Report on the Preparation for and Response to the August and October 2011 Storms by The Connecticut Light and Power and The United Illuminating Companies

Presented to the:

Staff of the Connecticut Public Utilities Regulatory Authority

By:



65 Main Street
P.O. Box 1237
Quentin, Pennsylvania 17083

(717) 270-4500 (voice)
(717) 270-0555 (facsimile)
Admin@LibertyConsultingGroup.com (e-mail)

April 16, 2012

Table of Contents

Summary of Findings 1
I. Introduction 3
A. Background 3
B. List of Recommendations 3
II. Emergency Plans 7
A. Background 7
B. CL&P 8
C. UI 24
III. Routine Maintenance and Inspections 28
A. CL&P 28
B. UI 41
IV. Storm Monitoring and Predicting 48
A. CL&P 48
B. UI 49
V. Storm Preparations 51
A. CL&P 51
B. UI 57
VI. Emergency Organization 59
A. CL&P 59
B. UI 67
VII. Emergency Alerts and Mobilization 71
A. CL&P 71
B. UI 73
VIII. Recruitment and Deployment of Outside Resources 76
A. CL&P 77
B. UI 81
IX. Damage Assessment and Restoration Status 84
1. CL&P 84
2. UI 91
X. Communications and Outage Information 94
A. CL&P 96
B. UI 130
XI. Support Organizations 155
A. CL&P 155
B. UI 157
XII. Field Restoration 158
A. CL&P 158
B. UI 169
XIII. Post-storm Activities 176
A. CL&P 176
B. UI 178

Acronym List

ACD	Automatic Call Distributor
AMR	Automated Meter Reading
AWC	Area Work Center
CCC	Customer Care Center
CE	Customer Experience
CIS	Customer Information System
CL&P	The Connecticut Light and Power Company
CSR	Customer Service Representatives
EDS	Electronic Dispatch System
EEI	Edison Electric Institute
EMG	CL&P Emergency Management Group
EOC	Emergency Operations Center
EPE	Engineering & Project Excellence
EPOPS	Emergency Plan Operating Procedures
EPP	UI Emergency Preparedness Plan
ERP	CL&P Emergency Response Plan
ESO	Electric System Operations
ETR	Estimated Time of Restoration
ETT	CL&P Enhanced Tree Trimming specification
FTE	Full-Time Equivalent
GIS	Geographic Information System
IAP	Incident Action Plan
ICC	Incident Command Center
ICS	Incident Command Structure
IR	Infrared scan
IVR	Interactive Voice Response
MAMA	Mid-Atlantic Mutual Assistance
NEMAG	New England Mutual Aid Group
NESC	National Electric Safety Code
NU	Northeast Utilities
NU EOG	Northeast Utilities Emergency Operations Group
NWS	National Weather Service
NYMAG	New York Mutual Aid Group
OMS	Outage Management System
PURA	Connecticut Public Utilities Regulatory Authority
RCM	Reliability Centered Maintenance
RFI	Request for Information
ROW	Right-of-Way
SCADA	Supervisory Control and Data Acquisition
SEE	Southeast Electric Exchange
SMS	Short Messaging Service
SOC	System Operations Center
TFCC	Twenty First Century Communications
TL	Town Liaison
TVM	Transmission Vegetation Management
UI	The United Illuminating Company
VM	Vegetation Management
WCSU	Western Connecticut State University

Summary of Findings

The August and October 2011 storms were significant, and the early snowstorm was unprecedented. Liberty found that The Connecticut Light and Power (CL&P) and The United Illuminating (UI) each performed some things well in the preparation for and response to the storms. Liberty also found that aspects of both companies' performance made worse the severity and duration of the storms' effects.

Liberty concluded that the items listed below were beneficial aspects of CL&P's performance.

1. CL&P's systems and methods enabled customers to communicate easily with the company during the storms.
2. CL&P has a superior distribution pole specification and groundline inspection program. CL&P has been purchasing one of the more durable types of poles since the mid-1980s. The percentage of reject poles is low.
3. The CL&P district emergency organization provides the framework to support an effective response. In both storms, CL&P opened and staffed the district commands in good time.
4. CL&P proactively communicated with the media, public officials, customers, and the public before, during, and after the storms.
5. CL&P's emergency plans provide clear expectation of employee involvement in support activities. This is a very important aspect of any successful response effort.
6. The Classification of Service Outage Events in CL&P's emergency plans provides helpful guidance in determining the amount of required resources.

However, and overall, Liberty found that CL&P's storm performance was below average. The following lists the most important items in this category.

1. CL&P's distribution tree trimming program contributed significantly to the extent of 2011 storm damage and the duration of storm service interruptions. CL&P should institute a four-year, full-cycle trim program, a more aggressive overhang trimming process, and a more aggressive hazard-tree removal program.
2. CL&P could not provide restoration estimates or restoration status to customers on a timely basis. CL&P should pursue the technology enhancements that will facilitate real-time updates of restoration status information into the outage system. It should also develop specific, measurable goals and objectives for improving the accuracy and timeliness of outage related information provided to its constituents.
3. CL&P's implementation of the Incident Command System (ICS) did not set up the strong, top-down management response that is necessary in reacting to major outages. CL&P should modify its storm management structure, placing more direct authority and responsibility at the System, Area, and Division level.
4. CL&P made a determined effort in acquiring outside resources, but the results were disappointing. CL&P should work with EEI and other Mutual Assistance Groups to improve the present process.

5. CL&P management did not have proper control over the "Cut/Clear, Make Safe" work done with the towns. CL&P should work with the towns, other utilities, and emergency agencies to establish specific guidelines as to the work CL&P will do in this effort with the towns.

The effect of the storms on UI was not as severe as experienced by CL&P, primarily because of UI's smaller and more compact service territory. Liberty concluded that the items listed below were beneficial aspects of UI's performance.

1. UI well organized its response to the two storms.
2. UI proactively communicated with the media, public officials, customers, and the public before, during, and after the storms.
3. UI managed the alert and mobilization processes well in both storms.
4. UI has an aggressive distribution-pole groundline program.
5. UI used automatic meter reading technologies to communicate with installed meters during the storm to confirm restoration status.

The most significant aspects of UI's performance that need improvement were the following.

1. UI could not handle the large volume of customers trying to communicate with the company during the storm. UI should create a call center storm staffing process to facilitate quick ramp-up of call takers during a large outage. It should redesign its call center technology to improve communications with customers during a large outage or storm. Moreover, it should rigorously test call-handling technology, website, and the outage management system to ensure the technologies operate to expectations and specifications.
2. The results of UI's efforts to procure outside resources were disappointing. UI should affiliate with more than one mutual assistance group and work with EEI and other Mutual Assistance Groups to improve the present process.
3. UI could not provide restoration estimates or restoration status to customers in a timely basis. UI should pursue technology and process enhancements that will facilitate real-time update of restoration status information in the outage system and enable more timely estimated restoration times.
4. UI management did not have proper control over the "Cut/Clear, Make Safe" work done with the towns. It should work with the towns, other utilities, and emergency agencies to establish specific guidelines as to the work to be done in the "Cut/Clear, Make Safe" effort with the towns.
5. Hazard trees contributed to the effects of the storms. The hazard-tree removal budget has not had consistent funding in past years. The current budget rate allows the removal of only very high priority hazard trees.
6. UI tree trims single-phase circuits every eight years. While it conducts some reliability-centered maintenance on these lines, the eight-year cycle allows for increased vegetation density that will cause storm outages.

I. Introduction

A. Background

The Connecticut Public Utilities Regulatory Authority (PURA) contracted with The Liberty Consulting Group (Liberty) to assist its Staff regarding the investigation of the performance of The Connecticut Light and Power Company (CL&P) and The United Illuminating Company (UI) in storms that occurred 2011. Storm Irene, which hit Connecticut on August 28, and an unusual snowstorm at the end of October each caused an interruption of electric service to over 800,000 customers. Restoration of service took up to nine to eleven days. Both CL&P and UI experienced significant damage to their electric distribution systems. This is Liberty's report to Staff on that investigation.

Liberty began its review in mid-December 2011. Liberty interviewed personnel at both utilities, received written responses to requests for information, and relied on the significant amount of information provided by the utilities in response to questions asked by the various parties to this case. Liberty's team comprised very experienced consultants.

Liberty organized its report by the following topics:

II. Emergency Plans
III. Routine Maintenance and Inspections
IV. Storm Monitoring and Predicting
V. Storm Preparations
VI. Emergency Organization
VII. Emergency Alerts and Mobilization
VIII. Recruitment and Deployment of Outside Resources
IX. Damage Assessment and Restoration Status
X. Communications and Outage Information
XI. Support Organizations
XII. Field Restoration (includes staffing)
XIII. Post-Storm Activities

The report addresses each of these topics separately for CL&P and UI.

B. List of Recommendations

This report provides conclusions and recommendations for each utility under the topics listed above. The following is a complete list of Liberty's recommendations.

II-CL&P-1 Re-format the EPOPS document into smaller segments to enhance the use of this information during emergencies..... 22
II-CL&P-2 Add language to the "Authority and Policies" subsection of the Basic plan that clearly describes and reaffirms top management's ultimate authority for and complete support of the response to major outages. 22
II-CL&P-3 Include language in Sections 2.2 and 2.3 (safety and environment) that emphasizes a more proactive approach in these areas. 22

II-CL&P-4	Add language to the ERP to provide guidance for activation/escalation "from the top down" when the situation calls for it. 23
II-CL&P-5	Change Level V in the Classification of Service Outage Events chart (Section 5.2, page 22, Basic Plan) to cover all outages of 80,000 customers and above. 23
II-CL&P-6	Add a segment on clean-up activities in Subsections 6 – Post Incident Activities – in the Basic Plan, and Subsections 5 – Post Storm Activities – in the District and Division Plans. 23
II-CL&P-7	Place the responsibility for all drills and training with the EMG, and reword Section 2, District Plan, 3.13 to strengthen the process and place more emphasis on the training process. 23
II-CL&P-8	Provide specific guidance 3.2, Conference Calls, Section 2, District Plan, as to the frequency and time of day for conference calls. 23
II-CL&P-9	Modify the wording in 3.3, District Decentralization, Section 2, District Plan to provide for the activation of Area and Division Command anytime decentralization is being considered. 23
II-CL&P-10	Strengthen the wording in 3.4, Activation and Staffing of the District Incident Command Post, Section 2, District Plan. The wording should provide specific guidelines for triggers of when it should use certain organizational structures. 23
II-CL&P-11	Revise the ERP to provide for centralized training and drills, and firm up the wording concerning number of required drills. 24
II-CL&P-12	Address aggressively the concerns of the response team concerning the usefulness and use of the plan. 24
II-UI-1	Initiate a process for regular updates to the EPP, document the updates, and conduct the necessary training to be sure all responders are familiar with the plan. 25
III-CL&P-1	Institute a four-year full cycle trim program, a more aggressive overhang trimming process, and a more aggressive hazard-tree removal program. 35
III-CL&P-2	Verify the condition of the wood cross arms on the system and put in place a program to replace them at a sustainable rate. 41
III-UI-1	Institute a four-year full cycle trim program and a more aggressive hazard-tree removal program. 44
IV-CL&P-1	Use a weather vendor that has the confidence of the storm team. 49
IV-CL&P-2	Develop a pre-storm resource prediction process. 49
IV-UI-1	Develop a pre-storm resource prediction process. 50
V-CL&P-1	Improve the organization, planning, and execution for satellite and staging area setup. 56
VI-CL&P-1	Modify the storm management structure and processes to clarify the makeup and role of System Command and place more direct authority and responsibility at System Command. 66
VI-CL&P-2	Strengthen the Area Command structure with regard to its direct functional control in key areas. 66

VI-CL&P-3	Activate the division command posts in all major outage events as set forth in its emergency plan..... 66
VII-CL&P-1	Develop a checklist for winter storms similar to the one it has for hurricanes and use the event classification levels to guide preparations during the alert phase..... 73
VII-UI-1	Amend the EPP and change UI's practice to ensure that it opens the EOC prior to the onset of major events. 75
VIII-CL&P-1	Work with EEI and other Mutual Assistance Groups to improve the present process, and work with PURA in an attempt to avoid problems such as the one involving a governor not allowing crews to leave his state. 80
VIII-CL&P-2	Adopt an aggressive plan to avoid the mistakes made in Irene and the October snowstorm in requesting outside help. 80
VIII-CL&P-3	Follow the deployment point process as outlined in the EPP when large numbers of outside resources are incoming. 81
VIII-UI-1	Work with EEI and other Mutual Assistance Groups to improve the present process, and work with PURA in an attempt to avoid problems such as the one involving a governor not allowing crews to leave his state. 82
VIII-UI-2	Join other mutual assistance groups. 83
IX-CL&P-1	Develop a process to use damage assessment information in a statistical manner for overall crew resource-requirement projections. 90
IX-CL&P-2	Improve the damage assessment processes at the district level. 90
IX-CL&P-3	Reinforce aggressively the need for accurate, timely damage and restoration updates from the field..... 90
IX-UI-1	Develop a process to use damage assessment information in a statistical manner for overall crew resource-requirement projections. 93
IX-UI-2	Verify that the 2011 EPP adequately covers restoration status updates, and address the issues identified during the two storms. 93
X-CL&P-1	Create a call center staffing model to facilitate quick ramp-up and consider staging agents in nearby hotels in preparation for a large storm, especially one that makes travel to the center difficult or unsafe. 129
X-CL&P-2	Redesign the interface between the call center technologies and Twenty First Century Communications to improve communications with customers during a large outage or storm..... 129
X-CL&P-3	Enhance the Town Liaison program to create a more coordinated and consistent approach to keeping community leaders and municipal officials better informed of storm restoration status. 129
X-CL&P-4	Pursue technology enhancements that will facilitate real-time updates of restoration status information into the outage system. 130
X-CL&P-5	Develop specific, measurable goals and objectives for improving the accuracy and timeliness of outage related information provided to its constituents..... 130
X-UI-1	Create a call center storm staffing process to facilitate quick ramp-up of call takers during a large outage. 152

X-UI-2 Redesign call center technology to improve communications with customers during a large outage or storm. 152
X-UI-3 Rigorously test call-handling technology, website, and Outage Management System to ensure the technologies operate to expectations and specifications. 153
X-UI-4 Enhance the Municipal Liaison program to create a more consistent approach to keeping community leaders and municipal officials better informed of storm restoration status. 153
X-UI-5 Pursue technology and process enhancements that will facilitate real-time updates of restoration status information in the outage system and enable more timely ETRs. 153
XI-CL&P-1 Reduce the number of support functions assigned to Area Logistics. (See also Chapter VI, Recommendation 2) 156
XII-CL&P-1 Strengthen procedures for getting regular, timely restoration status updates from crews in the field. 168
XII-CL&P-2 Change the restoration practice in major events such as Irene and the October storm to limit the amount of time crews are moved from one circuit to another until work on the first circuit is completed. 168
XII-CL&P-3 Assign crews to specific circuits in a major outage event. 168
XII-CL&P-4 Work with the towns, other utilities, and emergency agencies to establish specific guidelines as to the work to be done in the "Cut/Clear, Make Safe" effort with the towns. 169
XII-UI-1 Strengthen the procedures for getting regular, timely restoration status updates from crews in the field. 174
XII-UI-2 Change the restoration practice in major events such as Irene to limit the amount of time crews are moved from one circuit to another until work on the first circuit is completed. 174
XII-UI-3 Work with the towns, other utilities, and emergency agencies to establish specific guidelines as to the work to be done in the "Cut/Clear, Make Safe" effort with the towns. 175
XIII-CL&P-1 Revise post-event process to accomplish the mutual goals of senior management involvement and timely completion, and to make the critiques of more value to the response team. 177

II. Emergency Plans

A. Background

"Plan your work and work your plan," is never more applicable than with the response of a utility to a major outage event. While all utilities have experience in responding to common outages, a major outage event brings more and greater challenges in both degree and complexity. For any utility to respond appropriately, it must begin with a comprehensive, user-friendly emergency plan. A comprehensive plan addresses all aspects of the response process beginning with pre-event activities, covering all aspects of the restoration, and concluding with the post-event period. It also addresses major outage events other than those related to storms, such as floods, catastrophic facility or equipment failures, overload emergencies, and terrorist activities.

In addition to being user-friendly, a plan must be readily accessible to all response employees in both print and electronic format. To provide the intended guidance, response employees must use the plan. Response employees must have a good general knowledge of all aspects of the plan and a verified working knowledge of those sections of the plan dealing specifically with their functional area. To ensure that the employees have this degree of knowledge and are comfortable using the plan, utilities must conduct regularly scheduled drills and training activities. All key responders should be drilled or receive supplemental training at least once per year.

Failing to keep the plan updated can have a significant negative effect on their usefulness. Not only does the out-of-date or lacking information cause confusion and lost efficiency, but also the signal sent to the responders is that company leaders do not put a high priority on the plan. A good test of a utility's commitment to having an outstanding response organization is the quality of its emergency plan, and the resources expended in drilling and training their responders and in updating their plan.

This chapter provides a description and evaluation of the emergency plans that Connecticut Light & Power (CL&P) and United Illuminating (UI) had in effect prior to the 2011 storms. Liberty's objective for the work included in this chapter was to assess the companies' emergency plans, including the companies' training and drill procedures for emergency response. The chapter addresses:

1. The adaptability of the plans to address different sizes of events, including a method to categorize events by severity level and to detail activities required for each level
2. The accessibility of the plans to all response personnel
3. The extent to which the plans are user-friendly and provide necessary information in a clear, concise format
4. The extent to which response personnel have a good working knowledge of the plans
5. The comprehensiveness of the plans, covering all phases of emergency response – prevent, restoration, and post-event
6. The extent to which the plans contain recognized utility best practices
7. The frequency, comprehensiveness, and effectiveness of drills and training exercises on the plans and emergency response activities

8. The extent to which the plans capture and use feedback from drills, training exercises, and post-event critiques of actual storm responses to affect improvements in the plans
9. The proven effectiveness of procedures, methods, organizational structures, and processes as set forth in the plans
10. The frequency, comprehensiveness, and effectiveness of updates to the plans

The chart below lists items that a comprehensive emergency plan should address. While not intended to be comprehensive, this list includes the important topics in a major outage response. In its review of the emergency plans of both CL&P and UI, Liberty used this chart to determine whether in its opinion the plans were comprehensive in content.

