports.
- Encourage utilities to utilize state agency information, such as shelter locations and hours, road closures, and school closures, through the WebEOC.
- Improve and update communications among utilities, HSEM, DOT, and municipalities.
- Explore opportunities for better utility communication with municipalities and media outlets.
- Determine ability of utilities to estimate and communicate restoration timelines.

Meetings were held on six occasions between April 30, 2009, and November 4, 2009, to discuss improvements to existing and future communications methods and to examine best practices for communications among utilities, state agencies, municipal officials and utility customers.

Although regular meetings have been suspended, the task force remains a source for ongoing suggestions and changes, as well as a network for future communications. The task force's next steps will be to expand discussions to include telecommunications providers and inter-utility communication policies.

The following outlines the results of the task force's discussions to date.

1. *Improved status/situational awareness*

The task force, utilizing an outage status template created by the PUC during the December ice storm restoration efforts, developed a standardized utility outage report for use by all utilities in future events. A process was developed to allow for rapid compilation by the PUC of utility information at a town level within a matter of minutes for mass distribution. The utility outage report will provide information on the number of customers out of service in each town and, when applicable, the estimated time to restore power. In an outage event, each utility will submit an outage report to the PUC at predetermined intervals. The PUC will quickly produce an accompanying graphic representation of customers without power throughout the state for dissemination by HSEM on its website or a temporary incident website set up on the www.nh.gov website for state emergencies. Other state agencies, municipal officials, town leaders, the media and the general public that have a need for planning and timely decision making will benefit from the information.

Frequency of updates are initially expected to be four times daily:

1. Approximately 5 a.m. to 6 a.m.
2. Approximately 10 a.m.
3. Approximately 3 p.m. to 4 p.m.
4. Approximately 8 p.m.

Examples of the improved format are shown in Figures 2, 3, and 4.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	Town Name	Power	PSNHTotal	PSNHCust	PSNH%O	Power	UnitilTotalC	UnitilCust	Unitil%Ou	Power	NGridTotal	NGridCust	NGRID%	Power	NHECTotal	NHECCust	NHEC%O
2	Acworth				no outage				no outage	N Grid	163	0	0%	NHEC	376	0	0%
3	Albany	PSNH	515	0	0%				no outage				no outage				no outage
4	Alexandria	PSNH	690	0	0%				no outage				no outage	NHEC	308	0	0%
5	Allenstown	PSNH	1,797	0	0%	Unitil	12	0	0%				no outage	NHEC	274	0	0%
6	Alstead	PSNH	37	0	0%				no outage	N Grid	845	0	0%				no outage
7	Alton	PSNH	199	0	0%				no outage				no outage	NHEC	4131	0	0%
8	Amherst	PSNH	5,279	0	0%				no outage				no outage				no outage
9	Andover	PSNH	41	0	0%				no outage				no outage	NHEC	1258	0	0%
10	Antrim	PSNH	1,455	0	0%				no outage				no outage				no outage
11	Ashland				no outage				no outage				no outage				no outage
12	Atkinson	PSNH	122	0	0%	Unitil	2,854	0	0%				no outage				no outage
13	Atkinson - Gilmanton A				no outage				no outage				no outage				no outage
14	Auburn	PSNH	2,128	0	0%				no outage				no outage	NHEC	117	0	0%
15	Barnstead	PSNH	1,471	0	0%				no outage				no outage	NHEC	1109	0	0%
16	Barrington	PSNH	3,970	0	0%				no outage				no outage				no outage
17	Bartlett				no outage				no outage				no outage	NHEC	4554	0	0%
18	Bath	PSNH	471	0	0%				no outage	N Grid	8	0	0%	NHEC	65	0	0%
19	Beans Grant				no outage				no outage				no outage				no outage
20	Beans Purchase				no outage				no outage				no outage				no outage
21	Bedford	PSNH	8,947	0	0%				no outage				no outage				no outage
22	Belmont	PSNH	3,935	0	0%				no outage				no outage	NHEC	102	0	0%
23	Bennington	PSNH	811	0	0%				no outage				no outage				no outage
24	Benton				no outage				no outage				no outage	NHEC	178	0	0%
25	Berlin	PSNH	5,466	0	0%				no outage				no outage				no outage
26	Bethlehem	PSNH	1,573	0	0%				no outage				no outage				no outage
27	Boscawen	PSNH	17	0	0%	Unitil	1,668	0	0%				no outage				no outage
28	Bow	PSNH	95	0	0%	Unitil	3,019	0	0%				no outage				no outage
29	Bradford	PSNH	1,007	0	0%				no outage				no outage				no outage

Figure 2 Sample Excel Spreadsheet

Note: Totals can be broken down by town, utility served, and % of customers without power.

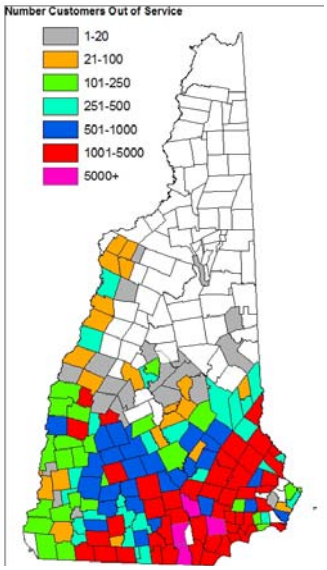


Figure 3

Note: Geographic displays will benefit the media and general public looking for high level information updated periodically throughout the incident.