General Information	Administration/Resources	Planning Processes
Lines of Authority	Roles/Responsibilities	Drills/Training
Pre-Event Activities	Weather Services	Monitoring/Alert Processes
Event/Damage Prediction	Activation/Mobilization	Documentation
Classes of Emergency	Alert Notification Process	External Communications
Internal Communications	Organizational Structure	Personnel Support
Restoration Activities	Damage Assessment	Restoration Work Force
Use of Outside Resources	Crew Guides	Team Leaders
Operation Center	Division Operation Center	Local Operation Center
Inventory Control	Material Supply	Procurement
Public Safety	Employee Safety	Logistics
Meals/Lodging Practices	Security	Worker Orientation
Use of Other Personnel	Work Prioritization	Work Order Handling
Downed Wire Process	Cut and Clear Process	Regulatory Relationships
Elected Officials	Priority Services	Critical Care Customers
Employee Services	Plan Accessibility	Fleet Management
Est. Restoration Time	Call Center Operations	Tree Clearing
Transmission System	Substations	Status Conference Calls
Hazard Analysis	Transportation	Fueling Process
Post-Event Activities	Ramp-Down	Clean-Up
Post-Event Critiques	Action Item Prioritization	Corrective Action

B. CL&P

1. Form and Contents

The emergency plan used by CL&P in responding to Hurricane Irene and the October snowstorm was the Emergency Response Plan, filed with the Connecticut Public Utilities Regulatory Authority (PURA) in June 2011. The plan consists of four sections as follows:

Section 1 – Basic Plan – 28 pages
Section 2 – District Plan – 42 pages (including 11 pages of appendices)
Section 3 – Division Plan – 22 pages
Section 4 – Emergency Response Organizations – 45 pages

In addition to these four sections, the CL&P plan has three pages of definitions and a four-page summary of changes to the previous plan. While not on file with PURA, CL&P used a 414-page Index of Operating procedures (known as EPOPS), which covers 25 separate response functions, to provide response guidance. CL&P requires each district storm room to keep these combined plan documents, which total 558 pages.[1] Contained in one large binder, these plans are physically unwieldy.

Section 1 – Basic Plan

The basic plan has six subsections – Introduction, Authority and Policies, Concepts of Operation, Preparedness Activities, Response Activities, and Post Incident Activities.[2]

Subsection 1 – Introduction

As stated in the opening line, the objective of the CL&P Emergency Response Plan (ERP) is to provide "a systematic and organized approach to prepare for, and respond to, power outages caused by severe weather, flooding, civil disturbance, or other major disruptions of the Distribution System." This subsection established the operational structure, defined as Incident Command Center (ICS), for CL&P's emergency response. The plan is applicable to CL&P and Northeast Utilities (NU) corporate staffs in all moderate through major power outages.[3] This subsection is, and by definition should be, general in nature.

Subsection 2 – Authority and Policies

This subsection covers the delegation by the president of CL&P of "authority for performance and direction of actions of this plan." For CL&P, it delegates this authority to the Manager – Emergency Management and the CL&P Emergency Management Group (EMG). For NU, it names the Manager – System Restoration and Emergency Preparedness, and the Northeast Utilities Emergency Operations Group (NU EOG).[4] There is no specific wording in this section to underscore top management's full support and involvement in major outage restoration.

This subsection discusses policies dealing with safety, environmental concerns, and communications. As would be expected, the treatment of these topics is primarily generalized and conceptual in nature. The wording makes the ICS Communication Policy seem more proactive than the Safety and Environmental Policies. There is no mention of advanced training and specific actions such as daily safety briefings.[5]

Under Public Safety and Restoration Priority, the document makes the following statement: "Public safety requires immediate efforts for making safe downed, energized wires, and clearance of downed wires, poles, **trees, and limbs on major transportation arteries that**

[1] CL&P Emergency Response Plan, Section 2 – District Plan, page 33; Interview No. 27, 1/4/2012
[2] CL&P Emergency Response Plan, Section 1 – Basic Plan, page 2
[3] CL&P Emergency Response Plan, Section 1 – Basic Plan, page 3
[4] CL&P Emergency Response Plan, Section 1 – Basic Plan, page 5
[5] CL&P Emergency Response Plan, Section 2.2 – 2.5 – Basic Plan, pages 5-7

provide access for emergency services (emphasis added)."[6] Liberty discusses CL&P's practice of working with towns on road clearing in a following section of this report.

Subsection 3 – Concepts of Operation

The opening statement of this subsection is "Normal District work groups handle most power outages." It goes on to say CL&P activates the response organization first at the local level to "handle events of moderate and medium severity."[7] It does not address the situation of a large storm with advance notice (*e.g.*, hurricane) in which "top down" activation is more likely. The language in the two segments dealing with Management and Process Summary – Sections 3.2 and 3.3 – is general and conceptual in nature, but serves the purpose of this part of the overall plan.

Subsection 4 – Preparedness Activities

This subsection sets forth the "elements [that] are set in place prior to an actual emergency." The list is not all-inclusive, but contains the following elements: personnel, notification systems, contact lists, equipment, staging areas, contract crews, mutual-aid utility crews, weather forecasting, and media kits.[8]

4.1 – CL&P EMG (Emergency Management Group)

The description of the role of Area Command in 4.1.3 is troubling because CL&P worded the ERP in such a way as to exclude proactive activation of the Area Command prior to the onset of storms such as Hurricane Irene and the October snowstorm. Specifically, the plan uses the following language, "An Area Command is activated when there are numerous outages in more than one division, or when outside resources are required."[9]

The segment 4.1.5 – Augmenting Personnel and Support Functions – is a very important part of any successful emergency response effort. CL&P does a good job of clearly setting forth the responsibilities of employees and different functional groups in providing this support. One extremely significant statement: "Personnel are drawn from normal CL&P and NU work groups to augment division or district staff and fill functions in the ICS organizations. It is the expectation of executive management that every CL&P and NU system employee will participate in his or her assigned storm role when called upon."[10] To set forth clear expectations regarding support efforts is very important, and CL&P has done so.

Sections 4.2 through 4.6

These sections cover (4.2) State, Municipal, and Community Coordination, (4.3) Emergency Restoration Equipment, (4.4) Outside Services, (4.5) Emergency Response Alerts, and (4.6) Training and Drills. The wording in these segments is helpful and adequate for the intended

[6] CL&P Emergency Response Plan, Section 2.2.1 – Basic Plan, page 5
[7] CL&P Emergency Response Plan, Section 3.1– Basic Plan, page 8
[8] CL&P Emergency Response Plan, Section1, 4. Preparedness Activities - Basic Plan –, page 10
[9] CL&P Emergency Response Plan, Section 1, 4.1.3 – Basic Plan, page 12
[10] CL&P Emergency Response Plan, Section 1, 4.1.5 – Basic Plan, page 13

purpose, which is general and conceptual in nature. The Basic Plan appropriately addresses these topics.

Overall, the ERP treatment of Preparedness Activities found in Subsection 4 provides good guidance as well as clearly stated responsibilities and management expectations. The Emergency Plan Operating Procedures (EPOP), which Liberty covers in a following section of this report, provides specific details of these activities.

Subsection 5 – Response Activities

This subsection covers six separate response elements.

5.1 – Command System Initiation

This element sets forth the ICS initiation process, providing that senior management, Area command leaders, and Division or District heads may initiate ICS. In its application of the ICS structure, CL&P appears to put the largest responsibility on the lowest unit – the district.

5.2 – Emergency Classifications

In the chart below, [11] the CL&P ERP establishes five levels of emergency that help determine the amount of required resources.

Classification of Service Outage Events

Level	Expected Number of Customers Likely to be Affected	Expected Number & Type of Crews Required	Expected Duration	ICS Activation
Level I	< 10,000	1 to 25 CL&P Crews (Note 1)	< 12 hours	Managed by the SOC and District personnel
Level II	< 20,000	26 to 75 CL&P Crews (Note 1)	12 to 24 Hours	Managed by the SOC, District and Division Command
Level III	< 40,000	76 to 100 CL&P, NU System Crews, & Mutual Aid Crews (Note 1)	24 to 48 Hours	Managed by the District Incident Commander, Division Command, and Area Command
Level IV	< 80,000	101 to 175 District, NU System, & Mutual Aid Crews (Note 2)	48 to 72 Hours	Managed by the District Incident Commander, Division Command, Area Command, and System Command

[11] CL&P Emergency Response Plan, Section1, 5.2 – Basic Plan, page 22 (selected data – formatting)

Level V	>100,000	over 175 District, NU System and Mutual Aid Crews (Note 3)	> 72 Hours	Managed by the District Incident Commander, Division Command, Area Command, and System Command

Notes: 1. Corporate Personnel pre-positioning is unlikely except for extenuating circumstances.
2. Corporate Personnel pre-positioning is optional but more likely.
3. Corporate Personnel pre-positioning is expected.

There is an error in this chart concerning the number of customers out at each level. As shown above, there is no classification level listed for events affecting 80,000 to 100,000 customers.

The event classifications as shown above are in keeping with standard utility practice. Beginning with Level III, CL&P activates Area command and brings in outside resources, including crews from other NU companies. At Level IV, CL&P activates System command, and at Level V, pre-positions corporate personnel. (At Level IV, pre-positioning of corporate personnel is optional.) As stated above, the primary purpose of CL&P's event classification is to make an early determination of required resources, based on the best information available at the time. Based on this chart, it is clear that the CL&P ERP calls for the full engagement of all resources available for all events at Level III and above.

5.3 – Escalation of Emergency Response

This segment covers the "bottom up" escalation, which the ICS structure stresses. This segment covers each level—District, Division, Area, and System—along with action steps taken at each level upon activation. Escalation is the topic here, and it is adequately covered.

Sections 5.4, 5.5, and 5.6

These segments address (5.4) Contractor Support and Mutual Aid, (5.5) Work Schedule, and (5.6) Demobilization from Emergency. They address the subject in a succinct manner, providing good guidance. Included are assigned responsibilities for procurement of outside resources, the emergency working hours (16 hours on and 8 hours off, maximizing daylight), and the priority order in the release of outside crews.

Subsection 6 – Post Incident Activities

This subsection addresses three specific areas, Equipment and Vehicle Restoration, Post-Storm Critique, and Administrative Updates and Procedure Revisions. It covers these three topics well and assigns responsibility for such things as critiques and updating of contact lists. There is one topic not covered that is normally considered an essential post incident activity. The topic left out goes by a number of names, but is essentially clean-up. This includes things like making repairs and replacements of temporary fixes to the distribution system and clearing partial tree work. This process involves thorough inspections of both line facilities and tree exposure.

Section 2 – District Plan

The district plan is a 42-page document divided into five subsections plus an 11-page Appendix. The five subsections are Introduction, Concepts of Operation, Instructions, Demobilization and Recentralization, and Post Storm Activities.

Subsection 1 - Introduction

Consisting of just one page, this first subsection addresses the objective, applicability, and organization of the District Plan. It treats these topics adequately.

Subsection 2 – Concepts of Operation

This subsection addresses three topics:

- 2.1 General – Use of ICS at the District level
- 2.2 Management – Duties of the District Commander
- 2.3 Process Summary – Key points are Activation of ICS; Action Steps (pre-event, during event, and post-event); Priority of recruiting/releasing outside crews; System Operations Center (SOC) handles OMS and all dispatching.

Subsection 3 - Instructions

3.1 Preparedness Activities

The segments on Pre-storm Checklist and Annual Preparedness Activities (3.1.1 and 3.1.2 respectively) provide a good overview on these topics with references to more detail in sections of Emergency Plan Operations Procedures (EPOP).

Segment 3.1.3 – Emergency Drills and Tabletop Exercises – places the primary load on the district. It indicates that CL&P EMG (with help from NU) normally conducts simulated storm drills annually.[12] The Division Director can decide fewer district drills are needed, and the Director, System Operations can decide fewer simulated drills are needed based on storm response experience during that period. The converse is also true, and CL&P may hold more frequent drills when there are new processes or software that requires more training. The concept of pushing the responsibility down to the lowest level of the organization is contrary to the usual practice in utilities. As written, the CL&P plan does not place an adequate stress on training and drills.

3.2 Conference Calls

This segment sets forth the concept of and reason for conference calls, the responsibility for initiation of calls, and the key elements of the calls. There is no specification as to how many or at what time of day personnel should make the calls.

[12] CL&P Emergency Response Plan, Section 2, District Plan, 3.1.3 page 12

3.3 District Decentralization

"District Decentralization is defined as the transfer of certain SOC functions out to District locations during emergency events. The decision to decentralize is a collaborative process initiated by System SOC Management, Area Command, Division Command, and District Command."[13] These are the opening sentences in this subsection. Expressed differently, it is moving the duties of switching and dispatching crews from the System Operations Center (SOC), where they normally reside, down to the district level. This is due to the large amount of damage and repair crews in the impacted area. It sets forth the duties of the four separate functional groups mentioned – SOC and Area/Division/District Command – as related to this decentralization process.

The plan allows for the decentralization down to the district level even when the Area and Division Commands are not activated (although they participate in a conference call with the SOC and District Command.) When an outage event has occurred or anticipated in which CL&P considers district decentralization, the Area and Division Commands should be activated. Therefore, the plan covering district decentralization should confirm Area and Division Command activation. There should not be any need to qualify the instructions to cover "when the Area Command is activated," and "when the Division command is activated."

3.4 Activation and Staffing of the District Incident Command Post[14]

The second paragraph of this segment deals with the district organization in "an elevated event." The wording is weak, leaving some important considerations left to the district to decide. For instance, "it is advisable for the District Commander to utilize the Section Chiefs…," or "The District Commander needs to maintain a manageable span of control and delegate responsibilities as the situation warrants." To provide effective guidance, the ERP should provide specific triggers to implement certain organizational structures.

3.5 Transfer of Command and 3.6 Scheduling and Utilization of Required Resources

The wording in these two segments cover the process for the Incident Manager to effect transfer to the next shift Incident Manager, and the sequence of actions to begin the response and gain situational awareness. The wording effectively covers the subject matter.

3.7 Required Resources

A more apt name for this segment is "restoration process requirements." It covers the assessment and deployment of line and tree crews, the analysis process, "wires down" support, damage assessment patrols, food and lodging for workers, safety, field services (stores, transportation, and facilities), environmental management, municipal and large customer liaisons, and corporate communications. The wording is primarily general and conceptual in nature, but used in

[13] CL&P Emergency Response Plan, Section 2, District Plan, 3.3 page 14
[14] CL&P ERP, Section 2, District Plan, 3.4, page 15

conjunction with the EPOP section, provides adequate guidance. Worthy of note is the process for determining early the total estimated restoration time. The plan describes it in this manner:

> ***Estimated Restoration Time = (Trouble spots) x (Average time to restore) / (# of Crews)***
> *Rules of Thumb:*
> *Three trouble Spots per interruption*
> *Time to restore Trouble Spot varies depending upon type of storm damage as follows:*
> *Lightning = 2 hours/Trouble Spot*
> *Wind = 3 hours/Trouble Spot*
> *Ice = 4-5 hours/Trouble Spot*
> *Take into account 'Make Safe Time'*
> *If a Transmission event – Update restoration time*
>
> *NOTE*
> *Restoration times obtained using the aforementioned formula and Rules of Thumb only provide a guide to determining restoration times. Rules of thumb and calculated restoration times obtained must be considered in light of actual damage and extrapolations based on application of logic and experience.*[15]

It is commendable that the CL&P plan has a process to seek to determine for each district the overall restoration time, and the approach in the formula is logical. In the absence of a predictive model, this is a good tool.

Subsection 4 – Demobilization and Recentralization

This subsection is short, but adequate. It describes the order of release of outside crews, and the demobilization process when the remaining restoration work is manageable by the normal district operations. The recentralization process is described as, "the District release of the SOC function back to the SOC."[16] It sets forth the key points of both of these processes.

Subsection 5 – Post Storm Activities

This subsection has three segments – Equipment/Supplies, Exemplary Performance Recognition, and Post-Storm Critique. Worthy of mention is the provision that CL&P will complete all district critiques within 14 days after the restoration completion, and complete division critiques within 30 days. However, as in the Basic Plan, the district plan does not cover another essential post-incident activity, clean-up. This activity involves making repairs and replacements of temporary distribution system fixes, cleaning up temporary tree work, and thorough inspections of lines and trees.

[15] CL&P ERP, Section 2, District Plan, 3.7, page 18
[16] CL&P ERP, Section 2, District Plan, 4.2, page 28

District Storm Room Forms

At the end of Section 2, District Plan, there are ten pages devoted to samples of forms used in the District Storm Room. This includes, Storm Room Check List, Trouble Ticket, Damage Assessment Patrol Report, Outside Crew Record, Storm Restoration Analysis, Storm Pre-package Cover Sheet, Customer Notification Damaged Service Tag, and Environmental Response Guide. This type of information included in the storm plan enhances its usefulness to responders.

Section 3 – Division Plan

The CL&P Division Plan is 22 pages in length compared to 28 in the Basic Plan, and 42 in the District Plan. It consists of five subsections – Introduction, Concepts of Operation, Instructions, Demobilization and Recentralization, and Post Storm Activities. Much of the wording in the division plan is included in either the Basic Plan or the District Plan, or both. The comments, conclusions, and recommendations on the previous two sections are applicable to the Division Plan.

Section 4 – Emergency Response Organizations

This is a 45-page section, covering Emergency Operations Groups, Incident Command System, System Command Positions and Responsibilities, CL&P Area Command Positions and Responsibilities, Division Command Positions and Responsibilities, District Command System Positions and Responsibilities, and Emergency Operations Center. The purpose of this section is to set forth specifics of the different organizational levels of the CL&P emergency organization. CL&P arranged this in a logical order, beginning with the emergency groups (NU EOG, CL&P EMG). It explains the concept of the Incident Command Center, and it is clear that CL&P is committed to following ICS closely. In the subsection on ICS, the plan provides generic organization charts showing the system, area, division, and district ICS structures. This is helpful to the user in understanding ICS better. As the sub-headings would indicate, the following segments show the specific organization charts and job responsibilities of function leaders at the System, Area, Division, and District level. Much of the information included in this subsection is a compilation of information found in the Basic, District, and Division Plan. It is useful because it provides a quick reference for responders arranged in an organizational concept.

Worthy of note is the sentence found in the subsection on ICS, "The ICS uses a tiered approach placing authority and responsibility at the lowest possible organization level to efficiently respond to emergencies of varying magnitudes."[17] It is worth repeating – the CL&P ERP appears to approach all emergency response from the "bottom up." This would work well in the case of an incident that starts small and escalates; it is not the approach to take in emergencies such as Hurricane Irene and the October snowstorm.

[17] CL&P ERP, Section 4, Emergency Response Organizations, 2.2, page 5

Emergency Plan Operating Procedures (EPOP)

The EPOP section of CL&P's ERP is a 414-page addendum to the plan filed with PURA in June 2011. It contains 25 storm response procedures that the table below lists.

Emergency Operations Center Activation & Operations	Safety
Environmental Management	Communications and Media Relations
System Project Support	Mutual Aid and Staging Area Support
Vegetation Management	Telecommunications Support
Wires Down	Damage Assessment Patrols
Food and Lodging Support	Stores
Transportation	Facilities Support
Information Technology Support	Contract Services
Emergency Work Orders and Accounting	Transmission Assistance Teams
Interruption Ticket Analysis and Processing	E911 Call and Trouble Ticket Processing
Municipal and Customer Liaisons	Staging Areas Support
Decentralized Emergency Operations	Future Procedure
CL&P Emergency Disturbance and Incident Reporting	

This is a very good response tool, providing roles, responsibilities, instructions, and checklists for each of the above procedures. Although the Emergency Operations Center Activation and Operations procedure mentions System Commander, there is no checklist for this position.

2. Training, Drills, and Use of the ERP

The best emergency plan is of little or no use unless the utility thoroughly trains and regularly drills responders, and the emergency response team actually uses the plan. Liberty found deficiencies in this area at CL&P.

The following are excerpts from the Basic Plan dealing with training and drills:

> *"Training and Drills*
> *Training and drills are required to ensure the knowledge and skills of personnel assigned emergency response activities are current and sufficient to efficiently complete all required actions. CL&P EMG coordinates core, basic training with the assistance of the NU Training Department….*
>
> *The Division Director or his designee, with assistance from CL&P EMG, shall initiate District level tabletop drills and perform drill critiques within his assigned Division. Periodically, the Division Director shall expand the drills to incorporate Division Command roles and responsibilities…*
> *The Division Director ensures drills are performed in a manner that exercises the departments and organizations that assist in storm and outage recovery within his Division.*
>
> *The Division Director may delegate responsibility for District level drills to the District Operations Manager who will conduct the drill and provide a report evaluating the drill's effectiveness.*

> ***District level drills will normally be performed biannually. Fewer drills for a specific District may be required if the Division Director determines that District's recent or ongoing experience with actual storm events have adequately exercised the departments and support organizations involved. Adequacy reviews of District level storm critiques will determine whether outcomes from a storm event in a given District merit a reduction in the number of required drills. Conversely, additional drills may be necessary when introducing new or revised process flows or new software, etc."[18] (Emphasis added.)"***

The above wording does not provide for the coordination and consistency so important in training. A centralized training group should have more direct involvement. In addition, the language permitting fewer drills is troubling. While certainly actual storm response will interrupt the drill schedule, this wording could promote a less than aggressive approach to drills.

In a response to an audit request for information about their Outage Restoration Training Plan, CL&P responded by describing three courses offered to support personnel. The three courses covered the "wires down" process, patroller and detail damage assessment training, and web workspace (analyst) training. There was no mention of any other training for other responders.

CL&P conducted a tabletop hurricane drill on August 25, 2011, just days before Hurricane Irene made landfall. Appendix 1 is the script of that drill.[19] The scenario and action prompts in the drill should have been helpful to CL&P in preparing for the ongoing storm.

CL&P filed their revision to their 2006 ERP on June 1, 2011, but at the time of the impact of both storms, it had not held training on the new plan. They had it scheduled but storms interrupted that. Using on-line training, all incident commanders were supposed to have finished section 100 of the training course before Christmas. Incident commanders must complete sections 200 and 700 by March. CL&P gave copies of the full plan book to all incident commanders and placed in all storm rooms. The employees charged with the responsibility of training on the new plan were not aware of any meetings with employees out in the field to review the new plan.[20]

With regard to the use of the ERP, Liberty noted several variations from the plan in the response to Hurricane Irene and the October snowstorm. Liberty covers the specific instances in a following section of this report.

Below are several comments made by CL&P employees during interviews concerning the plan, its usefulness, and its use during the two 2011 storms.

- After these two storms, responders probably think the plan was written for regulators[21]
- Did not use the plan during either storm.[22]

[18] CL&P ERP, Section 1, Basic Plan, 4.6.1 and 4.6.2, pages 18 and 19
[19] Response to audit request Q-WITT-005.
[20] Interview CLP22, January 3, 2012
[21] Interview CLP23, January 3, 2012

- Plan does not have good specificity – no procedures that they are trained on and then put into practice. Have had 20-30 weather incidents since he has been involved, so they are well-rehearsed, but people not working according to plan – not sure of their role. It is a "structural issue" – people resisted the machine to bring structure.[23]
- Followed the plan "as best we can" – "people know their assignments" – they do drills; use the plan. Familiar with EPOPs – "not word for word" – know who to talk to – used checklists from EPOPs[24]
- The plan is OK on paper – when you get into details it is very nebulous, not a lot of substance – they are not trained on it – about 20 procedures covered as a separate addendum to the plan – the procedures are a cut above the rest of the plan – 10 years ago, used to do a lot more training, led by the manager, emergency preparedness. If budget is tight, they cut training and tree trimming. If training not mandated, it is not done.[25]

It is clear from the above that there are significant issues that CL&P needs to address in training and drilling the plan, and in its usefulness and use.

3. Conclusions

1. The CL&P Emergency Response Plan (ERP) is comprehensive in its content.

The ERP addresses all key functional response areas, and provides good coverage of organization charts, checklists, and processes.

2. CL&P's ERP is cumbersome and awkward in its present format. (See Recommendation 1.)

With 558 pages in one binder, the plan in the district storm rooms is very hard to handle. It is difficult to turn the pages on the binder rings and this discourages use of the manual.

3. CL&P's ERP contains no language concerning top management's authority for and support of the response to major outage events. (See Recommendation 2.)

The CL&P ERP describes the delegation by the CL&P president of authority for restoration performance, but there is no language describing and reaffirming top management's complete support of and involvement in response to major outage events.

[22] Interview CLP Tour A, January 6, 2012
[23] Interview CLP37, January 6, 2012
[24] Interview CLP30, January 4, 2012
[25] Interview CLP26, January 3, 2012

4. The safety and environmental segments in CL&P's ERP Basic Plan do not include any proactive language concerning action steps used to help train workers and the public in advance. (See Recommendation 3.)

While the ICS Communications Policy contains language such as, "developing communications strategies and messages…," neither the safety nor the environmental segment addresses things such as strategies and messages. There is wording such as "highest priority," "management ensures employees, work in a safe manner…," and "management ensures employees, .work in an environmentally sound manner…"[26] A statement such as the following would strengthen the segment. " Management is responsible to see that the proper information and training is provided to workers and the public as required, including daily briefings during major outage events."

5. There is insufficient clarity in the ERP concerning the activation of the CL&P emergency response organization in the case of large pending weather events with advance notice. (See Recommendation 4.)

The language in the general segment under "concepts of operation" and in sections 4.1.3 and 5.3 describes the activation/escalation of the ICS structure from the "bottom up" when outages have occurred or outside help is needed. It is silent on activation and escalation of ICS in the type of emergency faced in both Hurricane Irene and the October snowstorm.

6. The CL&P ERP sets forth clear expectations of employee involvement in support activities. This is a very important aspect of any successful response effort.

Section 4.1.5, Augmenting Personnel and Support Functions, contains very explicit language concerning management's expectations of employee participation.

7. Except for an error that inadvertently leaves out a certain level storm, the Classification of Service Outage Events as found in the Basic Plan is well conceived and provides helpful guidance in determining the amount of required resources. (See Recommendation 5.)

The chart shown in Section 5.2 establishes five classifications of events, and stipulates the number and types of crews needed, anticipated duration of the event, and the activation level (District, Division, Area, and System). The primary purpose of CL&P's event classification is to make an early determination of required resources, based on the best information available at the time. Based on this chart, it is clear that the CL&P ERP calls for the full engagement of all resources available for all events from Level III and above. The error is not technically covering outages involving 80,000 to 100,000 customers.

[26] CL&P Emergency Response Plan, Section 2.2 – 2.5 – Basic Plan, pages 5-7

8. The subsections in the Basic, District, and Division Plans do not cover all of the necessary elements. (See Recommendation 6.)

The topics covered in these subsections are essential parts of post-incident activities and are well covered. However, they do not cover another essential post-incident activity, clean-up. This activity involves making repairs and replacements of temporary distribution system fixes, cleaning up temporary tree work, and thorough inspections of lines and trees.

9. The CL&P plan – Section 2, District Plan, 3.1.3 – places primary responsibility for drills and training on the district. In addition, the overall wording of this segment is not as strong as it should be for this important issue. (See Recommendation 7.)

Segment 3.1.3 – Emergency Drills and Tabletop Exercises – places the primary load on the district. Simulated storm drills are scheduled and conducted by the CL&P EMG (with help from NU) "normally" annually.[27] The Division Director can decide fewer district drills are needed, and the Director, System Operations can decide fewer simulated drills are needed based on storm response experience during that period.

10. The segment dealing with conference calls – 3.2, Section 2 – District Plan – lacks specificity as to frequency and optimum times for these calls. (See Recommendation 8.)

This segment stresses the necessity of conference calls as an important function in storm response. However, there is no specification as to how many calls CL&P should make or at what time of day it should make the calls. These are important considerations and should be in the plan. The calls should be coordinated with each other to ensure the most timely and accurate communication between different levels of the response organization.

11. Segment 3.3, page 14 – Section 2, District Plan – lacks clarity and emphasis on district decentralization (See Recommendation 9.)

The plan allows for the decentralization down to the district level even when the Area and Division Command are not activated. When an outage event has occurred or anticipated in which CL&P considers district decentralization, it should activate the Area and Division Commands.

12. Segment 3.4, page 15 – Section 2, District Plan – lacks specific guidance on the District organizational structure. (See Recommendation 10.)

The second paragraph of this segment deals with the district organization in "an elevated event." The wording is weak, leaving some important considerations left to the district to decide. For instance, "it is advisable for the District Commander to utilize the Section Chiefs…", "The District Commander needs to maintain a manageable span of control and delegate responsibilities as the situation warrants", or "the ICS process suggests that the span of control for any supervisor is optimally limited to five people."

[27] CL&P Emergency Response Plan, Section 2, District Plan, 3.1.3 page 12

13. The process for determining the estimated total restoration time at the district level – as described in 3.7.1 of the District Plan – is a commendable approach and confirms CL&P's awareness of the need of this information for all stakeholders.

It is commendable that the CL&P plan has a process to seek to determine for each district the overall restoration time, and the approach in the formula is logical. In the absence of a predictive model, this is a good tool. This advanced information can be used not only to determine needed resources, but also to set realistic expectations among stakeholders.

14. The CL&P ERP wording dealing with training and drills is weak, and does not provide the adequate structure to effectively train and drill responders. (See Recommendation 11.)

The approach of the CL&P ERP is to push the responsibility for training and drills down to the district level. This does not foster the type of consistent, coordinated training and drills as needed. The wording on drills allows too much leeway for the district and division to skip drills.

15. A significant portion of the CL&P response team has not "bought in" to the new ERP. This results in an inconsistent restoration response because of selective or no use of the plan. (See Recommendation 12.)

Comments from several members of the CL&P response team indicate that there are responders who think the plan is deficient, and either do not use it or use it selectively.

3. Recommendations

II-CL&P-1 Re-format the EPOPS document into smaller segments to enhance the use of this information during emergencies.

By re-formatting this large document into smaller books no larger than the basic plan, CL&P will make it easier as a reference for responders, and therefore encourage its use.

II-CL&P-2 Add language to the "Authority and Policies" subsection of the Basic plan that clearly describes and reaffirms top management's ultimate authority for and complete support of the response to major outages.

Prior to the statement on the delegation of the authority for the emergency response, it should be clearly set forth in the Plan (and communicated to all members of the CL&P response team) that the top management of NU and CL&P take ultimate responsibility and provide their enthusiastic support to the CL&P storm leaders.

II-CL&P-3 Include language in Sections 2.2 and 2.3 (safety and environment) that emphasizes a more proactive approach in these areas.

Safety and Environmental should include some language concerning proactive training and preventive measures.

II-CL&P-4 Add language to the ERP to provide guidance for activation/escalation "from the top down" when the situation calls for it.

Language to the effect that in the event of a pending major outage event where there is some advance notice, the ICS activation will begin with the Area Command.

II-CL&P-5 Change Level V in the Classification of Service Outage Events chart (Section 5.2, page 22, Basic Plan) to cover all outages of 80,000 customers and above.

The chart inadvertently skips the range of customer outages from 80,000 to 100,000. By starting Level V at 80,000, CL&P will be committing to a maximum response from both CL&P and NU at even a lower trigger, which is appropriate.

II-CL&P-6 Add a segment on clean-up activities in Subsections 6 – Post Incident Activities – in the Basic Plan, and Subsections 5 – Post Storm Activities – in the District and Division Plans.

This includes post-storm patrols, repairs of quick-fixes on line facilities, additional trimming, and removal of broken trees and limbs that pose an outage hazard.

II-CL&P-7 Place the responsibility for all drills and training with the EMG, and reword Section 2, District Plan, 3.13 to strengthen the process and place more emphasis on the training process.

The concept of pushing the responsibility down to the lowest level of the organization is contrary to the usual practice in utilities. As written, the CL&P plan does not place an adequate stress on training and drills.

II-CL&P-8 Provide specific guidance 3.2, Conference Calls, Section 2, District Plan, as to the frequency and time of day for conference calls.

It will be necessary to change the time and frequency of the calls during the response effort as situations dictate. However, as part of the planning process, the optimum times and frequency of these calls should be determined and written into the plan.

II-CL&P-9 Modify the wording in 3.3, District Decentralization, Section 2, District Plan to provide for the activation of Area and Division Command anytime decentralization is being considered.

The plan covering district decentralization should confirm Area and Division Command activation. There should not be any need to qualify the instructions to cover "when the Area Command is activated," and "when the Division command is activated."

II-CL&P-10 Strengthen the wording in 3.4, Activation and Staffing of the District Incident Command Post, Section 2, District Plan. The wording should

provide specific guidelines for triggers of when it should use certain organizational structures.

Wording such as "the District Commander shall use the Section Chiefs assigned to the respective District ICS to assist in the implementation" should be used. (CL&P may choose to establish a specific threshold for this move.) Another suggested wording change is, "The span of control for any ICS supervisor shall be limited to 5, unless there is a specific need to exceed that slightly."

II-CL&P-11 Revise the ERP to provide for centralized training and drills, and firm up the wording concerning number of required drills.

There should be more direct involvement of a centralized training group. In addition, the language permitting fewer drills is troubling. While certainly actual storm response will interrupt the drill schedule, this wording could promote a less than aggressive approach to drills.

II-CL&P-12 Address aggressively the concerns of the response team concerning the usefulness and use of the plan.

Top management should make visits to all districts and division commands to discuss with responders how the plan can become more useful, and clearly communicate that management expects all to follow the plan.

C. UI

1. Form and Contents

The emergency plan for United Illuminating (UI) is the Emergency Preparedness Plan (EPP). The plan of record during the response to Hurricane Irene and the October snowstorm was the plan filed with PURA in 2006. UI planned to file a revised plan with PURA in June 2011, but requested an extension until it could incorporate the recommendations of a consultant contracted for early in 2011. As a result, the revision was in progress at the time of the two storms, and there was considerable confusion as to the actual plan that UI used during the response to these storms. Responses from UI to audit requests and in interviews reflected that confusion.

For example, when requested to provide the organization chart for the storm response team, UI responded with a chart dated October 26, 2011, and made reference to sections in the 2011 plan. However, in the revision history of the plan filed December 1, 2011, UI noted that on October 31, 2011, it sent the final draft for review by the UI team, and that the final update of the plan was not complete until November 21, 2011.[28] In another response, UI confirmed that the plan of record was the 2006 plan, and that it did not file the 2011 plan with PURA until after the response to both storms.[29] During the course of Liberty's inquiries, UI referred to organization charts dated July 6, August 23, and October 26.

[28] Response to audit request Liberty - 003
[29] Response to audit request AG -169

Based on information received by Liberty, it appears that UI used an interim plan, which provided guidelines in some areas. In other areas, the 2006 plan was still in use. Liberty was unable to find documentation of the specific plan that UI used. Based on its review, Liberty concluded that the 2006 plan was very outdated and afforded little if any guidance in 2011. UI appears to have made some significant changes for the better in the newly revised 2011 plan. However, because it was not complete, it would be misleading for Liberty to provide comments on that plan as if UI used it during the 2011 storms.

Based on the above, Liberty is unable to make any meaningful comments on the UI emergency plan used in 2011, other than to say that UI's failure to have a definite plan for the responders was a confusing and negative factor in their response efforts.

2. Training, Drills, and Use of EPP

For the reasons stated above (no definitive documented emergency plan in use), it can only be concluded that drills and training leading up to these two storms would have been nonproductive. UI covers training and drills in the 2011 plan. Liberty is unable also to comment on the use of the plan during the 2011 storms, as there was no definitive plan.

3. Conclusions

1. UI's failure to have a revised emergency plan in place at the time of the impact of the two storms created confusion and affected the restoration response. (See Recommendation 1)

Based on information received by Liberty, it appears that UI used an interim plan, which provided guidelines in some areas. In other areas, the 2006 plan was still in use. Liberty was unable to find documentation of the specific plan that UI used. Liberty concluded that the 2006 plan was very outdated and afforded little if any guidance in 2011. UI appears to have made some significant changes for the better in the newly revised 2011 plan.

4. Recommendations

II-UI-1 Initiate a process for regular updates to the EPP, document the updates, and conduct the necessary training to be sure all responders are familiar with the plan.

Even though UI is not required to file a revised plan more frequently than 5 years, the changes made in the 2006 plan were significant and should have been made earlier rather than wait until required by PURA.

Appendix II-1 – Script for CL&P Tabletop Drill held August 25, 2011

Scenario
A tropical depression has formed in the Eastern Atlantic, just south of The Cape Verde Islands. The storm formed on Day 1 and has begun moving to the west-northwest. Over the next several days, the storm will become better organized and gain in strength.

Day T-4
The storm has reached hurricane strength and is located several hundred miles to the east of the Leeward Islands. It is expected when the storm approaches these islands it will make a sharp turn to the northwest and pass to the north of all the islands in the Caribbean.

EOC will continue to monitor and send out the weather forecast.

Initial Actions

Area Work Center
What are your plans and/or preparations?

Day T-3 & T2
The storm has reached its peak as a Category 4 storm. Sustained winds are now at 143 mph with higher gusts. The storm is located several hundred miles to the east of Florida. As the storm is approaching the east coast, it will begin to curve northward passing over the Outer Banks of North Carolina. The storm is expected to decrease in strength to a Category 2 storm as it approaches Connecticut.

Additional Actions

Area Work Center
What are your preparations?

Day T-1
The storm is tracking along the east coast, over the water which is allowing the storm to maintain its strength. As a typical hurricane along the east coast, it is beginning to accelerate as it passes North Carolina. The storm is expected to make landfall on Long Island, New York in the early morning hours of Day 5, tomorrow. The storm will continue north through Connecticut (tracking up the Connecticut River Valley) and is expected to make landfall in CT somewhere between 5:00 AM and 10:00 AM as a Category 2 with winds forecasted between 96 to 110 MPH, and continue to track towards Massachusetts, central New Hampshire and western Maine.

Ongoing Actions

Area Work Center
What are your plans and/or preparations?

Day T 0

At 0600 hours, Connecticut is experiencing gale force winds and outages are occurring on the coast line.