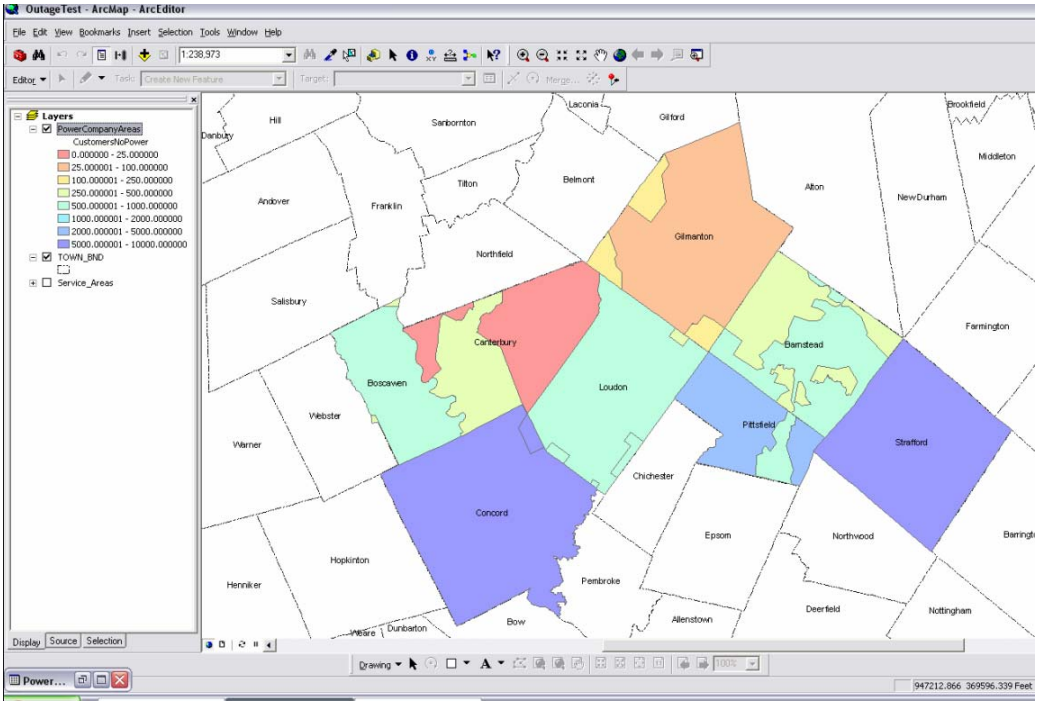


Figure 4 Sample of specific areas

Note: Many outage reporting systems in other states such as Florida, Illinois, and Kansas give details only at the county level. New Hampshire's systems delineate at the town level and further reflect the sub-areas within towns served by multiple utilities.

2. *Improvements regarding resource reporting*

Following the development of a standardized utility outage report, the task force developed the state's first standardized resource report. During the December '08 ice storm, inconsistent reporting from the utilities concerning field resources resulted in unnecessary confusion and difficulties in analyzing the data. This led to communication breakdowns among state emergency response officials, utility response personnel and municipalities. The new reporting process will enable the PUC to determine and report on the availability of restoration forces throughout the state prior to and during an event. Figure 5 shows the newly developed utility crew report template. Common terminology regarding crew definitions and types of resources was identified. Three basic categories for field personnel of utilities were designated: Front Line, Field Assessment and Public Safety. These were further classified by transmission and distribution systems.

The frequency of reports will be the same intervals established for Situational Awareness Reporting:

1. Approximately 5 a.m. to 6 a.m.
2. Approximately 10 a.m.
3. Approximately 3 p.m. to 4 p.m.
4. Approximately 8 p.m.

This information should benefit state agencies, municipalities and customers, as utility response levels may be precisely measured to determine the adequacy of resources to handle the emergency. With more precise information on resource deployment, public officials and customers will have more confidence in restoration progress, an often cited concern.

NH PUC DISTRIBUTION CREW REPORT

EVENT		December Noreaster Snow Storm				
DATE:		Dec 11 2009	TIME - DATA EXTRACT:		Dec 16 8pm	
Submitted by:		J Expert				
Company:		Unitil (includes all Divisions)				
tity of Field Personnel				Prior to Event	During Event	Incremental
		FRONT LINE				
Distribution[A] 69 KV and Less includes Subtransmission 46kv, 34.5kv,22kv, 13kv, 7.5 kv, 4kv, 2kv and below	Line	Company Line Crews restoring Distribution Circuits		11	11	0
		Affiliate Co Line Crews restoring Distribution Circuits		0	0	0
		Contractor Line Crews restoring Distribution Circuits		8	37	29
		Foreign Utility Line Crews restoring Distribution Circuits		0	0	0
	Service	Company Line Crews restoring Service		0	0	0
		Contractors restoring Service *includes Electricans*		0	0	0
	Pole[B]	Pole Setting/Digging Operations *includes Co, Foreign Uitlity, Contractor*		0	6	6
	Tree	Contractor Tree Clearing - Working on Distribution Circuits		4	20	16
		Foreign Utility Tree Clearing - Working on Distribution Circuits		0	0	0
			SUBTOTAL	23	74	51
		FIELD ASSESSMENT				
Distribution *see above*	Line[C]	Company Damage Assessment Personnel		0	0	0
			SUBTOTAL	0	0	0
		PUBLIC SAFETY				
Wires Down Appraiser	Line	Company Personnel		0	0	0
Field Guides		Bird Dogs, Location Guides		0	0	0
Other Support		*includes contractors*		0	0	0
			SUBTOTAL	0	0	0
			GRAND TOTAL	23	74	51

A includes crews physically present, signed into work , includes off road and on road
B does not include line crews who are doing both, includes those who are exclusively doing pole setting, includes contractor, in-house crews, mutual aid crews, does not include Telecom Crews
C does not include line crews who are also doing assessment

Figure 5 Sample Crew Report

Note: Transmission Reports only applicable to PSNH, all four utilities will provide Distribution Reports

It is anticipated that the utility resource report can be further enhanced to show crew allocations and deployment locations as an event progresses. The ability of utilities to determine and report crew locations by town continues to be an unresolved issue for the task force. Many of the impediments utilities have noted can be overcome with the use of add-on software packages that accompany and integrate outage management systems (OMS) with geographical information systems (GIS).

3. *Expansion of WebEOC beyond state agencies to include utilities*

HSEM uses WebEOC as the State's main web-enabled system for crisis information management. This is a common platform used by many state emergency operations centers across the United States. In New Hampshire, state agencies, local emergency directors, and some energy providers (Seabrook Station and VT Yankee) currently use this as a common platform for communications during emergencies. The availability and uses of WebEOC were demonstrated to the utilities at task force committee meetings and were well received. Information sharing regarding local and state road closures, shelter openings, municipal critical needs and restoration priorities were among the topics discussed. Recognizing the advantages of a web access platform and that the availability of real time information may aid restoration activities, the utilities sent representatives to attend WebEOC training at HSEM during September and October 2009. The expansion of this communication platform to utilities should help to reduce miscommunications and allow for improved decision making by both utilities and the communities they serve.

4. *Better understanding of utility and HSEM EOC activation levels*

PUC responsibilities at the EOC were defined for the utilities, along with the type of information, the frequency and the platform required for information reporting by the utilities to the PUC. Mutual understanding of state and utility activation levels and the kinds of information needed at each stage of an emergency were discussed. The task force examined language used by HSEM and each of the utilities to describe activation levels, including terminology concerning escalation levels, emergency classifications and activation protocols. The following standard classification of scenarios most typically encountered during emergencies was established.