At 0800 hours, Connecticut is being hit with a Category 2 hurricane with sustained winds of 110 mph and gusts to 120 mph accompanied by tropical rains (up to 4 inches is expected). Outages are occurring all over Connecticut and Massachusetts. As of the last hourly report, Connecticut is reporting 400,000 people out of power and the damage to the electrical system is heavy. Many roads are closed due to fallen trees and flooding. Also many bridges have been damaged. Massachusetts is reporting 80 mph winds in Springfield and heavy rains. Outage reports are 100,000 people without power.

The storm moved quickly across Connecticut. At 1000 hours, the eye of the storm has crossed the Massachusetts border and is still headed north on its path towards New Hampshire. New Hampshire is currently experiencing gale force winds.

We are currently reporting over 406,000 customers out in CT. with over 1,800 trouble locations. There is a total of 91 E911 calls:

- Level 1 – 130 calls
- Level 2 – 90 calls
- Level 3 – 310 calls

Necessary Actions/Steps:

III. Routine Maintenance and Inspections

A. CL&P

1. Vegetation Management

a. Background

(1) Requirement to Trim

Electric utilities operate their systems along many miles of right-of-way (ROW) and deeded easements. In order to provide safe and consistent electric service, the utilities must keep these lines clear of contact with tree branches and limbs. Trimming trees is an essential part of maintaining a reliable system for any electric utility. Vegetation Management (VM) programs refer to a utility's tree trimming practices and ROW policies.

The National Electric Safety Code (NESC) states: *"Vegetation that may damage ungrounded supply conductors should be pruned or removed. Vegetation management should be performed as experience has shown to be necessary."* These rules are broad and vague; however, the NESC's goal is mainly safety. From a utility perspective, circuits normally de-energize from vegetation contact before circuit damage. Therefore trimming trees is primarily important for maintaining reliable service. The main public safety issues are homeowners contacting lines while cutting their own trees or homeowners cutting trees that fall and damage the lines. In addition to trimming trees and ROW to prevent line contact, maintaining a corridor of trimmed trees also provides access to the power line for inspections and maintenance.

There are two mechanisms where a tree can cause a power outage. The most common of these is electrical. Vegetation contacts and bridges the circuit between an energized conductor and a grounded conductor. The voltage in the circuit creates and builds up a carbon path across the vegetation. It eventually arcs over and trips a circuit fuse or other protective device to cause an outage. The second means is mechanical. A heavy branch or tree falls and breaks lines, poles, and equipment.

(2) Storm Impacts on Vegetation

Listed below are some definitions of common vegetation concerns due to storms.
Fall Zone – This is the area including the roadside clearance zone and extending from the conductors out a distance to where an uprooted tree could strike the conductor and cause an outage.
Danger Tree – Any tree located in the fall zone that is tall enough to potentially contact the energized conductors if it were to fall. The total number of danger trees on the CL&P system is in the millions.[30]

[30] Interview #65, 2/23/12, Sean Redding

Hazard Tree – Any danger tree that is dead or, after evaluation using the Handbook of Hazard Tree Evaluation for Utility Arborists, rates as a moderate or high hazard. Another term for these is risk trees. CL&P estimates the number of hazard trees on its system is 340,000.[31]
Clearance Zone – This is the area to the side, above and below the energized conductors that is trimmed during the trim cycles.
Overhang – Any limbs projecting above the defined clearance zone are overhanging limbs.
Overhead Hazards – These are dead, dying, diseased, insect infected or structurally weak branches that overhang or are located to the side of the clearance zone, including those which could break at weak points and strike conductors when swinging down in an arc.

The main storm impacts to utility circuits from vegetation are:

- Falling Hazard Trees – these could occur during both minor and major storms.
- Breaking Overhead Hazards
- Falling Danger Trees – these occur mainly during major storms when the tree is uprooted and falls or leans into the line.

Irene caused over 15,600 distribution trouble spots (estimated damage locations resulting in outages) and the snowstorm caused over 25,500. Trees caused the vast majority of these trouble spots. Connecticut has one of the most dense tree canopies in the United States (# 1 in the U.S. for Woodland/Urban Interface tree density). Connecticut's tree profile also revealed trees with larger circumferences than average.

In addition to the normal cyclic trimming of clearance zones, key success factors in reducing tree-caused storm outages are the identification and removal of hazard trees and overhead hazards; and the reduction of overhanging limbs.

(3) General Vegetation Trim Rights

When utility facilities are not located on the public right-of-way or on property owned by the utility itself, it must obtain an easement, license, lease, or other applicable property right in order to trim. The real estate documents granting such use of private property set forth the rights the utility has to use, operate, and maintain its facilities on that property, including any right to deal with vegetation management issues. Such vegetation management rights generally fall within three areas: the cleared width, danger or hazard tree rights, and access rights to the right-of-way. In the cleared width, the property documents dictate the rights to trim and remove vegetation that is incompatible with the safe and reliable operation of the electric system. Danger or hazard tree rights allow the utility to trim or remove trees that are an imminent threat to the electric system from outside the cleared width. Access rights allow the utility to travel across land outside of the cleared width to access the private right-of-way and the electric facilities.

Within the cleared width of the right-of-way, the property rights obtained by the utility do not generally restrict the amount of tree trimming or removal that it can perform. Outside of the cleared width, if the utility does not have hazard tree rights, it generally cannot trim or remove trees without the consent of the property owner. Even where there are risk tree rights, the utility

[31] Audit Request OCC-118

may not have the authority to remove every tree that has the potential to fall into the electric facilities.

For roadside distribution line-clearance tree work (i.e., facilities that are located on the public right-of-way), the utility's rights to trim and remove trees are limited by the Connecticut General Statutes and the rights they convey to tree owners. The utility and its contractors are restricted by statutes that require a tree warden permit (CGS 23-65(f)), adjoining property owner consent (CGS 16-234), a state DOT permit (CGS 13a-140), and notification of the chief elected official for removal of any tree with a diameter greater than 18 inches along state highways (CGS 13a-140). These statutes allow the state, towns, and individual property owners to restrict the nature and amount of tree work that the company performs from outright refusing to allow any tree work at all or limiting the extent of permitted tree work.

b. Program Overview - Distribution

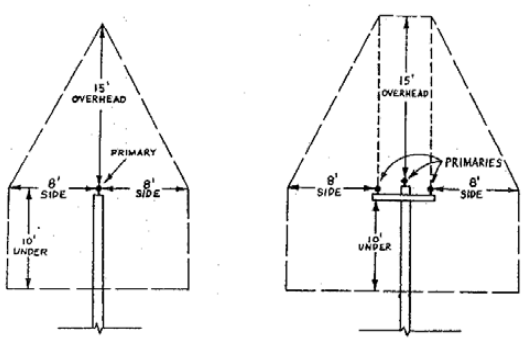
CL&P has 16,961 miles of overhead primary voltage distribution lines that it must trim. About 46 percent of the conductors are insulated types such as tree wire, aerial cable, or spacer cable. The remaining 54 percent is bare conductor. The company's existing tree trimming plan is to trim these lines on an average 5-year cycle. CL&P estimates that is needs to trim 180 trees per mile.[32] The Public Utilities Regulatory Authority established and authorized funding for the 5-year cycle in its decisions in Docket Nos. 07-07-01 and 09-12-05. The budget established by these dockets was $21.5M for 2011.

The company's tree trimming plan for 2011 is to complete 3,393 miles of trimming. This will be the fourth consecutive year in which CL&P has trimmed approximately 20 percent of the total miles. By the end of 2012, it will achieve the 5-year cycle average across the entire system.

The trimming plan is not a true cyclic program. Arborists choose the circuits for trimming each year based on two conditions, SAIDI (the system average interruption duration index) and years since last trimmed. As a result, CL&P has not trimmed some circuits for seven to eight years. CL&P developed the 2011 plan in the fall of 2010. CL&P's vegetation management team of arborists developed the annual work scope to get a balance of miles and tree crews spread throughout the service territory. There is a documented process for the circuit selection method. They calculate a weighted ranking of each circuit. They use the last three years of SAIDI non-storm performance and the last three years of SAIDI storm performance. After this ranking, they exclude circuits trimmed within the last three years. Typically, in June of each year, they make the selection based on the worst performers and the years since the last trim.

Once CL&P's vegetation management team finalizes the schedule, it meets with the contractors to plan the timing of the work completion over 12 months. Throughout the year, the team meets with the contractors each month to review schedule completion and contractor performance.

[32] Interview #65, 2/23/12



Since 1987, the standard trim specification has been to trim 8 feet to the conductor side, 15 feet above, and 10 feet under (8 x 15 x 10). All hazard trees up to and including 16 inches DBH (diameter at breast height) within 8 feet of the outermost conductor are identified and removed. Northeast Utilities (NU) must approve the removal of any tree greater than 16 inches DBH. NU will provide specific instructions in each case depending on whether others are sharing the cost or disposing of the tree parts.

In addition to the standard trim specification, CL&P has an Enhanced Tree Trimming (ETT) specification used for selected circuits. The ETT trim specification depends on whether the circuit portion is a backbone or a lateral.[33] The table below shows the ETT specifications. The side clearances are the same as the standard specification. The ETT specifications are more aggressive in the removal of overhanging limbs, overhead hazards, and hazard trees.

	Side Clearance	Overhead Clearance	Hazard Trees
Backbone	8 feet of side clearance or to the previously established tree line.	Trim and remove all overhanging limbs. Remove all overhead hazards within reach of a (70 foot) lift unit.	Inspect, evaluate, and eliminate all hazardous trees within the fall zone by pruning or removal.
Lateral	8 feet of side clearance or to the previously established tree line.	Trim to provide a minimum of 20 feet of overhead clearance and remove all overhead hazards within reach of a standard (55 foot) lift unit.	Inspect, evaluate, and eliminate all hazardous trees within the fall zone by pruning or removal.

CL&P cleared all of the roadside backbone circuit portions (3,694 miles) to ETT specifications.[34] It cleared about 3,124 miles of lateral circuit portions to ETT specifications, but has not cleared 9,667 miles of lateral to ETT specifications.

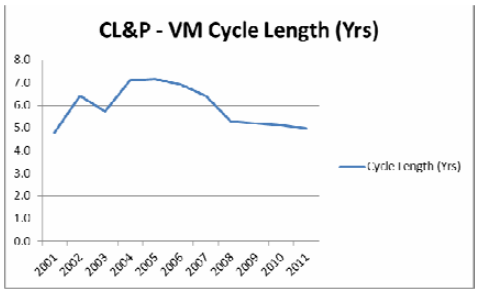
[33] Backbone – A three phase section of line starting at a substation and extending to the first fused device or single/double phase reclosing device. About 22 percent of the circuit miles are backbone. Lateral – A section of primary voltage line extending from the end of backbone to a secondary or service wire. About 78 percent of the circuit miles are laterals.
[34] Audit Request OCC-109

The hazard-tree removal process is the remaining critical part of the vegetation management program. During the cycle trimming, the contractor will identify and remove any hazard trees as part of the unit price per mile for the cycle work. CL&P's arborists monitor and approve the amount of hazard tree removal. Company personnel and others (e.g., property owners, tree wardens, and public works individuals) identify hazard trees located along circuits that are not being cycle trimmed. The arborist determines what work is necessary and manages to the allowed budget for this type of work.

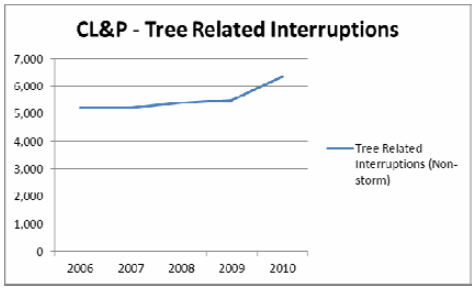
c. Program Results

(1) Distribution

The Supervisor, CL&P Vegetation Management, manages the vegetation-trimming program. They have a staff of eight arborists that oversee the work of the contractors. There are two primary contractors referred to as Alliance Partners. Lewis Tree is the Alliance Partner in the Western and Southern divisions. Asplundh is the Alliance Partner in the Central and Eastern divisions. These contractors have two-year contracts. About 70 to 80 percent of their work uses unit prices per mile. Lump-sum bids make up the remainder of their work. About 110 contractor crews, mostly 2- or 3-person crews, are involved in the trimming program.

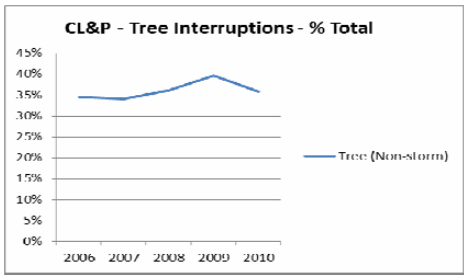


The graph to the left shows the trim cycle for the past ten years.[35] This cycle length was calculated based on the annual trim miles divided by the total circuit miles.

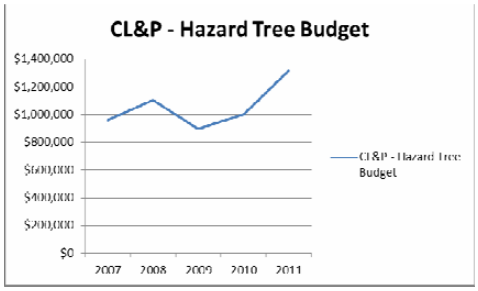


Since the number and size of major storms vary from year to year, any available outage data of tree-caused interruptions would not show any trends. In addition, outage causes are rarely captured in major storms due to the number and rapid pace of restoration. Non-storm tree-caused interruption data is an indicator of the current effectiveness and program trends and the graph to the left shows these data.[36] Despite the increased cycle trimming for the past few years, the number of interruptions is holding steady or increasing. For 2010, there were about 37 tree-caused interruptions per 100 circuit miles.

[35] Audit Request AG-84
[36] 2011 CL&P Transmission & Distribution Reliability Report



The next graph to the left shows the percentage of non-storm interruptions due to trees.[37] Over one-third of all non-storm outages are due to trees.



The graph to the left shows the budget history for hazard tree work.[38] These budgets are a portion of the total allowed vegetation management funding. Based on the total circuit miles to be trimmed, the $1.3M for 2011 funding would be about $77 per mile.

CL&P investigates and prioritizes customer requests for tree work based on the condition of the tree and the impact of the tree's failure to the distribution system. CL&P only trims or removes high priority hazard trees because the budget will not support all of the customer requests that it receives. The Arborists do not measure or count the number of removals. CL&P does not track the quantity or cost of individual hazard tree removals.

In 2010, CL&P performed a hazard tree survey on one of its circuits in the lower Connecticut River valley. The Arborists that performed the survey reported an average of 20 hazard trees per mile of line on the 50-mile circuit. Extrapolation of these data to CL&P's 17,000 miles of line results in approximately 340,000 risk trees.[39]

NU must approve the removal of any tree greater than 16 inches DBH. CL&P does not track the number of tree removals it submitted for approval, but reported that there were tree removals submitted for approval that were not approved.

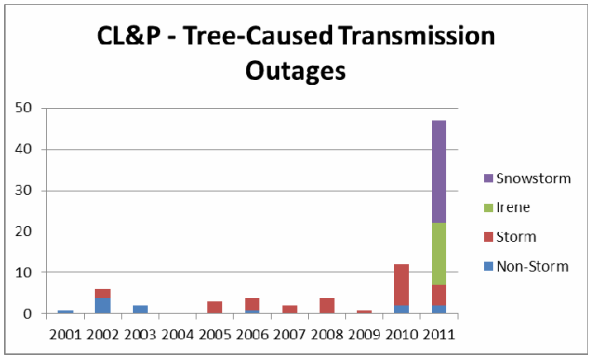
(2) Transmission

The transmission system consists of 1,638 circuit-miles of overhead transmission located on 808 miles of right-of-way (ROW). The management and oversight of the vegetation management activities for the NU Transmission Group fall under the direction of the Transmission Vegetation Management Section (TVM), which had a 2011 VM budget of $3M.

The company normally clears transmission lines to the full width of the ROW. It does not allow overhanging tree limbs. The cleared ROW width is wider for higher voltage lines. Transmission

[37] 2011 CL&P Transmission & Distribution Reliability Report
[38] Audit Requests AG-15 and Liberty-89
[39] Audit request OCC-118

line outages are mainly due to trees falling over rather than limbs. As in distribution, the company identifies and removes hazard trees to the extent possible.



The graph to the left shows the history of all tree-related transmission outages.[40] It shows the effects of Irene and the snowstorm. The failure of healthy trees caused about 80 percent of the Irene and snowstorm outages.

d. Conclusions

1. CL&P's distribution tree trimming program contributed significantly to the extent of 2011 storm damage and the duration of storm service interruptions.

The present five-year trim cycle program is a performance-based program rather than a true cyclic program. Arborists select the circuits for trimming each year and so there are some circuits not trimmed for seven to eight years. This approach leaves considerable vegetation growth on the right-of-ways when outages have not occurred there. This additional growth is a concern during major storms. The five-year trim cycle is also not the recommended NU trim cycle for the tree density in New England. NU recommends a four-year trim cycle for this area.[41] A four-year cycle allows for increased trim clearances and more opportunities to spot and remove hazard trees.

The amount of overhang present in the standard clearance specifications is another concern. Overhanging hazards are a major source of tree-caused outages. The ETT specification reduces the amount of overhang. However, CL&P does not apply this specification to all of its system.

CL&P is expanding its Vegetation Management program in 2012 and has scheduled approximately 1,600 miles of additional tree trimming.[42] It schedules about 500 miles of Enhanced Tree Trimming (ETT) and 1,100 miles of maintenance trimming. The plan for the 500 miles of ETT is to expand the work specification to remove all overhanging limbs and aggressively remove hazard trees with the expectation that the expanded specification will significantly reduce tree failure in major storms.

The hazard tree budgets are also a concern. The amount of this budget allows for expenditures of $77 per mile. With typical hazard tree removals easily costing over $1,000, hazard tree removal is restricted to the most critical needs.

[40] Audit Request Liberty-85
[41] Audit Request Liberty-074, p. 312.
[42] Audit Request TOWNS-005

e. Recommendations

III-CL&P-1 Institute a four-year full cycle trim program, a more aggressive overhang trimming process, and a more aggressive hazard-tree removal program.

To reduce tree-related storm interruptions, the vegetation management program needs to be much more aggressive for the tree density in this region. The current non-storm tree-caused interruption rate of 37 per 100 circuit miles is high.[43] This is a certain indicator that the tree-caused interruptions during storms, both major and minor, will also be high. A more aggressive vegetation management program to reduce overhanging material, increase clearances, and remove more hazard trees will improve both storm and non-storm reliability.

2. Wood Pole Maintenance

a. Background

Wood poles have a long history of providing excellent service for supporting overhead electrical and telecommunication lines. They are still unsurpassed as the structural foundation of the overhead distribution system due to their combination of economy, sustainability, flexibility, and strength.

The NESC (National Electrical Safety Code) requires replacement of wood poles when they deteriorate to below ⅔ of their original strength. Decay of a pole is usually in the form of gradual deterioration in an area just below the groundline caused by fungi and other low forms of plant life. In addition, insect attack (termites and ants) and excessive weathering and splitting at the pole top can contribute to pole failure or need for replacement. However, these failures are not as significant as ground-line decay, and typically happen much later in the pole's life. By far the main cause of pole replacement is active decay in the groundline area of the pole to 18 inches below. Moisture and oxygen in this area greatly speed up the decay process.

The number of defective poles is a public safety issue. It will normally not show up in the regular reliability reports. Poles are sized with safety factors to allow for the extreme loading conditions of storms. However, any defective pole problem will become increasingly apparent in storm situations. The poles will experience their maximum stresses during the icing and high-wind storm events.

b. Distribution Wood Pole Inspection Program - Overview

CL&P owns and maintains 425,972 wood distribution poles. CL&P has been purchasing CCA (Chromated Copper Arsenate, treated) southern yellow pine wood distribution poles for roadside installation since the mid-1980s. This pole type is one of the more durable types available. For off-road rights-of-way, CL&P purchases Pentachlorophenol treated southern yellow pine wood poles, known as a Penta pole. Penta poles are easier to climb than the CCA poles but not as

[43] UI's rate is 14.4 and the highest that Liberty has seen at other utilities is about 14 per 100 circuit-miles.

durable, so their use is restricted to the off-road circuits. CL&P estimates that 35 percent of its wood poles are CCA and 65 percent are a mixture of Pentachlorophenol and Creosote.

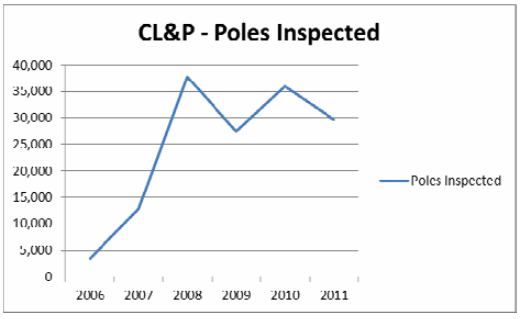
A cyclic groundline excavation and inspection program is an industry best practice for determining whether poles are decayed. It is also the most economical means of preserving and lengthening the life of the pole. In a groundline program, a contractor will excavate around the pole at the groundline, inspect, add preservative treatment if needed, and wrap the pole in a protective wrap before backfilling. CL&P had been conducting groundline inspection programs since the early 1980s. In 1983, it was on a 10-year inspection cycle that it discontinued in the 90s. In 2006 and 2007, CL&P conducted pole inspections and developed unit cost data for a 2007 rate case. In 2007, CL&P requested and received funding to inspect approximately 30,000 poles per year (a 15-year cycle) beginning in 2008.

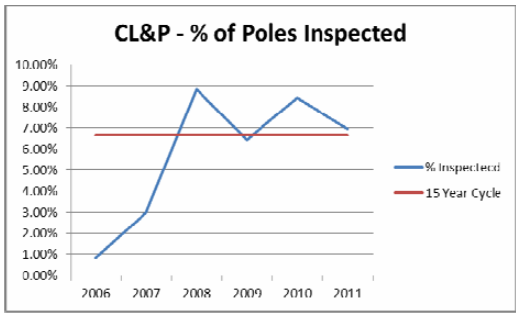
The Vegetation Management section oversees the ground-line inspection and treatment program. Two contractors are currently doing the pole inspections, Osmose and United Pole Technologies (an Asplundh subsidiary). CL&P awards the unit rate contracts on annual bids. Purchasing will negotiate to hold the rate the same for another year, which results in multi-year contracts. The contractors reject poles based on a remaining strength calculation. They use a hand-held computer to record data, determine pole strength, and measure the wire and attachment load on each pole. They classify rejected poles as either priority rejects or normal rejects. CL&P replaces or makes safe priority rejects within five working days, and normal rejects within one year.

CL&P has facilities attached to 388,407 wood poles that are owned and maintained by AT&T. AT&T generally follows a 10-year inspection cycle for maintaining their poles.[44]

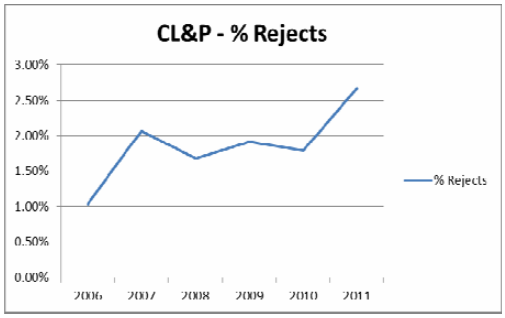
c. Program Results

The graphs below show the number and percentage of poles inspected since 2006.[45] In recent years, CL&P has exceeded the 15-year target cycle schedule.

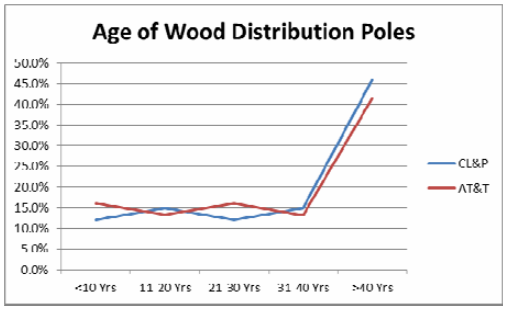




[44] Audit Request AG-23
[45] Audit Requests AG-23 & 26



The above graph shows the percentage of poles rejected. CL&P replaces about 647 reject poles each year. The reject rates are currently not high enough to be a concern. The rates will likely continue to climb until it excavates and treats all poles and the second inspection cycle begins. This will occur around 2022. If the reject rate climbs above the 5 to 6 percent range, it would be a concern.



The graph to the left shows the age distribution of CL&P-owned poles and AT&T-owned poles.[46] The age distributions are very similar. This is reasonable since each company serves a common base of customers that required services to be connected in the same time period.

AT&T does not treat poles to extend their life. If AT&T inspects a pole and finds that it has deteriorated or is defective, it replaces the pole. In the past, AT&T has not maintained records of the number of poles that passed inspection under the cyclical pole inspection process. Instead, AT&T maintained records on individual poles that failed inspection and require replacement. AT&T has begun to transition pole-inspection information to a database system to monitor better the status of inspections. AT&T is able to quantify data for 2010 and 2011 year to date only. Based on these data, AT&T has replaced about 1,600 poles each year for the past two years. This is more than double the annual replacement rate of the slightly larger CL&P system.[47]

The table below shows the number of pole failures during the 2011 storms for each company.[48] Because the age distributions are similar, the percentage of pole failures of each company is also similar. When wind and snow/ice conditions are high enough to cause healthy trees to fail, it is common for the larger trees to snap poles in good condition. The number of pole failures experienced was a small percentage and is typical for the storm conditions that the CL&P area experienced.

[46] Audit Request AG-22
[47] Audit Request AG-27
[48] Audit request AG-106 & 107

	Irene		Snowstorm	
	CL&P	AT&T	CL&P	AT&T
Poles Failed	854	710	1064	810
% Failed	0.20%	0.18%	0.25%	0.21%

2) Transmission

According to pole inspection records, there are 15,901 wood poles on the CL&P transmission system. Western Red Cedar poles have been their standard for many years. This is one of the most durable pole types available.

The company uses the same contractor used in distribution, Osmose, to inspect and treat the transmission poles on a ten-year cycle. It immediately turns in all rejects for replacement. The table below shows the number of rejects.[49] These numbers are minimal.

Transmission Wood Poles Inspected (Connecticut)					
	2007	**2008**	**2009**	**2010**	**2011**
Number Inspected	1,664	1,682	1,526	1,386	1,422
Number Rejected	4	3	2	7	0
Percent Rejected	0.24%	0.18%	0.13%	0.51%	0.00%

There were not any wood pole failures in Irene. In the snowstorm, there were two wood pole failures.

d. Conclusions

1. CL&P's wood pole conditions did not appear to contribute materially to the effects of the 2011 storms.

The number of pole failures experienced in these storms was a small percentage and was typical for the weather conditions encountered. The maintenance program in place is adequate to maintain the poles in the strength condition required by the NESC. Many of the pole failures were due to falling trees, both healthy trees and hazard trees, located outside of the clearance zone.

e. Recommendations

None.

3. Line Inspections & Maintenance

a. Background

Overhead line conductors, insulators, crossarms, and other hardware are subject to damage by outside forces such as public interference, storms, decay, and the general forces of nature.

[49] Audit Request Liberty-80

Without consistent maintenance and inspections, normal aging and wear may result in outages. Decreased reliability, safety concerns, and the potential for unnecessary losses of revenue are eventual penalties of poorly maintained facilities.

The NESC (National Electrical Safety Code) requires a periodic line inspection to maintain the lines in a safe condition. The National Electric Safety Code states:
"Lines and equipment shall be inspected at such intervals as experience has shown to be necessary. NOTE: It is recognized that inspections may be performed in a separate operation or while performing other duties, as desired.

Similar to poles, utilities size line conductors and hardware with safety factors to allow for the higher loading conditions of storms. However, any condition problem will become increasingly apparent in storm situations. Conductors and other hardware will experience their maximum stresses during the icing and high-wind storm events.

b. Program Overview

CL&P manages circuit reliability and inspections through a system of circuit zones. CL&P has 1,019 circuits. A Circuit Zone Manager is responsible for managing an engineering group of Circuit Owners. Their job functions include monitoring circuit and substation loads, planning, reliability and power quality investigations, running voltage profiles, and patrolling circuits.

The Circuit Owners perform annual patrols of their assigned backbone circuit sections from January to the end of June. They log all items found into a system wide Patrol Database for tracking. CL&P enters work orders in the work management system for tracking. It uses five levels of defect classifications. If an item needs immediate attention, CL&P repairs it on a trouble ticket rather than through the work order system. CL&P prepares monthly reports on found and repaired items. The program calls for CL&P to repair all defective items by the end of the year.

CL&P's patrols formerly covered the entire circuit. CL&P backed off this approach and now patrols 25 percent of the fused circuit sections each year.

In addition to the patrol by the Circuit Owners, CL&P performs an annual infrared scan (IR) on all of the backbone overhead circuit portions. CL&P performs most of the patrols by camera scans from a van. It does a walking IR scan for rear-lot line circuits. In addition to hot spots, this inspection logs any major repair or broken items noted and CL&P creates a work-order repair request with a priority and a scheduled complete date. CL&P has been doing some kind of IR inspections for the past 26 years. It created the present day 100 percent backbone program about five years ago.

In addition to the circuit patrols and IR scans, certain critical line equipment has its own maintenance schedule. This equipment includes disconnect switches, ganged air break switches, reclosers, and automated sectionalizers.

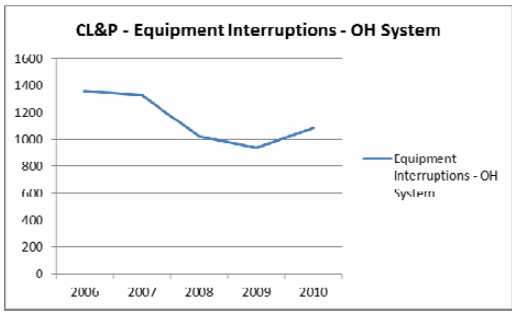
CL&P identifies the worst performing circuits and issues a top 100 list. Circuit Owners will review this list and develop improvement plans.

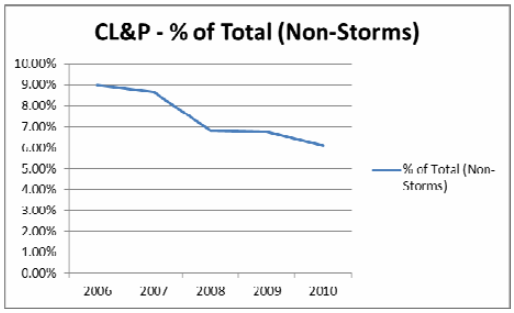
During storms, the Circuit Owners will generally be analyzing the circuits and helping in restoration planning.

c. Program Results

CL&P conducts the line patrols and tracks found items according to its plans. During the 2010 line patrol, it identified 674 defective items. The IR scan identified 315 items.

Similar to tree interruptions, the number of overhead equipment interruptions during non-storm periods is a general indication of the ability of the system to weather storm events. This data is in the graphs below.[50] Both the number of interruptions and the percentage of the total interruptions show a steady decline.





Outside of the poles, the main overhead item replaced during the storms was a crossarm. The standard crossarms are eight or ten feet in length. Being smaller than wood poles, these arms should break more easily than a pole during storm events when a tree falls into the line. During Irene, it replaced 3,249 crossarms; during the snowstorm, it replaced 4,493 crossarms.[51] For each storm, it replaced about twice the number of crossarms than poles. Due to the amount of large conductors and the covered tree wire conductors, some amount of this type of breakage is to be expected.

d. Conclusions

1. CL&P's overhead equipment conditions did not appear to contribute materially to the effects of the 2011 storms. However, the condition of the wood cross arms is unknown.

CL&P has been conducting regular line inspection programs and replacing defective items found in a managed program. A circuit ownership process consisting of Circuit Owners has contributed to a steady decline of equipment caused interruptions on the overhead system.

The amount of broken cross arms that it had to replace following a storm is a factor. These types of outages require several line crew hours each to replace. The cross arm breakage relates to the

[50] 2011 CL&P Transmission & Distribution Reliability Report
[51] Audit Request OCC-330

fact that it is a weaker member than the pole, and will often fail first when a tree contacts the line. Based on the number of aged or broken cross arms reported on the annual backbone and lateral patrols (30 per year over the past three years[52]), the number of cross arms being replaced annually in maintenance programs appears to be very low. This is well under any sustainable rate. Liberty estimates that CL&P should be replacing well over 1,000 crossarms per year for a sustainable rate.[53] CL&P has both wood and fiberglass cross arms. The overall condition of these wood cross arms could be a concern. Liberty is not able to validate this concern without a field inspection.

e. Recommendations

III-CL&P-2 Verify the condition of the wood cross arms on the system and put in place a program to replace them at a sustainable rate.

Line crew hours for cross arm replacement in storms is a large factor in increasing the length of the outages. The current annual replacement rate of the cross arms appears to be well below a sustainable rate. Without field inspection and more data, Liberty could not be more specific on this recommendation, nor conclude that CL&P was not adequately inspecting cross arms.

B. UI

1. Vegetation Management

a. Program Overview

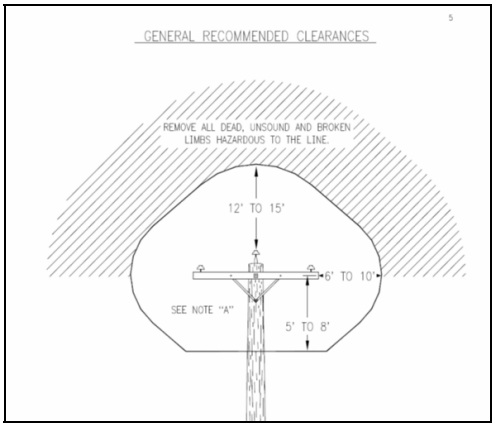
UI has 3,293 pole-line miles of distribution circuits that it must trim. About 90 percent of the conductors are insulated types such as tree wire or aerial cable. The remaining 10 percent is bare conductor. UI has been trimming on the same cycle since 1998. It is a mixed program of 4- and 8-year cycles. It trims all two- and three-phase portions of lines (fused and mainline) on a four-year cycle. Every 8 years, it trims the entire circuit of single and three-phase lines. It trims about 460 miles annually. The 2010 trim budget was $3.2M.

The single-phase portions are also on a RCM (Reliability Centered Maintenance) program. It trims all taps having two or more outages (excluding major storms) in a rolling 3-year period.

There is a 6-foot clearance limit trimmed from the conductor and a 10-foot limit from the pole. The standard construction has the conductors on an 8-foot cross arm. Overhang clearance is 12 to 15 feet. These clearances used to be smaller but were increased in 2005.

[52] Audit Request Liberty-88

[53] Based on the number of poles, CL&P likely has about 400,000 wood crossarms. With an average 25-year life, it would have to replace about 16,000 in an average year (including those replaced with an entire new pole).



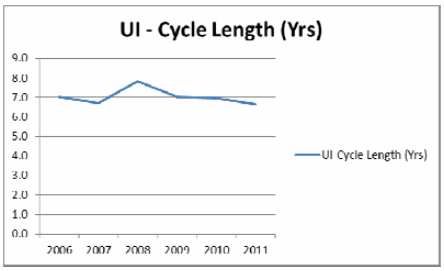
With regard to overhang, UI's specifications require that trees or limbs hazardous to the operation of the line be patrolled and every effort made to remove them.

UI added hazard tree removal processes to the vegetation program in 2005. The tree contractor employs Permissions People who identify hazard trees. A different crew comes behind and does the tree takedowns. UI pays for hazard trees on unit rates from a budget separate from that for the cycle trimming. Some large trees are on time and materials rate. Other sources such as customer or local official requests, or UI reliability engineers may identify hazard trees.

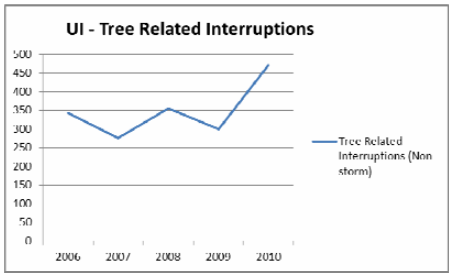
b. Program Results

In the recent past, System Maintenance has been responsible for the vegetation management program. The Line Clearance staff has consisted of one arborist and two Line Clearance technicians. In December 2011, System Maintenance was moved from EPE (Engineering & Project Excellence) to ESO (Electric System Operations). Line Clearance has moved out from under System Maintenance and UI created a new position of Manager, Vegetation Management & Line Clearance.

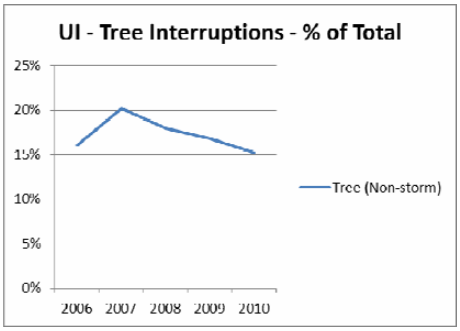
Lewis Tree has had the tree maintenance contract from 2008-2011. They are now on an interim contract for six months while UI negotiates a new four-year contract. Lewis Tree has 19, mostly two-person, crews working. There are three Permissions People and two General Forman.