- Normal operations - State has not declared emergency, utilities have not declared emergency.
- Pre Event - State has not declared emergency but has activated State Emergency Operations Center (SEOC), utilities *have not activated* corporate EOC.
- Pre Event - State has not declared emergency but has activated State Emergency Operations Center (SEOC), utilities *have activated* corporate EOC.
- Event - State has declared emergency and activated SEOC, utilities have activated corporate EOC.
- Post Event – State has returned to normal operations and deactivated SEOC, utilities may have deactivated corporate EOC but still have a small number of customers being restored or additional work to complete temporary repairs.

A tabular representation is depicted below:

State EOC Activation Level	Non State Declared Emergency		State Declared Emergency	
Normal Operation (1)	Utility EOC not opened	State EOC not opened	Not Applicable	
Pre Event (2)	Utility EOC not opened	State EOC opened		
Pre Event (2)	Utility EOC opened	State EOC opened		
During Event (3 or 4)	Not Applicable		Utility EOC opened	State EOC opened
Post Event (1 or 2)			Utility EOC opened	State EOC closed

The task force defined an "event" as a significant outage requiring more than 24 hours for the restoration of power. Prior to an event, each utility will review its Emergency Operations Plan, including applicable checklists, and notify the PUC of response status with updates approximately every four hours by email and, when necessary, by phone. The PUC and HSEM will determine at this time whether utility participation in HSEM's pre-event conference calls is warranted or whether the PUC will convene a conference call with the utilities at a later time.

5. *Communications with the media*

The task force discussed the possibility of utilizing the state as a single resource to provide basic situational information to the media. Some of the benefits of providing timely information to the HSEM include:

1. A single resource for information about roads, shelters, restoration reports, school closing, local shelters;
2. More accurate information with fewer resources expended to track the latest updates;
3. Current, consistent and accurate emergency information for the Governor's office to provide to media outlets during press conferences;
4. A centralized state web site to serve as a clearinghouse to handle inquiries from the public and the media;
5. Links to utility and state agency website resources to lessen the number of utility resources diverted to handle public and media information inquiries.

HSEM will coordinate implementation efforts for this endeavor. This will require working with the media, who are accustomed to working directly with the public relations

personnel in each utility during non-emergencies, to establish a new source of information during emergencies. It was noted that not all media inquiries to the utilities would be eliminated since the media often looks for 'faces' to accompany personal interest stories.

6. *Communications with municipalities*

The utilities reviewed and summarized the communication practices that worked well with municipalities during the December '08 ice storm:

1. All electric utilities currently conduct annual meetings with municipal officials to review emergency plans.
2. Municipalities are provided with dedicated unpublished phone numbers for utility emergency contacts. This works successfully when the numbers are not breached. Dedicated contact numbers should be used only as municipal hot lines or their effectiveness will be immediately lost.
3. "Municipal rooms" dedicated solely to communications with town officials are located within utility EOCs and manned by utility personnel.
4. Prearranged conference calls between utilities and municipalities were determined to be a best practice and worked well during the 2008 ice storm.
5. Utilities proactively call municipalities to determine changing needs and priorities.

7. *Communications with other utilities and within utilities.*

Daily conference calls conducted by the New England Mutual Aid Group (NEMAG) enabled electric utilities to communicate resource availability to each other. In 2009 NEMAG amended it rules to include electric cooperatives participate on the emergency daily conference calls. Cooperatives did not participate on these calls during the December '08 ice storm. Participation in NEMAG calls continues to be part of each electric utility's Emergency Response Plan.

The electric utilities noted that they have frequent and direct contact with each other throughout emergency events, including through the subcontractors working on their systems. Communication methods among electric utilities include: conference calls for overall status updates, frequent emails, frequent radio communications, frequent cellular and landline calls. There did not appear to be any technical or equipment breakdowns that limited the ability of utilities to conduct restoration efforts.

While the focus on communications for the task force was primarily with electric providers, there was a sense that improved coordination between electric companies and telecommunications companies would be helpful. Early in a restoration effort,

telecommunications crews can not do much to restore service to their customers until electric companies have declared an area to be safe. Current communications between telecommunications companies and electric providers center around pole setting activities, but telecommunications companies need to know the areas electric companies are clearing on a daily basis, so that they can effectively plan and implement resource procurement. Better coordination could also improve the ability of telecommunications providers to assist electric companies with pole sets while waiting for additional areas to be declared safe.

The task force will examine the potential for electric providers to share daily work plans with telecommunications companies and to include telecommunications companies on municipal conference calls initiated by the electric companies.

8. *Restoration timelines*

The task force examined the perceived requirements for estimated restoration times. The utilities acknowledged that the systems and methods used in the past were designed for short timeframe outages (less than 24 hours). Through the task force, utilities worked to develop a plan that would provide the most concise and timely outage information possible. Utilities reviewed reporting mechanisms, updated their outage management systems where possible, and discussed design improvements for better reports. Part of this was accomplished with the creation of standardized outage and crew reports. The utilities agreed that more information could be shared on preparations prior to an event; timeframes for damage assessment could be provided during an event; and restoration estimates could be given soon after assessment is completed. Restoration estimates would be amended daily to reflect completion of repairs, additional issues uncovered, work crew schedules, updated restoration times, and, as soon as feasible, restoration timelines by municipality.

Observation:

The Communications Task Force identified a number of areas where utility communications could be improved and produced deliverables concerning many of those areas. The following action items highlight additional steps that could achieve the most immediate benefits for customers, media, government officials and the utilities themselves.

***Action Items*:**

6.1 HSEM can greatly assist municipal communications by providing the PUC with an updated list of municipality Emergency Management Directors at the start of an event, to be

forwarded to utilities for maintaining direct contact with each town. Updated lists could be maintained on the WebEOC.

6.2 DOT could provide updated DOT contact information to utilities and participate on utility conference calls during an event. .

6.3 DOT and municipalities could cooperate to expand information available on the WebEOC to include both local and state road closures.

6.4 HSEM and the Division of Fire Safety may want to consider developing a non-endorsed contact list of pre-qualified electricians available during emergency events. Once an event has been declared an emergency, the list could be uploaded to the state incident website for public purposes and for distribution to media outlets. The list should be screened to include only qualified electricians who maintain appropriate insurance levels, meet state licensing requirements, and are committed to providing services in designated geographic areas within the state during emergency events. Such a list will reduce public frustration, provide a valuable public service and remove further delays in restoring eventual power to residences in areas where overhead masts are damaged, meter housings are damaged, or private service drops require electrical work beyond the jurisdiction of the individual utility. The utilities should coordinate their communication messages to include this type of information.