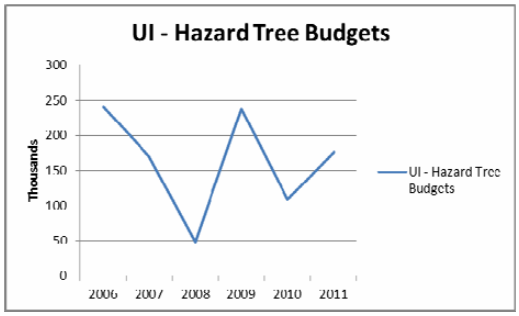
The graph above shows the trim cycle for the past ten years.[54] This cycle length is the annual trim-miles divided by the total circuit-miles. Due to the mixed four- and eight-year trim cycle, the cycle length period is high for the tree density.



The number of non-storm tree caused interruptions is steady, with a possible upward trend.[55] The year 2010 was a more active year in terms of outlier days (both those days that qualified as "major storm" and those days that were slightly below the "major storm" criteria). For 2010, there were about 14.4 tree-caused interruptions per 100 circuit miles.



The graph above shows the percentage of non-storm interruptions due to trees.[56] Less than 20 percent of all non-storm outages are due to trees.



The next graph shows the hazard tree actual expenditures (year 2011 is a budget figure).[57] The budget and expenditures have not been consistent. In 2007, UI reduced the budget by $30K due

[54] Audit Request AG-14
[55] 2011 UI Transmission & Distribution Reliability Report
[56] 2011 UI Transmission & Distribution Reliability Report
[57] Audit Request AG-15

to overall budget constraints. It deferred approximately $100K from 2008 into 2009. The 2011 dollars reflect $23K that UI advanced from the 2012 budget. Based on the total circuit miles to be trimmed, the $176K 2011 funding would be about $53 per mile.

c. Conclusions

1. Certain aspects of UI's tree trimming program may have increased the severity of storm damage.

UI trims single-phase circuit portions every eight years. While there is also some reliability-centered maintenance being conducted on these lines, the eight-year cycle allows for increased vegetation density that will cause storm outages.

In addition, the hazard-tree removal budget has not had consistent funding in past years. The budgeted rate of $53 per mile allows the removal of only very high priority hazard trees.

d. Recommendations

III-UI-1 Institute a four-year full cycle trim program and a more aggressive hazard-tree removal program.

A more aggressive vegetation management program to reduce overhanging material, increase clearances and remove more hazard trees will improve both storm and non-storm reliability.

2. Wood Pole Maintenance

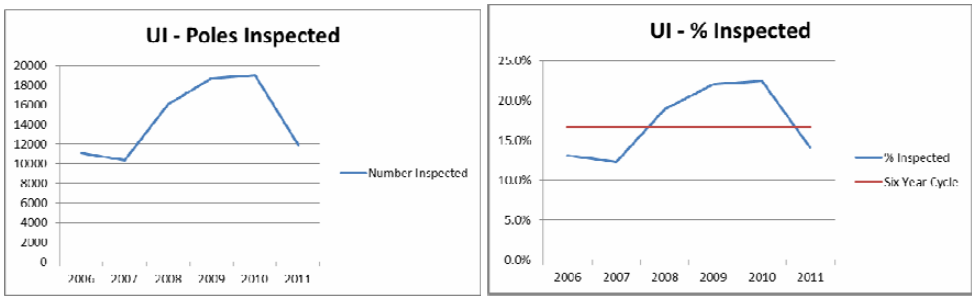
a. Program Overview

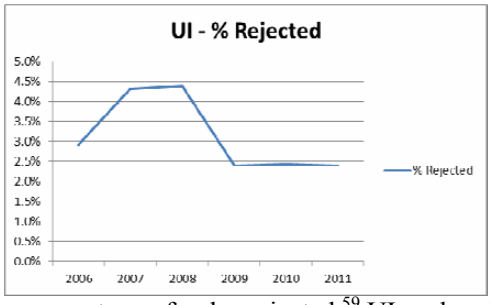
UI owns and maintains 84,481 wood poles. Starting in 1997, UI inspected poles on a 12-year cycle and continued through 2002. In 2002, the company completed 5,082 pole inspections in the sixth year of the 12-year cycle. In 2003, UI temporarily stopped to evaluate the program. In 2004, UI implemented a new comprehensive inspection and maintenance program as part of an asset management strategy for distribution wood pole infrastructure. In 2004 and 2005, UI completed a visual check and sounding on all UI custodian poles to determine physical condition and to identify deteriorated poles for replacement. In 2006, the Company implemented a new inspection and treatment program over a planned 6-year period. Beginning in 2012, the 6-year cycle will be complete and the pole inspection program will migrate to a 10-year cycle.

b. Program Results

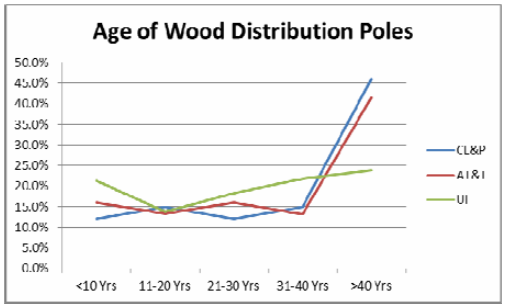
The graphs below show the number and percentage of poles inspected since 2006.[58] UI has been exceeding the 6-year target cycle schedule.

[58] Audit Request AG-26





The graph above shows the percentage of poles rejected.[59] UI replaced about 44 poles each year in the 6-year cycle program. The reject rates are currently not high enough to be a concern. With a new inspection cycle starting in 2012, the reject rates should be at or below these levels.



This graph shows the age distribution of the UI poles compared to the CL&P and AT&T poles.[60] The reduced percentage of poles over 40 years old on the UI system is significant.

The table below shows the number of wood pole failures during the two major 2011 storms.[61] The failure percentages were minimal.

	Irene	Snowstorm
Poles Failed	84	17
% Replaced	0.099%	0.020%

[59] Ibid
[60] Audit Request AG-22
[61] Audit Request AG-170 & 171

c. Conclusions

1. UI's pole conditions did not appear to contribute materially to the effects of the 2011 storms.

UI recently completed an aggressive six-year ground-line inspection and treatment program to improve the condition of its poles. The maintenance program in place is adequate to maintain the poles in the strength condition required by the NESC. These pole conditions did not contribute materially to the effects of the 2011 storms.

d. Recommendations

None.

3. Line Inspections & Maintenance

a. Program Overview

The same contractor, Utility Pole Technology, who does the pole groundline treatment program also performs the overhead circuit-inspection program. This contract was in place from 2009 to 2011. Osmose was the contractor prior to that period. Starting in 2006, the groundline treatment program, and hence the visual inspection program, was on a 6-year cycle. UI completed that cycle and is now evaluating whether to stay on the 6-year cycle or go to a 10-year cycle.

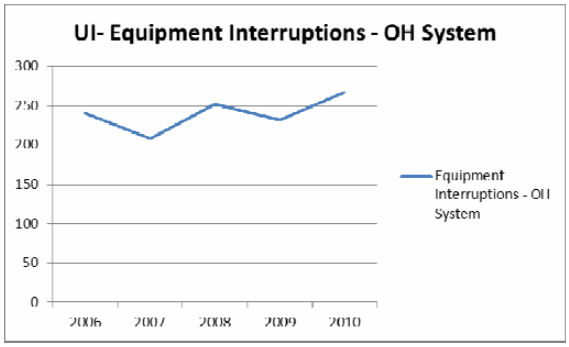
The contractor uses a GIS extract loaded in a handheld data unit for the line inspections. It reports all data electronically to the Project Manager of Pole Inspection. They review the data and separate it according to VM, pole replacements, double poles, or repair items. The Line Department receives repair items. The contractor calls in priority items. Inspection entries are in an Access database for tracking. UI does not enter or track repair schedules.

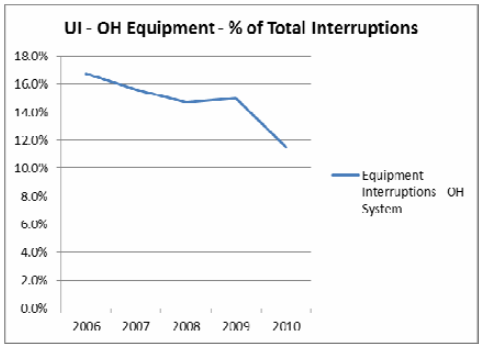
In addition to this line inspection, an infrared inspection is included in the Reliability Centered Maintenance (RCM) Program. UI inspects three-phase main lines and three-phase fused side taps annually. Single-phase fused side taps off main lines are on a performance basis. UI inspects bulk substations semi-annually and distribution substations annually. Internal work crews in the Test Department conduct an annual IR inspection of the three-phase portions of the circuits. The survey is a ride-by in a van. They are able to identify and capture some defective items as they ride by. They send the results to a contracted Maintenance Engineer. They forward the repair items to the Line Department by either calling or e-mail. There is no database of the repair or hot spot items logged.

b. Program Results

Similar to tree interruptions, the number of overhead equipment interruptions during non-storm periods is a general indication of the ability of the system to weather storm events. These data are

in the graphs below.[62] The number of interruptions appears to be holding steady. The percentage of the total interruptions shows a steady decline.





UI replaced 165 broken crossarms during Irene. Due to the amount of large conductors and the covered tree wire conductors it uses, some of this type of breakage is to be expected.

c. Conclusions

1. UI's overhead circuit conditions did not appear to contribute materially to the effects of the 2011 storms.

A program for inspection and repair of defective items is in place and had held the number of non-storm overhead equipment caused failures steady. The amount of cross arms replaced during the storms also appears to have been reasonable for the conditions experienced.

d. Recommendations

None

[62] 2011 UI Transmission & Distribution Reliability Report

IV. Storm Monitoring and Predicting

A. CL&P

1. Weather Monitoring

Initial storm response begins with weather monitoring. It is an industry best practice to use a professional weather service to provide custom impact reports for the system. Telvent Corporation provided weather forecasting services for all Northeast Utilities companies, including CL&P.[63] In addition to Telvent, CL&P also relied heavily on the forecasts from the National Weather Service (NWS), National Hurricane Center. These services were an input used by CL&P management in determining the appropriate readiness actions. CL&P started weather monitoring conference calls with their storm team four days[64] in advance of Irene and one day in advance of the snowstorm.[65]

The Director - System Operations provides the weather forecast information to the CL&P storm organization. They provided two electronic weather reports each day. The weather forecaster will normally sit in on all conference calls where they anticipate the storm level to be level three[66] or above. Telvent participated in conference calls with the Division Coordinators for the 2011 storms. The storm team is able to ask Telvent "what if" questions and other forecast questions. The storm team went through preparedness checklists on these calls. The CL&P storm team also had a conference call with the NWS on Thursday before the snowstorm, which occurred on the following Saturday.

The CL&P storm team did not express full confidence in the Telvent forecasts. Some of the interview comments were:

- Suspect that Telvent is being overly conservative or aggressive when their forecast is compared to other forecasts
- They missed it
- Telvent needs to have a better understanding of the damage to company facilities done by certain weather events.
- Telvent has disappointed three times – "three strikes and you're out." Need to have conversation with the weather provider
- Not comfortable with Telvent at this time.

2. Predicting Resource Requirements

Based on a detailed weather forecast, it is an industry best practice to use the forecast for estimating damages and predicting resource requirements. The CL&P ERP does not specifically address a process/system to predict damage.[67] Prior to tropical storm Irene, CL&P reviewed the

[63] Audit Request EL-3
[64] Audit Request EL-1
[65] Audit Request EL-13
[66] A level-three storm event is a serious event affecting less than 40,000 customers.
[67] Audit Request Liberty-22

historical restoration information from Hurricane Gloria. During the review, CL&P personnel discussed the safety record, damage, resources, duration, and other issues that it had to address during the restoration. Tropical storm Irene and Hurricane Gloria had similar paths and wind speeds. CL&P used Gloria as a gauge to predict the damage from tropical storm Irene. The snowstorm was unprecedented and the lead-time was much shorter. CL&P did not have a prior storm to use as a gauge for damage prediction.

3. Conclusions

1. The CL&P storm team lacks confidence in the present weather vendor.

A competent professional weather vendor is critical to the initial storm response. A good forecast allows the utility to prepare properly for the event. CL&P does not have confidence in the present NU weather vendor.

2. CL&P does not have a pre-storm resource prediction process in place.

CL&P used past storm history for estimating resource requirements. This process is crude and inaccurate.

NU is working with the University of Connecticut's School of Engineering to develop a predictive weather damage model. The development of this tool is currently in progress. The tool, when completed, will allow NU to better prepare itself for forecasted inclement weather by predicting the amount and area of damage the infrastructure will sustain.

4. Recommendations

IV-CL&P-1 Use a weather vendor that has the confidence of the storm team.

CL&P and NU should either address and correct the issues causing a lack of confidence or use a vendor that will have the confidence of the CL&P storm team.

IV-CL&P-2 Develop a pre-storm resource prediction process.

A pre-storm damage and resource prediction model is necessary for proper storm planning and deployment.

B. UI

1. Weather Monitoring

Western Connecticut State University (WCSU) provided daily weather forecasts to UI.[68] They provided a morning and afternoon forecast. UI has used WCSU for several years and is pleased with its performance. UI also used the National Hurricane Center as a source of information as to the potential impact on its service territory and other areas along the eastern seaboard. WCSU

[68] Audit Request EL-2

provided an impact warning for Irene to UI six days in advance. UI began weather briefings with the storm team five days in advance. In the snowstorm, UI began weather briefings on Thursday, two days before the storm occurred.

The UI Incident Managers held private calls with the weather service vendor. The vendor did not participate on storm team conference calls. Based on early weather forecasts, UI began planning for a level one event (minor) on Thursday, then upgraded to level two event (significant) on Friday, and level three event (extensive) on Saturday.

2. Predicting Resource Requirements

UI does not have a predictive resource requirements model.[69] UI predicted the level of the storm based on a matrix in the EPP. The matrix listed only basic information on resources such as whether any outside mutual assistance is required and which system processes should be activated.

3. Conclusions

1. UI had a weather-monitoring vendor in place.

Western Connecticut State University (WCSU) provided daily weather forecasts to UI. UI has used WCSU for several years and is pleased with its performance.

2. UI does not have a pre-storm resource prediction process in place.

UI does not have any process in place for pre-storm estimating of resource requirements. It must therefore make mutual assistance resource decisions based solely on experience and a feel for the storm. This method leads to varying degrees of accuracy.

4. Recommendations

IV-UI-1 Develop a pre-storm resource prediction process.

A pre-storm damage and resource prediction model is necessary for proper storm planning and deployment.

[69] Interview #6, 1/19/12

V. Storm Preparations

A. CL&P

1. Preparation Actions – Storm Irene

Once CL&P receives a weather alert or forecast, it starts the process of pre-storm planning. Pre-storm planning activities are numerous and often hectic. Liberty categorized and reviewed the pre-storm planning activities in three overall groups:

- Triggering necessary storm plan support functions and processes
- Achieving full readiness status of field response personnel
- Pre-storm resource deployment and planning

CL&P followed the preparation activities[70] described in its ERP, Section 1-Basic Plan, page 10: 4.0 Preparedness Activities and Section 2-District Plan, page 10: 3.1 Preparedness Activities.

a. Triggering of Storm Plan Support Functions

CL&P conducted the following activities involving storm-plan support functions:[71]

- Developed and updated contact lists for state and municipal officials.
- Determined numbers of support personnel necessary to supplement the emergency response positions. Support resources included patrollers, analyzers, wire guards, food/lodging, town/customer liaisons, stores, facilities, transportation, media, crew guides, and satellite teams.
- Checked with Stores personnel and verified material availability. Stores reviewed material inventory based on the damage from hurricane Gloria. Stores also notified suppliers that it might need additional "on-demand" deliveries.
- Ensured environmental support was available for oil spill response. The NU Environmental Department opened their EOC.
- Ensured the Account Executive and communications groups were in place to support external communications to life support customers, state/local governments, priority customers, and media.
- Conducted a training course for new wire guards. While CL&P successfully organized on relatively short notice, the substance of the training proved to be less than optimal.
- Requested NU EMG to assign CL&P a dedicated project manager from Base Logistics. Base Logistics is the contractor responsible for establishing and maintaining large-scale staging areas and satellite facilities for the Company.
- Food & Lodging secured 5,745 hotel rooms and the required meals for incoming mutual aid and contractor crews.
- Transportation made a schedule for on-site fueling at each work location.

[70] Audit Request AG-1
[71] Audit Request AG-95 and EL-1

b. Achieving full readiness status of field response personnel

CL&P conducted the following activities involving its field response personnel and associated facilities:

- Cancelled vacations for all NU employees. Placed CL&P line crews on-call.
- Determined availability of employees assigned to District ICS positions.
- Conducted a hurricane preparations drill and tabletop exercise with employees assigned to General Staff ICS roles as outlined in the ERP. The drill started with a refresher on ICS roles and responsibilities for General Staff and Command Staff positions. The tabletop exercise focused on staffing and response strategies.
- Checked District storm rooms for readiness. Secured all outside material to prevent blowing debris.
- Activated all District Incident Command Posts Saturday evening. This included a contingent of line crews for responding to priority one E911 calls.

c. Pre-storm resource deployment and planning

CL&P conducted the following activities involving resource deployment and planning:

- Classified Irene as a level five event.[72] The Emergency Operations Center opened on Friday, August 26 at 12:02 pm.
- Conducted weather monitoring. (Refer to Section V, Storm Monitoring and Predicting, of this report.)
- Scheduled daily storm preparation conference calls with Division and District management and internal storm support organizations to review and evaluate district operations preparedness using the Hurricane Preparations Check List.
- Conducted mutual aid conference calls with the New England Mutual Aid Group (NEMAG) and the New York Mutual Aid Group (NYMAG) groups daily from August 24 through August 28. On August 24, CL&P requested that the NU EMG secure 200 outside line crews. On August 25, CL&P requested the NU EMG to secure an initial 100 outside line crews, making the total request 300 crews. On Friday, August 26, CL&P requested NU EMG to secure an initial 200 outside line crews, making the total request 500 crews.
- Secured and pre-positioned helicopters for reconnaissance.
- Initiated plans to ensure that it completed all project work by Friday and restored the system to its normal configuration. CL&P defeated the circuit-distribution loop schemes[73] on Friday, August 26.
- Opened the EOC in partial activation mode as of 8:45 a.m. Friday to further support and organize company-wide planning and coordination activities. CL&P fully activated the EOC at 12:02 p.m.
- Provided a liaison to the state EOC beginning at 9:00 a.m. on Friday.
- Deployed 250 down-wire guards to work centers across Connecticut on Saturday, August 27.

[72] A level five event is the highest level of storm plan activation in the ERP.
[73] This action prevented the automatic reclosing of loop line devices in the storm. It greatly enhanced public safety from downed tree wire conductors and protected electrical equipment that might have been damaged by the storm.

- Secured 250 tree crews for restoration activities.

CL&P did not fully establish satellite (or staging) areas. Utilities should plan and identify satellite areas prior to the storm arrival. This action greatly speeds up the restoration response for that area. In the areas where CL&P did establish satellites, it did not identify the actual locations before the arrival of the storm.[74] It did not have lease agreements in place with the site owners prior to the storm's arrival. As a result, CL&P could not pre-stage the satellite area with items such as maps, computers, and phone lines.

The Company established four satellite areas during the Irene restoration.[75] The table below shows these areas. They were fully equipped, full-service staging areas. The implementation procedures to setup and mobilize staging areas of this caliber are complicated and require numerous pre-storm planning actions.

Locations	Current Capacity Feeding	Maximum Capacity Feeding	Parking Capacity (Trucks) *	Feeding	Busing	Satellite Trailers	Stores Trailers	Environmental / Scrap Xfrm	Fueling	Security
***Waterford Speedbowl 1080 Hartford Turnpike Waterford, CT 06385	300 Tue 8/30 @1700	500	150	Yes	Yes	Yes	Yes	Yes	Yes	24/7
Westbrook Outlets 314 Flat Rock Place Westbrook, CT 06498	200 Wed 8/31 @0600	400-500	100	Yes	Yes	Yes and Mobile Command Center	Yes	Yes	Yes	24/7
Willimantic AWC 1270 Main Street Willimantic, CT 06226	200 Tue 8/30 @1700	200	50	Yes	Yes	No Trailer Operate out of Wmtc Bldg	No	No	Yes	24/7
Brooklyn Fairgrounds 15 Fairground Road Brooklyn, CT 06234	200 Wed 8/31 @0600	450	150-200	Yes	Yes	Yes	Yes	TBD	Yes	24/7

CL&P's satellite triggering procedures[76] were cumbersome and unclear. CL&P's procedure EP-2022 required Division Directors to develop and maintain a list of staging area locations and satellite locations. The procedures also stated "(Preferably Satellite and Staging Areas at the same location or in very close proximity)." The concept of what is a satellite area and what is a staging area was not clear. CL&P's ERP had the triggering mechanism at the district level, a bottom-up approach. It is an industry best practice that utilities centrally manage staging areas/satellite areas as a system storm-team function due to the close ties these areas have with crew mobilization plans. Most centrally managed staging area functions, including site identification and maintenance, are part of the logistics support group due to the close ties with functions such as lodging, meals, busing, and security.

A lack of pre-deployment of outside line crew resources was evident. Liberty reports on this issue in report Section VIII, Recruitment and Deployment of Outside Resources. The escalating

[74] Audit Request AG-38
[75] Audit Request OCC-199
[76] Audit Request Liberty-64

numbers of crew resource requirements for a relatively consistent storm forecast was also evident. Report Section V, Storm Monitoring and Predicting, addresses this issue.

2. Preparation Actions – Snowstorm

There was a much shorter time available for pre-storm planning in the snowstorm. The weather services did not predict the event until Thursday, October 27. CL&P understands that the prediction of timing and severity of winter storms is much more difficult than with hurricanes. Nevertheless, CL&P responders interviewed believed Telvent's prediction could have been more aggressive and helpful.

At approximately 11:00 a.m. on Saturday, October 29, rain turning to heavy wet snow and strong winds began affecting Connecticut. By 10:00 a.m. on Sunday, October 30, the snowstorm had left between 8 and 16 inches of heavy wet snow across the western and central portions of the state with lesser amounts along the shoreline and southeastern Connecticut.

The same pre-storm actions CL&P conducted in Irene were still necessary for the snowstorm despite the reduced planning period. However, the reduced timeframe available meant that some actions took place after the storm hit. CL&P's actions included:

- Participated in NWS conference call briefings starting on Thursday, October 27. CL&P System Operations notified division management of the potential of a snowstorm and that more information would be available on Friday.
- Conducted the first storm preparation call only one day in advance, on Friday October 28. CL&P alerted support organizations at that time.
- Confirmed that snow removal contractors were available.
- Requested that NU EMG secure an initial 30 outside line crews on Friday. Requests for outside crews evolved as outage numbers grew and damage information received. Shortly after 12:00 noon Saturday, CL&P increased the initial request for 200 crews to 300 by about 3:15 p.m., increased again to 500 at about 7:00 p.m., and then to 750 by at about 10:20 p.m.
- Partially activated the EOC at 12:00 noon Saturday. It fully activated the EOC at 1 p.m.
- Called in all CL&P crews, local wires-down, and patrol employees by about 2:30 p.m.
- Started the decentralization process at 3:35 p.m. District Incident Command Posts began to open in anticipation of E-911 calls. They staffed each area with additional line crews and tree crews.

CL&P discussed decisions for satellite areas in their EOC calls on Sunday after the storm hit.[77] It eventually opened the satellite/staging areas shown in the table below.[78] Execution of satellite/staging areas is a complex operation and should be an integral part of the pre-storm planning actions.

[77] Audit Request Liberty-37
[78] Audit Request OCC-199

District	Satellite/	Location	Initial Presence	Activation Date	Person Feeding Capacity	Truck Capacity	Need Busing	Meals	Truck Fueling
11/12 - ALL SATELITE AND STAGING AREAS CLOSED									
Simsbury	Satellite/Staging	Galasso 60 South Main Rt187	Monday, 10/31	Tues Dinner	500 max	tbd	Y 11/1-Done	Y	Y
Cheshire	Staging	Lake Compounce 186 Enterprise Drive Bristol	Tuesday, 11/01	1st Meal Tue dinner	700	tbd	Y Done for 11/1	Y	Y
Waterbury	Staging	Timex 199 Park Road Middlebury	Monday, 10/31	1st Meal Mon Evening (450)	400 max	tbd (750 cars)	Y Done for 10/31	Y	Y
Hartford	Staging	Pequot Lot 410 Market St (at Pequot St.) behind Citgo	Wed.11/2	11/2 Tents 11/2 Dinner	500	~400	Y	Y	Y
Hartford	Satellite	Rocky Hill S/S 699 West St Rocky Hill	Monday, 10/31	11/01/2011 (Closed 11/5)					At Marriott
Newtown	Satellite	Squantz Pond Firehouse 255 Route 39 New Fairfield							Y
East Hampt	Satellite	Arbor Acres 480 Marlborough Rd Glastonbury Off Rte 94	Monday, 10/31	?			Y		??
Newtown	Satellite	Sunset-Ridgefield 79 Sunset Lane Ridgefield	Sat 11/5	Sat 11/5					Y
Simsbury	Staging	Big E Fairgrounds 1305 Memorial Avenue West Springfield, MA	CL&P Mon 11/7	CL&P Mon 11/2 dinner	500		N	Y	N
Newtown	Staging only eff. Sun 11/6	Fairfield Hills 3 Primrose Street (off Wasserman Way or Mile Hill Road) Newtown	Monday, 10/31	1st Meal Mon Evening (125)	500	tbd	Y Done for 10/31	Y	Y
Simsbury	Satellite	West Farms Mall (JCPenney Side) 300 West Farms Rd Farmington	Monday, 10/31	Tuesday	n/a	tbd	Y	NO	Y
Tolland	Satellite	East Windsor (L.S.) 112 Prospect Hill Rd East Windsor	Monday, 10/31	10/31/2011					Y
Hartford	Satellite	Manchester S/S 109 Olcott St Manchester	In Service	In Service					N
Tolland	Satellite	So. Windsor S/S 751 Nutmeg St. So. Windsor							N
		Ct Jr Republic 550 Ocean Ave Litchfield CT 126 cots							Y
Hartford	Staging	755 Rainbow Road Tradeport Ind. Park Windsor, CT	Fri. 11/4	1st meal 11/4 dinner	1000	0	Y	Y	N

3. Conclusions

1. CL&P's pre-storm planning actions properly mobilized support functions.

CL&P's support personnel were involved in the planning process. Support resources mobilized and actively participated at the onset of the storm.

2. CL&P's pre-storm planning actions achieved full readiness status of the internal field response personnel.

CL&P's internal response resources mobilized and actively participated at the onset of the storm. CL&P also opened district storm centers and placed them in a state of readiness.

3. CL&P's pre-storm planning actions did not achieve the necessary external crew mobilization.

CL&P's pre-storm planning did not set the necessary level of external crew mobilization. Liberty addresses this issue, including any associated recommendations, in report Section VIII, Recruitment and Deployment of Outside Resources.

4. CL&P's pre-storm planning actions and organization for satellite and staging area support was not timely.

CL&P did not setup the satellite areas in a timely manner. It needs several areas of improvement in the satellite area planning process. The concepts and definitions of satellite areas and staging areas are not clear. The triggering procedures were cumbersome. The overall approach for identification and layout was weak. CL&P's process lacks strong central control and management.

4. Recommendations

V-CL&P-1 Improve the organization, planning, and execution for satellite and staging area setup.

Satellite and staging areas are a critical part of the outside crew mobilization process. There is a close connection between the need for the areas and their locations to the damage prediction process. A staging area that is properly located, planned, and organized improves restoration productivity.

CL&P has recognized that it needs some improvements in its satellite area process.[79] Some of the planned improvements are:

- Revise Emergency Plan Operating Procedure (EPOP) M3-EP-2022 to ensure satellite-operating procedures incorporate more detailed instructions on staging area logistics, e.g., satellite layout, pre-staged equipment, maps, communications, parking schematics, copy machines, and supplies. This has a completion date of September 29, 2012.
- Evaluate existing satellite locations and add, remove, or change locations as required to ensure optimum sites are available for future major restoration events. Secure written lease agreements with site owners. This has a completion date of April 29, 2012.
- Add the definition of a "Satellite" in the CL&P Emergency Plan. This has a completion date of April 29, 2012.

[79] Audit Request AG-38

B. UI

1. Preparation Actions– Storm Irene

UI's weather provider notified the company on Monday, August 22, at 2:15 p.m. that Irene could affect Connecticut late Sunday. Because of this early warning, UI initiated its restoration planning efforts on Tuesday, August 23.[80] This timeline allowed at least five full days for pre-storm planning. Based on early weather forecasts, UI began planning for a level one (minor) storm plan event, then upgraded to level two event (significant) on Friday, and to a level three event (extensive) on Saturday.

UI's pre-storm preparation actions included the following:

- Conducted a table-top hurricane drill on Monday
- Conducted storm team planning meetings
- Defined the potential damage impact
- Acquired additional line clearance and line construction crews. UI requested100 crews on Friday, and raised that to 200 crews on Saturday.
- Developed specific storm staffing plan and schedules
- Developed a restoration strategy
- Planned communications and stakeholder contact
- Conducted safety training
- Conducted logistics planning
- Implemented the municipal and state communication plan on Wednesday, August 24, at 7:00 am when the Municipal Liaison Team Coordinators first informed their assigned towns of UI's contingency plans regarding Irene.
- Established communications channels with first responders and provided specific training for regional fire departments on August 25.
- Conducted system integrity activities such as returning the system to normal
- Cancelled all planned work
- Pre-staged all storm responders, including the staffing of all key substations
- Pre-staged material at strategic locations
- Procured staging area locations
- Procured accommodations for mutual assistance contractors
- Mobilized all UI first shift storm room personnel

During the pre-storm period, the Restoration Manager was responsible for guiding the preparation including conducting conference calls. Once UI activated the EOC, the Incident Manager took over the conference calls and guidance of the organization. UI generally held calls at around 8 a.m. and 2 p.m. each day, and occasionally at night. Calls ran from one to two hours.

[80] Audit Request EL-1

2. Conclusions

1. UI's pre-storm planning actions properly mobilized the support functions.

UI's support personnel were involved in the planning process. These support resources were mobilized and actively participating at the onset of the storm.

2. UI's pre-storm planning actions achieved full readiness status of the internal field response personnel.

UI's internal response resources were mobilized and actively participating at the onset of the storm. The also opened district storm centers and placed them in a state of readiness.

3. Recommendations

None.

VI. Emergency Organization

Major outage events such as the two 2011 storms that are the subject of this report are not "business as usual" for electric utilities. One key element in the successful response to such storms is the structure and effectiveness of the emergency response organization. A common mistake among utilities in responding to major outages is the failure to organize properly and effectively to respond to the unique challenges presented. This mistake normally occurs for one or two reasons – the failure of the utility to predict properly the scope and severity of the event, or the failure to adequately organize and staff their emergency responders to match the challenge facing them. This section of the report focuses on the structure and performance of the CL&P and UI emergency response organizations. CL&P and UI based their organizational structures on their emergency plans. The following comments address the structures in place during the response to Hurricane Irene and the October snowstorm.

A. CL&P

NU and CL&P engaged all of their emergency organizations in the response to Hurricane Irene and the October snowstorm. Appendix VI-1 contains charts showing the top two layers of organizational structure for the System (NU) and Area/Division/District (CL&P) commands. The response personnel at all levels, System, Area, Division, and District, were utility operations veterans with good experience in storm response.

1. System Command

The information in the CL&P ERP does not provide a precise description of the System Command organization. There is a chart that shows the System Commander, the Area Commanders of the three operating companies (including CL&P), and the Mutual Aid Director.[81] This is obviously just a skeleton chart showing the basic functions under System Command. There is confusion regarding the membership of the System Command. The NU Executive VP and COO filled the System Commander position. NU officers were part of System Command, but there is no specific document showing the exact make-up of that command organization.

The plan states that the Manager, System Restoration and Emergency Preparation, has the responsibility of activating System Command[82]. The manager did this in conjunction with an NU officer. System Command operated out of an executive conference room at NU South (Berlin, CT) where NUEOG is located.[83]

One officer interviewed said that each operating company directed the restoration, and System Command was there to "oversee and assure," and maintained an "active dialog" with the operating companies beginning before impact. With regard to Mutual Aid, System Command acted as an "agent" for operating companies in securing outside help.[84] This is by far the most

[81] CL&P ERP, Section 4, 2.8, page 11
[82] CL&P ERP, Section 1, 4.1.4, page 13
[83] Interview #75, March 14, 2012
[84] Interviews #2, December 15, 2011, and #73, March 12, 2012

significant contribution that System Command made to the overall restoration performance of CL&P.

Another officer interviewed said that System Command exercised more command and control, ruling on decisions involving crew allocation and relocation when necessary. This officer said that he did not think the description of "oversee and assure" fully described the System Command role.[85] It is obvious that there is a lack of clarity and understanding as to the make-up and role of System Command.

System Command (NUEOG) initiated daily conference calls on Tuesday, August 23, 2011, in advance of Hurricane Irene. The three operating companies and all corporate support functions participated in these calls. The focus of the calls was on emergency preparedness. There was no confirmation that System Command held preparedness calls in advance of the October snowstorm. Additionally, the System Command coordinated support from NU Environmental, Safety, Security, Stores, and Facilities.

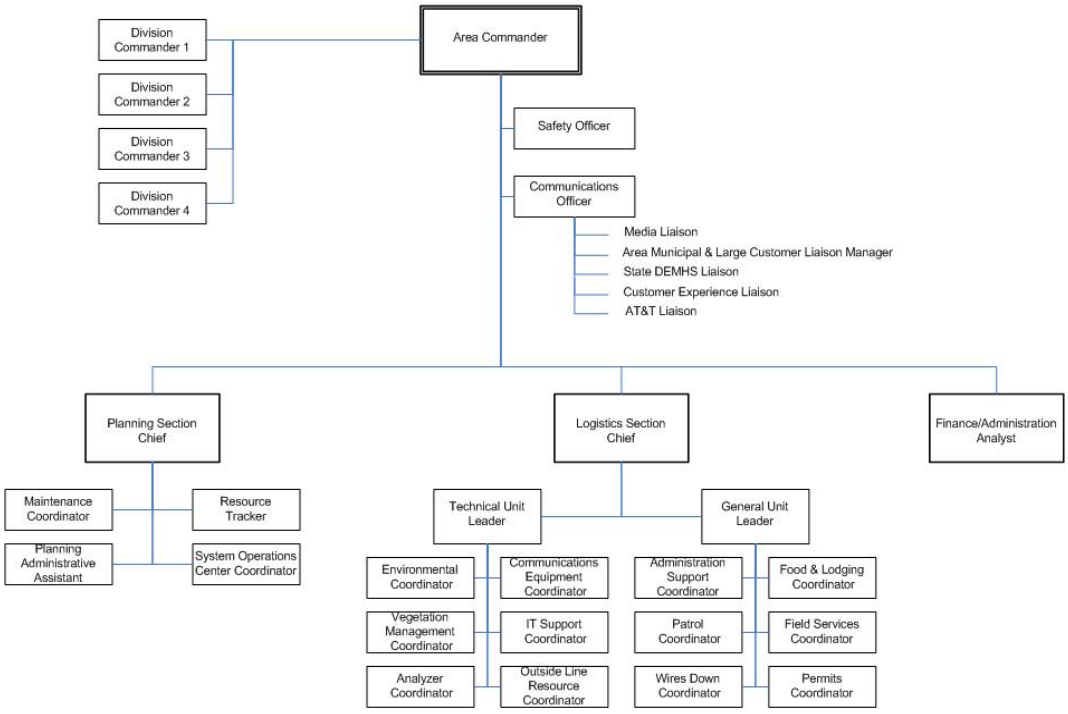
It appears that System Command functioned somewhat in a command and control role, making decisions as necessary when raised to its level. Otherwise, during these two storms the primary contribution of System Command was in securing Mutual Aid assistance. Based on the NU/CL&P application of ICS, considerable authority and responsibility for emergency response is pushed down to the operating company, even in major events as the two in question in which the entire NU system was involved.

[85] Interview #74, March 14, 2012

2. Area Command

The organizational chart below shows the structure of the Area Command in place during the response to Hurricane Irene and the October snowstorm.[86]

CL&P / Area Command



As shown in the chart, the Logistics Section Chief was responsible for twelve separate response functions. For the most part, the Logistics role was to provide resources requested by the divisions. Logistics was not accountable for the performance of five of these functions: Vegetation Management, Analyzing, Outside Line Resources, Wires Down, and Patrol (Damage Assessment). Logistics served as an agent to the Area Commander and the Divisions in these five areas. During the Irene response, there was a lag in communications from the logistics chief to the food/lodging people, as large numbers of outside crews began to arrive. To help with this, CL&P changed the procedure during the October storm to provide more assistance from the System level.[87]

In the Irene response, CL&P fully activated Area Command at noon Friday, August 26, 2011. They staffed the district storm rooms and had them ready at 6:00 p.m., Saturday, August 27. Irene made landfall at 10:00 a.m., August 28. Wind speed was building up and crews were called

[86] CL&P ERP, Section 4, Emergency Response Organizations, page 14
[87] Interviews #2, December 15, 2011, and #73, March 12, 2012

back to work centers because of the wind at 3:30 a.m. In the October response, CL&P activated Area Command shortly after 1:00 p.m., Saturday, October 29, 2011. Heavy snowfall was occurring at that time. The district command posts began to open shortly after 3:30 p.m. Area Command commenced Storm Operations conference calls on Sunday, August 28, and Sunday, October 30, respectively for the two storms, and held three such calls per day until restoration was complete. Area Command requested outside assistance from the NU Mutual Aid Director in both storms. Liberty addresses the topic of recruitment and deployment of outside resources in a later chapter.