6.5 Municipalities should be encouraged to coordinate with utilities on road closures and the input of updated and accurate road status information on the WebEOC to facilitate utility planning and deployment of resources.

6.6 Electric and telephone company representatives should join forces to identify ways in which better inter-utility coordination could improve overall restoration efforts, including the sharing of daily work plans and joint participation in conference calls municipal.

C. Communications with Municipalities

Poor communications between utilities and the municipalities they serve was a common complaint throughout the December ’08 ice storm and its aftermath. Communication methods varied from utility to utility, as did the quality of information provided. Each utility has room for improvement in this area. Following are summaries of utility interactions with municipal officials during the December storm.

Communications with Municipalities - PSNH. In accordance with the company's Emergency Response Plan, communications efforts at PSNH were coordinated by its Communications Chiefs. During the 13-day restoration effort, at least one of four designated Communications Chiefs was stationed in the EOC at all times. A total of 28 PSNH employees were dedicated to public communications during the storm restoration effort. Of those 28 employees, 12 were embedded in local communities in order to be better able to respond directly to municipal needs. Starting at 4:30 a.m. on Day 2, Friday, December 12, PSNH began issuing regular, proactive updates to keep the public as informed and safe as possible during the storm restoration effort. Updates were issued to customers and community officials through e-mail and posted on the company website. PSNH continued issuing updates until 5:00 p.m. on Day 14, Wednesday, December 24, the day on which its last customer was restored. The updates reflected the best information available at the time.

At the community level, PSNH employees provided regular updates to municipal officials and emergency response organizations. In the hardest-hit communities, PSNH placed employees in municipal Emergency Operations Centers in order to meet the communities' need for more detailed, up-to-the-minute information. As soon as reliable information was confirmed from the field, PSNH began publishing restoration estimates for each town. Information for each community was gathered directly from appropriate personnel in the field each day to ensure that estimates were accurate. However, PSNH was late in implementing a process for developing restoration estimates for each town. Estimated Times of Restoration (ETRs) for each community were first prepared late on Day 5, Monday, December 15 and were not disseminated to customers and the media until the morning of Day 6, Tuesday, December 16.

In addition to traditional information outlets, PSNH also used a social media Web-based tool called "Twitter" to send and receive short bursts of information via the Internet and cell phones. Municipalities as well as customers can subscribe to this free service and receive updates on their cellular telephones. PSNH was the only utility in New Hampshire to promote this method of communication. The information provided through Twitter, however, did not appear to contain much detail, so its effectiveness is difficult to measure.

Observation:

PSNH struggled with its municipal communications throughout the storm, primarily because it could not provide the message content that municipalities and their customers desired.

While delivery of the message was adequate, the message did not contain the three core informational elements outlined earlier in this section.

In the early days of its ice storm restoration efforts, PSNH did not have enough people assigned to communicate with municipalities. As restoration efforts progressed, PSNH assigned more and more personnel to the task. While this helped alleviate some of the mounting concerns, many of those individuals did not have the benefit of established relationships with the municipalities. In the future, increased training would help eliminate initial miscommunications. PSNH found that it could not assume that municipal lines of communication are always open during an emergency and that it must make multiple efforts to ensure that communications are going through proper channels. PSNH did not use a formal dedicated municipal room concept as National Grid and Unitil now do.

There were many frustrations voiced by local emergency providers concerning the accuracy of PSNH's ETR system, which establishes ETRs on a percentage basis (*e.g.*, 95% of the town estimated to be restored by a certain date). Many local emergency directors did not have confidence in the dates provided or PSNH's ability to provide details on the locations of the remaining customers without power. This was the first storm in which PSNH had ever posted any type of town-by-town ETR, so it was learning as restoration activities progressed.

Most of the larger municipalities that PSNH serves already have GIS systems. Visual overlays made in coordination with municipalities would have been helpful when communicating work plans for extensive outages. National Grid, Unitil and NHEC have all committed to state of the art OMS systems for their New Hampshire territories. Such systems facilitate accurate ETRs and facilitate communications with municipal and other officials. The lack of a state of the art OMS contributed greatly to PSNH's inability to communicate effectively.

Action Items:

6.7 When assigning communications personnel to be embedded directly with municipalities, PSNH should assign an optimized "span of control" ratio for such assignments. A ratio in the range of 5 to 6 towns per assigned personnel, for example, would require 30 to 40 people to fulfill the communication role and allow increased outreach by face to face visits.

6.8 PSNH should incorporate a dedicated municipal room as a best practice into its emergency response, given the extensive service territory in which PSNH provides electricity in New Hampshire.

6.9 PSNH should implement a GIS system with a state of the art OMS to facilitate emergency restoration communications.

6.10 PSNH should reconsider the long term viability of its existing system and reevaluate the feasibility of expedited implementation of a new OMS.

Communications with Municipalities - National Grid. National Grid's Energy Solutions Services department was responsible for communicating with local public officials during the December 2008 ice storm. The Town of Salem's Emergency Operation Center stated that National Grid's use of a municipal room was beneficial to town officials. National Grid established a series of pre-arranged conference calls that helped to alleviate the communications anxiety that often develops during prolonged outages. Planned work, crew locations and mapping were provided to municipal officials, who also appreciated the face-to-face visits with National Grid personnel. National Grid did not emphasize this approach in its western service territory as much as it did in its Salem/Pelham/Plaistow territories. Update letters faxed to police, fire, and other public officials provided direct phone numbers for utility officials and "wire down" tallies. The update letters were followed with a phone call to each community to ensure awareness that National Grid's municipal phone line had been activated.

Observation*:*

While face-to-face visits with municipal officials are optimal, an OMS reporting system with a graphical interface such as the one NHEC uses would allow municipalities additional flexibility in gaining the information they are seeking. OMS reporting would allow municipal officials to see information in between scheduled calls in the event there are multiple demands on their time. Since National Grid's OMS does not have that information readily displayed for the public and the ETR function of the OMS was disabled during the '08 ice storm, the municipal meeting rooms and face-to-face contact was the next best method of communication.

Action Item:

6.11 National Grid should hold municipal meetings with each of its New Hampshire communities, separate from the meetings it holds with its Massachusetts communities unless the southern border towns would prefer to be on-line with the Massachusetts communities. Since

each state conducts and coordinates its own emergency operations, it would benefit New Hampshire communities served by National Grid for the company to coordinate closely with state agencies and regional organizations involved in emergency response.

Communications with Municipalities - Unitil. Unitil relied heavily on Public Service Announcements to communicate with municipalities and the general public. Unitil's approach was for the most part ineffective because it did not include the three core information elements that municipalities and their citizens were looking for. In addition, there were many delays in responding to calls and requests for information from municipal officials. Many seacoast municipalities expressed little confidence in Unitil's estimated restoration times. Due to large call volumes, personnel shortages and a lack of accurate data, Unitil's customer call center was unable to meet the demands from customers for information.

As the restoration period lengthened, customers and public officials sought very specific information about the status of restoration efforts, the location of crews, and the length of time it would take to restore specific streets or addresses. Information was generally not available on such a granular level. After a week, Unitil management held a meeting with a number of municipalities to improve communications. The outcome of that meeting was that Unitil implemented twice daily conference calls with emergency officials. The first daily call provided an update of the plan for the day, including restoration objectives and crew locations; the second call reviewed the day's progress and outlined priorities for the next day. This process worked well for the remainder of the ice storm and has become a standard operating procedure for future storms.

Unitil has since met with municipal officials in each of its two New Hampshire territories and has conducted and included municipalities in simulated drills to address some of the miscommunications it experienced during December '08. It has assigned communications personnel to give routine updates on predefined time intervals, and has endorsed the municipal room concept for future use.

Unitil recently purchased a new outage management system that will increase communications capabilities with municipalities and customers. The system is expected to be up and running in December 2009. This should help to leverage many of the existing technologies that Unitil has and increase its communication message and methods.

Observation:

While Unitil experienced significant communications issues during December ’08 storm restoration efforts, it has since identified the most critical needs for improvement and made great strides toward accomplishing those improvements.

Communications with Municipalities - NHEC. NHEC had eight employees dedicated to communicating with customers and community officials during the storm. Two of those employees were specifically assigned to contact town managers and other local officials in the communities affected by power outages. Beginning on Day 5, Monday, December 15, phone calls were made to the police chiefs, fire chiefs and Emergency Management personnel of the 17 towns in NHEC service territory that were without power. From that point on, updates were provided several times per day.

Following the storm’s arrival, NHEC reached out to its members by placing calls to all emergency shelters to provide updates on outages and projected restoration times as information became available. NHEC also placed calls to town managers and police and fire chiefs in affected towns to update them on the progress of restoration efforts. Estimated times of restoration were first communicated on Day 5, Monday, December 15, to the seventeen towns still experiencing outages. From that point on, daily outreach calls to each of the towns were directed to the appropriate fire and rescue, police or emergency center contacts. Each town was provided with the latest estimate for the completion of restoration work and a direct call-back phone number should questions arise before the next outreach call. Estimated restoration times were provided to customer service operators and the news media, and were posted on the NHEC website (although not on the graphical interface posted front and center of the company’s website). The NHEC website has a real-time outage map that provides outage information down to the town and street level. During the ice storm, additional, more detailed outage information was provided on a web page created during the storm.

Observation:

NHEC’s real-time display of restoration efforts on the company website provides affected towns with instantaneous updates as repairs get made in the field. NHEC’s website reporting of emergency restoration efforts would be even further enhanced with the posting of ETRs on the graphical interface. Of the four electric providers, NHEC clearly is ahead of the other electric providers in the effective use of website portals for the dissemination of restoration information.

NHEC’s capabilities in this area combined with outreach to municipal officials eliminated much of the miscommunication experienced in communities served by other providers.

Action Item:

6.12 NHEC should consider posting ETRs on the front-page interface of its website.

D. Communications with State Agencies

In general, all the utilities have a support function identified in their Emergency Response Plans dedicated to providing information to the State Emergency Operations Center and regulators. In New Hampshire, the PUC fulfills the role of Energy Support Function as described in the State of New Hampshire Emergency Plan, serving as the subject matter expert for HSEM. In essence, during events such as the December ’08 ice storm the PUC represents HSEM interests while at the EOC. In this role, the PUC serves as a clearinghouse for any questions regarding utility involvement with the Departments of Transportation, Education, Environmental Services, Health and Human Services, and Resources and Economic Development, all of which may be directly or indirectly impacted by utility outages.

Communications between state agencies and the utilities during the December ’08 ice storm were frequent and continuous. A utility’s ability to provide accurate, consistent and detailed information is essential to the State’s response planning for its citizens and businesses.

Observation:

NHEC, Unitil, PSNH and National Grid endeavored throughout the ice storm to handle specific information requests and to standardize reporting. At the time of the December ’08 storm, there was no standard reporting system in place for utilities to use when communicating with State agencies. As a result, each of the utilities used its own unique, internal system to keep State officials apprised of updates. At the ground level, the utilities communicated with State officials through daily calls, emails, and face-to-face meetings. The task force succeeded in developing a standardized reporting system that utilities will use in future emergency events.

During the December ’08 ice storm, utilities requested assistance from the State in a variety of forms, including help with damage assessments, assistance with border crossings for foreign crews, and assistance from National Guard personnel in flagging and traffic control.

Action Item:

6.13 Staff will draft an amendment to Puc 300 that sets forth a clear standard requiring utility contact of the PUC and BEM in outage situations. Staff will consider and discuss with utilities a standard of 2% outages as the reporting trigger.

6.14 The State could assist utilities in future events by providing access to refueling sites, dedicating staging areas and potential satellite locations, messaging systems for the Emergency Broadcast System, communicating of the dangers of generators back feeding into electric distribution systems, updating contact lists, and establishing message boards at construction sites.

V. LESSONS LEARNED AND CORRECTIVE ACTIONS TAKEN

In the aftermath of a major event such as the December '08 ice storm, it is essential that utilities review their performance before, during and after the event to assess what went right, what went wrong, and which actions and processes could be improved. Utilities should use such assessments to modify actions and operations going forward in preparation and planning for future emergencies. Such reviews, conducted with a goal of continual improvement, can go a long way toward maintaining public confidence in the integrity of the electrical system and the competence of utility management. Ideally, after action assessments should gather input not only from within the utility's organization, but also from external sources such as contractors, customers, local government officials and regulators.

A. Utility Reports/Self-Assessments

Each of the electric utilities performed a self-assessment following the December '08 ice storm; a brief description of those self-assessments can be found in Chapter VI of the NEI Report. The scope and formality of the self-assessments varied by utility, with some producing concrete recommendations for future improvement and others simply recapping what took place before, during and after the storm.

Self-Assessment - PSNH. In early 2009, PSNH produced two reports assessing its actions and response regarding the storm. In February, a report entitled *Record Outage Record Recovery* was distributed publicly, chronicling PSNH's response efforts leading up to and during the storm. PSNH also conducted an internal review that resulted in a confidential report entitled *Incident Management System Review*. The system review was prepared by the principal supervisors on PSNH's Incident Management Team as a self-critical, confidential analysis to identify things that went well, as well as areas requiring improvement. As a result of that analysis, PSNH has reviewed its Incident Management System organization and created a number of new positions to enhance reporting and communications duties at its Emergency Operations Center, Division Operations Center, and Area Work Center levels.

Self-Assessment - National Grid. Subsequent to the December '08 ice storm, National Grid produced two reports recounting and assessing its storm restoration efforts. The first, dated February 11, 2009, and entitled *System Critique Report for December 11-12, 2008 Ice Event,*

covered National Grid's entire service area in the Northeast region. The report was the result of internal operational reviews and external meetings with customers, three of which occurred in New Hampshire. Although National Grid is proud of its response to the ice storm, the report identified a number of opportunities for improvement along with recommended actions in the areas of staffing and training, procedures, logistics, communications and information systems. On April 1, 2009, National Grid submitted a report entitled *New Hampshire – December 2008 Ice Storm Report* that described its storm preparations as well as its restoration efforts during the storm.

Self-Assessment - NHEC. NHEC's standard practice is to conduct a more informal storm critique consisting of lessons learned and anticipated action items, rather than a formal self-assessment report. In its post-ice storm critique, NHEC identified a number of changes to make to its emergency response plan, including the formalization of storm plans and procedures to enhance restoration efforts; seeking membership in additional mutual aid organizations; training additional staff and electricians to restore or reattach service cables and meter sockets; and establishing field contacts with telecommunications companies to expedite the replacement of broken poles and anchors.

Self-Assessment - Unitil. Unitil recognized that in many ways its storm preparedness and restoration efforts fell far short of expectations. On March 29, 2009, Unitil released a report entitled *December 2008 Ice Storm Self-Assessment Report.* That report provided a recap of Unitil's storm preparations and response actions, as well as an analysis of areas where improvements were deemed necessary. Unitil identified twenty-eight specific recommendations for improvements in various aspects of its storm response procedures. Unitil quickly implemented many of those recommendations and anticipates implementing the remainder by December 2009. Among the more notable actions was Unitil's hiring of a Director of Business Continuity and Emergency Planning in May 2009. This is a newly created position with job responsibilities that include emergency operations, as well as implementation of the recommendations arising from the self-assessment.

B. Corrective actions taken to improve emergency response procedures

The NEI Report lists a number of recommendations for potential improvements to the electric utilities' emergency response procedures. In preparing this After Action Review,

additional information provided by the utilities on measures taken since the December ice storm to improve emergency response procedures has been taken into account. Many of the actions taken are a result of the self-assessments and are similar to recommendations found in the NEI Report; however, there are a number of instances where the utilities did not agree with NEI's conclusions or recommendations. Further detail regarding the areas where the utilities agreed or disagreed with NEI can be found in the utilities' responses to NEI's draft report, which are available on the PUC website at http://www.puc.nh.gov/2008IceStorm/December2008IceStorm. Corrective actions taken by the various utilities following the ice storm are summarized below.

Corrective Actions - PSNH. PSNH implemented several key changes following the storm and identified further actions to be taken in the future. In terms of emergency response, PSNH created additional positions in its incident management system organization, each with certain reporting requirements within the hierarchy. PSNH has also made enhancements to its Emergency Response Plan, including:

- development of a database for significant storm updates at the Area Work Center level;
- provisions for additional supplies and damage assessment kits;
- purchase order enhancements to ensure the ability to obtain additional damage assessment resources during major storm events;
- planned enhancements to its Trouble Reporting System to allow for improved communications outside the organization; and
- planned improvements to computerized forms to allow tracking of crews and resources.

In addition, based on its experience with establishing satellite emergency operations centers in New Ipswich, Peterborough and Fitzwilliam during its ice storm restoration efforts, PSNH has created a company-wide Satellite Operations procedure for use during future major events.

Corrective Actions - National Grid. National Grid has made a number of improvements to its policies and procedures since the December '08 ice storm. Among the actions taken by National Grid are:

- revised Electric Emergency Procedures, including:
  - procedures for updating critical care customer data;
  - incorporation of the recently revised U.S. Transmission Emergency Plan; and
  - integration of the Incident Command System and National Incident Management System (an ongoing task).
- various communications improvements;

- improvements in the areas of resource coordination and mutual assistance including procedures to identify, train and deploy personnel from unaffected lines of business (*e.g.*, electric transmission, gas distribution) during a major event; and
- enhanced logistical procedures to improve the flow and staging of resources and supplies.

In July 2009, National Grid conducted a system-wide storm drill simulating response to a Category Three hurricane. The drill was used to test many of the procedural changes implemented since the ice storm. Following the drill, National Grid conducted another critique that identified additional opportunities for improvement; those improvement activities are scheduled for implementation by the end of 2009.

Corrective Actions - NHEC. NHEC identified certain recommendations made by NEI with which it agreed, has already implemented, or will be implementing, including:

- improved estimated time to restore communication from field assessment personnel for use in the company's outage management system to provide more current information to members;
- contacting municipalities to obtain lists of critical customers;
- conducting meetings with community emergency personnel to address critical issues such as "wires down," road closures, bridge closures, etc.
- Emergency Response Plan enhancements regarding issues of:
  - security;
  - the requirement of post-storm critiques;
  - emergency contact numbers for cable and communication companies; and
  - expanding emergency readiness drills for participation beyond NHEC.

Correction Actions - Unitil. Unitil has made great strides toward improving its emergency response procedures. As mentioned above, Unitil identified a number of areas in need of improvement and has created and filled a new position to direct its emergency response efforts. Among the improvements instituted by Unitil are:

- a substantially revised Emergency Response Plan;
- implementation of an outage management system, which Unitil states will be fully operational in December 2009;
- revisions to damage assessment procedures, including the training of additional personnel and the securing of contracts with vendors capable of providing damage assessment resources;
- establishment of a centralized system-wide EOC at Hampton, NH headquarters;
- improved communications procedures and protocols, including establishment of a municipal communications room at each district operating center; and

- call center improvements, including installation of additional telephone lines to handle customer calls, and expanded interactive voice recognition call system capabilities.

On September 18, 2009, Unitil held a system-wide storm drill exercise that included personnel from each of Unitil's offices in New Hampshire and Massachusetts. The drill scenario involved a simulated response to a hurricane with 100 miles-per-hour winds that impacted all of Unitil's service territories. Unitil's Distribution Operation Centers were set up as Emergency Operations Centers, with designated rooms for municipal communications, wires down/damage assessment, trouble analysis, system planning, logistics, and customer call service. Teams trained specifically for their emergency roles had been assigned to each operations group. The simulation drill included conference calls with other Unitil offices (complete with roll call and updates from each division in each office), conference calls with municipal representatives, call-ins to customer representatives, and internal calls to line up crews and material for restoration efforts. Information exchange was more fully automated than it had been during the December ice storm, and will continue to improve as Unitil integrates its new outage management system technology.

VI. CONCLUSION

Based on historical examples, the December ’08 Ice Storm may be classified as a high impact, low frequency event. By comparison, the next largest ice storm on record occurred in 1998 and resulted in approximately 80,000 outages, one fifth the size of the ’08 Ice Storm. However, there is no assurance that such an event will not recur in the near future. As a matter of fact, New Hampshire’s recent experience with flooding indicates that three so-called 100-year floods occurred within a three-year span.

As a general matter, it may also be accurate to say that electric utility resources were overwhelmed by the intensity and geographic scope of the December ’08 Ice Storm, but in order to make a judgment about the reasonableness of the utilities’ preparation and response in regard to this particular event it is necessary to take a closer look to distinguish between planning that was structurally adequate but could not be fully executed in extraordinary circumstances, and planning that was exposed by such extraordinary circumstances as structurally inadequate.

The primary focus of the after action review has been *prospective* in its application to the extent that the goal has been to ensure that utilities are prepared now and in the future to provide safe and reliable service. In that regard, PSNH, Unitil, NHEC and National Grid are to be commended, not only for the efforts of their employees during the Ice Storm, but for the actions they have undertaken since to improve their emergency planning and response capabilities.

At the same time, such a review necessarily requires a close scrutiny of past actions and provides a basis or probable cause for further action that is *retrospective* in nature. As an independent regulatory agency with general supervisory power over public utilities, the Public Utilities Commission must institute appropriate proceedings when the circumstances require it. In that regard, an adjudicative proceeding will be commenced to examine the reasonableness of certain aspects of Unitil’s response to the ice storm.

APPENDIX A – *ACTION ITEMS CHECKLIST*

1. Emergency Planning Actions

1.1 National Grid should designate a New Hampshire emergency management contact and incorporate into its ERP at least one position based in New Hampshire that can serve as an effective contact at a decision-making level. The ERP should incorporate language that clearly allows flexibility in determining the emergency response levels applicable for New Hampshire territories and recognizes that the company's service territories are in two distinct areas approximately 90 miles apart.

1.2 The Commission will amend section Puc 300 of the Administrative Rules to require electric utilities to file Emergency Response Plans annually with the PUC. Plans should be consistent with NIMS and ICS standards. Utilities should review and update plans at least once each calendar year. Plans with employee names and cell phone numbers redacted would be sufficient and may be filed electronically.

1.3 Each utility should work with municipalities to integrate their Emergency Response Plans to ensure emergency response efforts are coordinated for maximum effectiveness.

1.4 Each electric utility should expand emergency readiness drills to include in-house employees as well as outside participants typically involved in emergency response efforts. Each electric utility should conduct drills at least bi-annually that are coordinated with other electric and telecommunications utilities, mutual aid organizations, cities and towns, the State's Homeland Security and Emergency Management organization and the Commission. As part of their drill procedures, utilities should document attendees, topics and drill assessments.

2. Vegetation Management Actions

2.1 Standardized trim zones and cycles should be considered. A single statewide standard would alleviate confusion for municipal officials, as well as utility customers, as some franchise boundaries cut across municipal lines.

2.2 Commission Staff will meet with the four electric utilities and submit recommended trim cycles and zones by April 2010, to be promulgated in the Puc 300 rules. The following should be considered as a starting point for this review: all sub-transmission circuits (34.5 kV – 69 kV) should be trimmed on a cycle not to exceed 48 months, and all distribution circuits should be trimmed on a cycle not to exceed 60 months. All 3-phase distribution circuits should have clearances of 10 feet below, 8 feet to the side, and 15 feet above. Single phase circuits and those 3-phase circuits with Hendrix cable should be cleared 10 feet above and below and 8 feet to the side. Though considerably more expensive, "ground to sky" trimming also should be considered, as should the use of chemical treatments as part of an integrated vegetation management program.

2.3 Each utility should incorporate as standard practice the inspection of 100% of circuit miles trimmed and all hazard trees removed, a practice currently used by PSNH and National Grid. In addition, a detailed report compiling the results of inspections with mapping depictions should be submitted annually to the Commission. The inspection should be conducted by an arborist or forester unaffiliated with the entity providing the tree trimming services. Currently, PSNH, and NHEC employ in-house arborists or foresters; National Grid uses arborists or foresters employed by its affiliated service company. Unitil relies on unaffiliated arborists included in tree trimming contracts.

2.4 Commission Staff will monitor tree trimming on a more systematic basis, with an emphasis on identifying possible violations of the NESC safety code and utility integration of GIS with vegetation management practices. Rulemaking will be initiated to amend existing rules accordingly. The Commission will consider retaining an arborist to inspect and report on utility tree trimming practices.

2.5 Commission Staff will conduct a review of Unitil's vegetation management and distribution hardening practices and associated budget levels, and report its findings to the Commission by June 2010.

2.6 Commission Staff will conduct a review of NHEC's tree trimming policies and practices and report its findings to the Commission by April 2010.

2.7 Utilities should improve communications with customers concerning the importance of hazard tree removal and maintenance trimming.

2.8 Utilities should record each time a homeowner does not provide consent to trim or remove a tree where such consent was requested, as well as details of interactions with the homeowner. Utilities should file such record with the Commission on an annual basis by June 30 each year.

3. Outage Management Systems Actions

3.1 The Commission will consider, as part of PSNH's pending rate case, the adequacy of PSNH's outage management system.

3.2. Telecommunications companies should analyze the extent to which automated line testing could improve restoration efforts in widespread outages, and report their findings to the Commission by June 2010.

4. Resource Planning and Procurement Actions

4.1 Electric utilities should consider lining up outside contracts that include a right of first refusal in the event of a major storm and reducing reliance on mutual aid arrangements.

4.2 Electric utilities should examine the benefits of contracts with national firms to ensure a wider availability of potential resources in the event of an emergency.

4.3 Each utility should file with the Commission summaries of its mutual aid arrangements (regional as well as extra-regional), external contracts, and municipal outreach efforts.

4.4 Each utility should memorialize the expectations of senior management for Emergency Response Actions through the implementation of a clear management strategy for storm restoration to be included in the company's Emergency Response Plan.

4.5 Each utility should establish and incorporate into its emergency plan a standardized trigger-point for resource procurement, based on clear benchmarks.

4.6 Utilities should explore and report on opportunities to obtain damage assessment assistance from appropriately trained municipal employees, including Public Works Departments, Fire Departments, Police Departments and other Emergency First Responders. Such cooperation would be appropriate for a large-scale disaster classified as a State of Emergency in New Hampshire, rather than for more routine storm events. This concept, if found successful, could be further expanded to include other non-state emergencies requiring an immediate workforce spread over a large geographic area.

4.7 Utilities should train local officials well in advance of an incident, with a focus on the fundamentals of an electric distribution system, safety precautions, and safety hazards. Details would need to be worked out as to how such a public/private partnership could operate effectively, but the potential advantages should be explored.

4.8 Electric utilities should consider working with telecommunications companies to cross-train telephone line workers to assess damage, as they will tend to be already familiar with territory service geography and line circuits.

5. Emergency Response Actions

5.1 Each electric utility should gather and analyze weather and damage information during and immediately following weather events and develop improved models to predict damage.

5.2 Each affected utility shall file self-assessments with the Commission within 60 days following any State-declared emergency event that implicates utility services. Forensic analyses of weather data should be a part of those self-assessments.

5.3 The Commission will commence an adjudicative proceeding to examine the reasonableness of the timing of Unitil's response to the ice storm, the priorities of its restorations and the allocation of its resources in New Hampshire and Massachusetts.

5.4 Unitil shall add to its Emergency Response Plan by December 31, 2009, a section that outlines in detail how crews are allocated when simultaneous large-scale events occur in multiple states and jurisdictions.

5.5 Utilities should reassess their base staffing levels of field crews to reconfirm that adequate resources exist locally and report to the Commission by February 2010. Data assembled within

the NEI report suggests a need to reestablish appropriate crew levels. Utilities in the electric industry continuously review metrics such as these and should be able to share those findings.

5.6 Utilities should communicate to regulators, municipalities, and the public at large where crews are deployed, at the least by town and preferably by town and street. Such information can be obtained and managed through GIS and other electronic software systems. Crew schedules and locations should be electronically available to state and local officials during emergencies.

5.7 Utilities should consider and explore the advantages and disadvantages of acquiring and sharing more expensive off-road trucks that can be added to local fleets.

5.8 The Commission will open a docket to consider the establishment of a common jurisdictional endpoint (meter versus weatherhead) for electric providers.

6. Communications Actions

6.1 HSEM can greatly assist municipal communications by providing the PUC with an updated list of municipality Emergency Management Directors at the start of an event, to be forwarded to utilities for maintaining direct contact with each municipality. Updated lists could be maintained on the WebEOC.

6.2 DOT could provide updated DOT contact information to utilities and participate with municipalities on utility conference calls during an event.

6.3 DOT and municipalities could cooperate to expand information available on the WebEOC to include local road closures along with state road closures.

6.4 HSEM and the Division of Fire Safety may want to consider developing a non-endorsed contact list of pre-qualified electricians available during emergency events. Once an event has been declared an emergency, the list could be uploaded to the state incident website for public purposes and for distribution to media outlets. The list should be screened to include only qualified electricians who maintain appropriate insurance levels, meet state licensing requirements, and are committed to providing services in designated geographic areas within the state during emergencies. The utilities should coordinate their communication messages to include this type of information.

6.5 Municipalities should be encouraged to coordinate with utilities on road closures and the input of updated and accurate road status information on the WebEOC to facilitate utility planning and deployment of resources.

6.6 Electric and telephone company representatives should join forces to identify ways in which better inter-utility coordination could improve overall restoration efforts, including the sharing of daily work plans and joint participation in conference calls with municipalities.

6.7 When assigning communications personnel to be embedded directly with municipalities, PSNH should assign an optimized "span of control" ratio for such assignments. A ratio in the range of 5 to 6 towns per assigned personnel, for example, would require 30 to 40 people to fulfill the communication role and allow increased outreach by face to face visits.

6.8 PSNH should incorporate a dedicated municipal room as a best practice into their emergency response, given the extensive service territory in which PSNH provides electricity in New Hampshire.

6.9 PSNH should implement a GIS system with a state of the art OMS to facilitate emergency restoration communications.

6.10 PSNH should reconsider the long term viability of its existing system and reevaluate the feasibility of expedited implementation of a new OMS.

6.11 National Grid should hold municipal meetings with each of its New Hampshire communities, separate from the meetings it holds with its Massachusetts communities unless the southern border towns would prefer to be on-line with the Massachusetts communities. Since each state conducts and coordinates its own emergency operations, it would benefit New Hampshire communities served by National Grid for the company to coordinate closely with state agencies and regional organizations involved in emergency response.

6.12 NHEC should consider posting ETRs on the front-page interface of its website.

6.13 Staff will draft an amendment to Puc 300 that sets forth a clear standard requiring utility contact of the PUC and BEM in outage situations. Staff will consider and discuss with utilities a standard of 2% outages as the reporting trigger.

6.14 The State could assist utilities in future events by providing access to refueling sites, dedicating staging areas and potential satellite locations, and messaging systems for the Emergency Broadcast System; communicating of the dangers of generators back feeding into electric distribution systems; updating contact lists; and establishing message boards at construction sites.

APPENDIX B - *ITEMS FOR LEGISLATIVE CONSIDERATION*

1. The State Legislature should consider amending RSA 21-P:39, as appropriate, to encourage each municipality to prepare an Emergency Response Plan and to update such plans on a regular basis.

2. Pursuant to RSA 362:2, II, NHEC is not a public utility but it is regulated by the PUC in certain respects. There is some dispute about the extent of the PUC's regulation regarding safety, which the Legislature may wish to clarify.

3. The New Hampshire Legislature may wish to review closely recent legislative action in Massachusetts addressing utility resource planning and deployment during emergencies (*see* Mass. Gen. Laws ch. 133 (2009)).