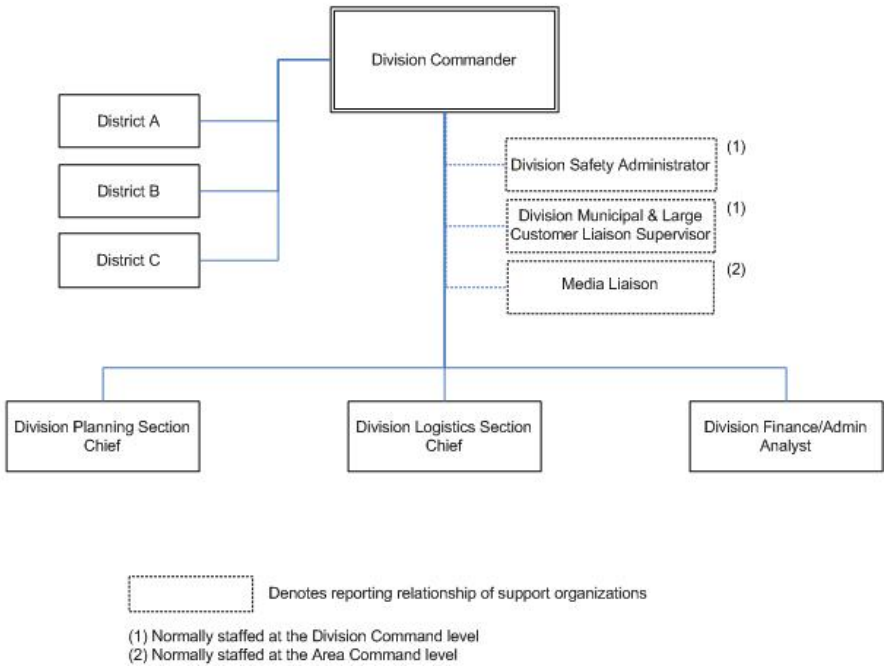
Prior to landfall of Irene, Area Command reviewed the CL&P response to the 1985 storm, Hurricane Gloria. One item discovered was the number of flashover outages due to sea spray. Based on the forecast for the same type conditions in Irene, CL&P made the decision to defeat all of the loop feeds. (This process opens all tie points between circuits to assist in accurate outage detection.) Area Command arranged helicopter patrols for both storms. They also requested and received assistance from senior management of the two other operating companies and the transmission group in both storms. Throughout the restoration effort of both storms, Area Command provided support and monitored resources and remaining customer outages. The CL&P EOC closed at 6:00 p.m. Tuesday, September 6, and Wednesday, November 8, respectively.[88]

[88] Responses to Audit Requests EL-001 and EL-013, and Interview #27, January 4, 2012

3. Division Command

The chart below shows the division emergency response organization.[89]

Division Command



According to CL&P, it was not operating under the Division command structure for either storm. In the CL&P application of ICS, CL&P uses the division command structure for storms that only affect the work centers within one division. The Division Commander has the authority to move all resources within a division. Once the storm involves multiple divisions it becomes necessary to engage Area Command. At this point, the authority to move resources is no longer in the control of the Division Commander.

CL&P predetermined that it would not need the Division Command structure prior to the landfall of Storm Irene and prior to the snowstorm. CL&P decided to move the staff from the Division Command positions to the staff positions needed for the anticipated number of satellites. CL&P also decided to leave the Division Commander in place to keep the number of direct reports to the Area Commander and District commanders as low as possible.[90] Division Directors

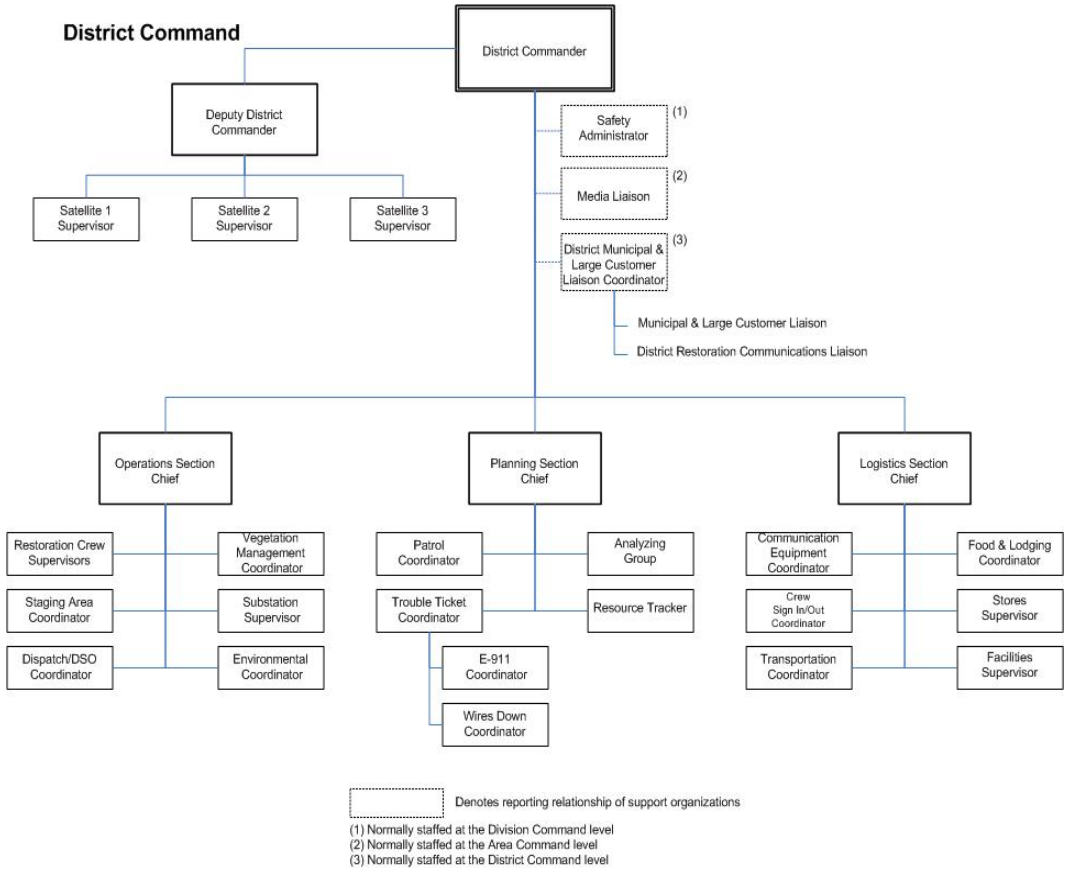
[89] CL&P ERP, Section 4, page 24
[90] Response to Liberty Audit Requests 084 and 097.

(Commanders) assisted Area Command or District Commands.[91] The district commands were then in effect reporting directly to Area Command.

The organizational modifications mentioned above were not in accordance with the CL&P ERP. This approach is reflective of the CL&P view of the Incident Command Structure (ICS). The division command is in reality not a part of the CL&P emergency organization in any outage event in which it activates Area Command. The fact that CL&P left Division Commanders in place to reduce the number of direct reports raises more questions about this organizational approach.

4. District Command

The chart below shows the district emergency organization.[92]



[91] Interview #74, March 14, 2012.
[92] CL&P ERP, Section 4, page 28

In the Irene response, CL&P had fully staffed district storm rooms and had them ready at 6:00 p.m., Saturday, August 27. Irene made landfall at 10:00 a.m., August 28. Wind speed was building up and CL&P called crews back to work centers because of the wind at 3:30 a.m. In the October response, CL&P began activating the district command posts shortly after 3:30 p.m., Saturday, October 29. It staffed the district work centers with additional line and tree crews.[93] It used satellite command centers in these two storms for the first time. A commander and support staff the satellite command, which reports to the district command.[94]

The district emergency organization has a good design. It could provide the necessary control, command, and support. Liberty covers the specifics of the performance of the district emergency organization in the chapter on field restoration.

5. Conclusions

1. The level of engagement by NU and CL&P and the experience level of response leaders were good, and helped facilitate the restoration.

NU and CL&P engaged all of their emergency organizations in the response to Hurricane Irene and the October snowstorm. The response personnel at all levels – System, Area, Division, and District – were utility operations veterans with good experience in storm response.

2. There are opportunities to strengthen the CL&P emergency organization by shifting more direct authority and responsibility for the response effort up to System Command. (See Recommendation 1)

There is a lack of clarity and understanding as to the make-up and role of System Command. In a major storm response affecting all operating companies, the NU System Command in large part functions in a coordination and support role, and does not direct the restoration activities. NU views System Command as supporting CL&P, but that CL&P implements. With regard to Mutual Aid, System Command acts as an "agent" for operating companies in securing outside help.

3. The effectiveness of Area Command was limited because it functioned more in a support role for several key response functions. (See Recommendation 2)

The Logistics group reporting to the Area Commander was not accountable for the performance of five of these functions – Vegetation Management, Analyzing, Outside Line Resources, Wires Down, and Patrol (Damage Assessment). Rather, its role was that of agent or broker to secure requested resources. The Area Command organization should include functional team leaders with specific accountability for performance in these key areas.

[93] Responses to audit requests EL-001 and EL-013
[94] Interview #37, January 6, 2012

4. CL&P's decision not to activate the division commands limited the effectiveness of the emergency organization. (See Recommendation 3)

CL&P was not operating under the Division command structure for either storm. In the application of ICS, CL&P uses the division command structure for storms that only affect the work centers within one division. The Division Commander has the authority to move all resources within a division. Once the storm involves multiple divisions it becomes necessary to engage Area Command. At this point, the authority to move resources is no longer in the control of the Division Commander. This eliminates a level of management that is needed in major events.

5. The CL&P district emergency organization provides the framework to support an effective response. In both storms, CL&P opened and staffed the district commands in good time.

The district emergency organization has a good design. It could provide the necessary control, command, and support. In the Irene response, CL&P had fully staffed district storm rooms and had them ready at 6:00 p.m., Saturday, August 27. Irene made landfall at 10:00 a.m., August 28. In the October response, CL&P began activating the district command posts shortly after 3:30 p.m., Saturday, October 29.

6. Recommendations

VI-CL&P-1 Modify the storm management structure and processes to clarify the makeup and role of System Command and place more direct authority and responsibility at System Command.

System command needs to implement and manage the restoration effort across the NU system in storms such as Irene and the October snowstorm. The wording in the NU and CL&P emergency plans should effect the change the role of System Command from providing support and working as an agent for the operating companies to a clear leadership role. The plan should clearly describe the precise membership of the System Command.

VI-CL&P-2 Strengthen the Area Command structure with regard to its direct functional control in key areas.

The Area Command organization should include team leaders with specific accountability for performance in functions such as Vegetation Management, Wires Down Coordinator (including specifically the road clearing work with municipalities), and Damage Assessment.

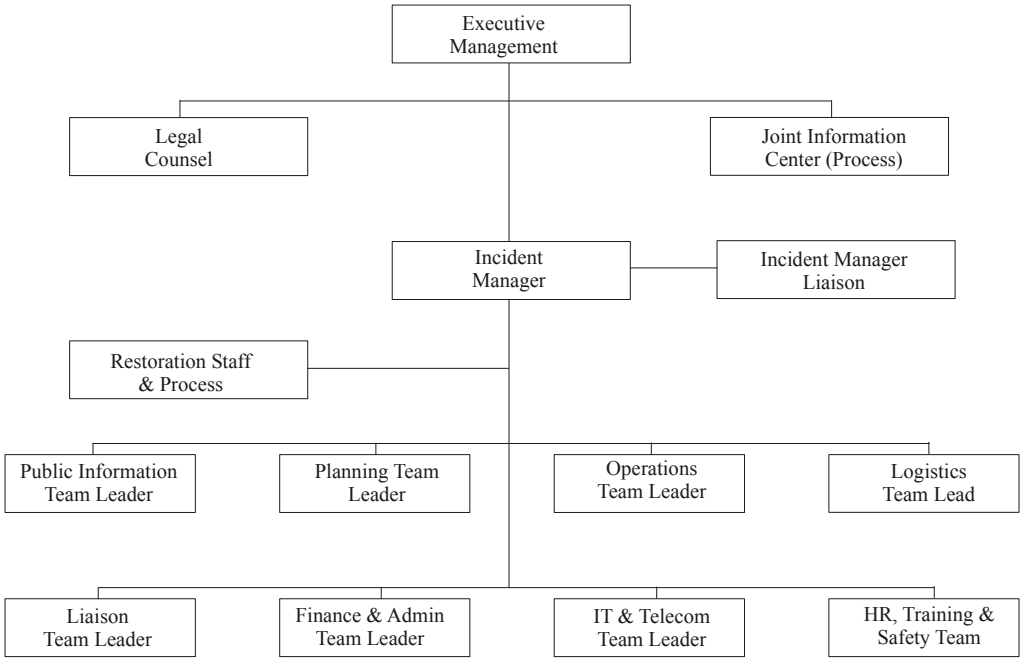
VI-CL&P-3 Activate the division command posts in all major outage events as set forth in its emergency plan.

The CL&P ERP wording on division commands does not include their elimination when more than one division is involved. CL&P would improve its storm response by having the benefit of command and control at the division level.

B. UI

1. Organization

The chart below represents the UI emergency organization that responded to Hurricane Irene and the October snowstorm.[95] Due to the size and compact nature of the UI service area, the response was under the command and control of one incident manager who reported directly to UI executive leadership.



Top management had a consistent presence at the EOC – one officer was there at all times – CEO; President; Senior VP; VP, Customer Fulfillment. The incident commander for both storms was the UI Director, Operations, an experienced utility operations veteran.

UI broke the service area into three geographic areas – West, Central, and East. Each area contained five to six towns. UI crews were in one area, "internal contractors" (those who work on UI property on a full-time basis) were in another area, and Mutual Assistance crews from other utilities and "external contractors" worked in the third area. The purpose in doing this was for control. They did move some crews from one area to another as the need arose. Crews worked directly out of EOC. Crew leaders would work with crews and report in at the EOC.

[95] UI EPP, figure 3.e.1, page 22

During the two storms, UI handled the response on the transmission system in this manner. The Operations Manager, reporting to the Incident Manager, carried out patrol and damage assessment. The Operations Manager forwarded patrol information to the Transmission Business Unit. Field crews were under the Operations Manager. UI contracted out transmission construction and the Vegetation Management group was responsible for tree-related outages on the transmission system.[96]

The UI emergency organization was well structured for its service area, and contributed positively to the restoration. Liberty covers the specifics of its performance in the chapter on Field Restoration.

2. Conclusions – UI Emergency Organization

1. UI was well organized in the response to the two storms.

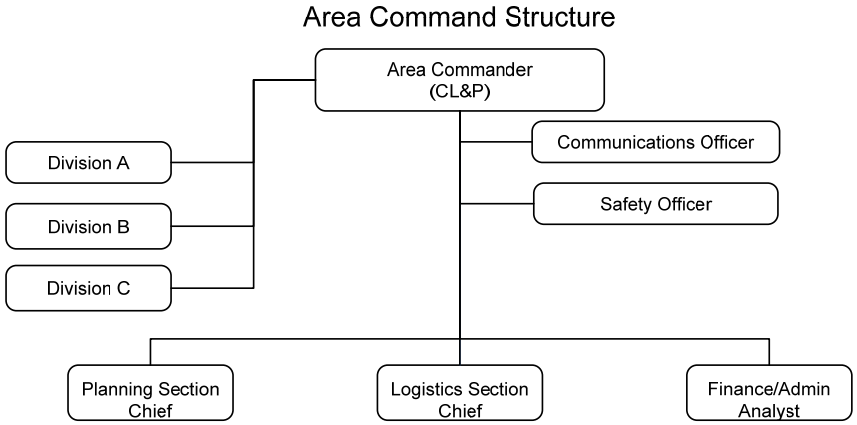
Due to the size and compact nature of the UI service area, the response was under the command and control of one incident manager who reported directly to UI executive leadership. The UI service area was in three geographic areas for the response to the storms – West, Central, and East. Each area contained five to six towns. UI crews were in one area, "internal contractors" (those who work on UI property on a full-time basis) were in another area, and Mutual Assistance crews from other utilities and "external contractors" worked in the third area. The purpose in doing this was for control. UI moved some crews from one area to another as the need arose. Crews worked directly out of EOC. Crew leaders would work with crews and report in at the EOC.

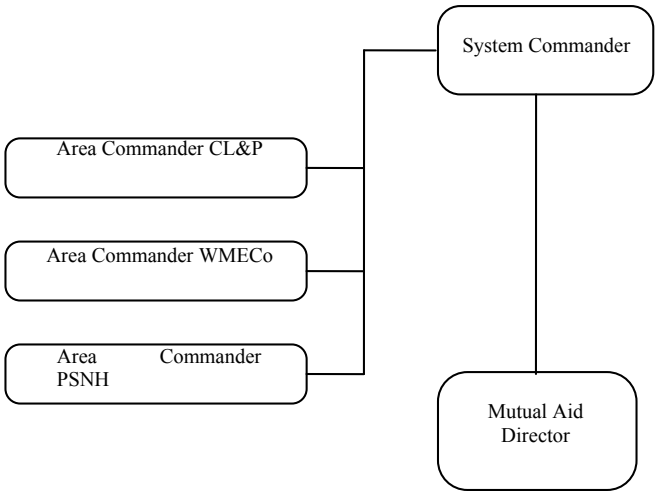
3. Recommendations

None.

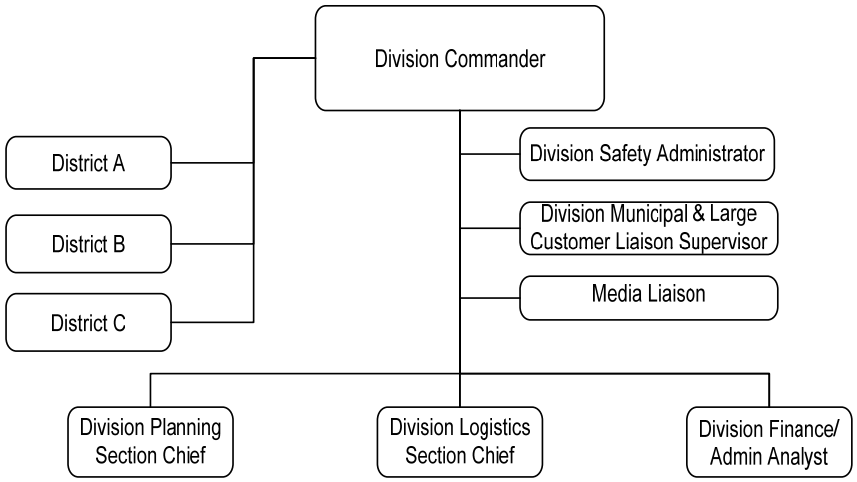
[96] Interview UI 11, February 8, 2012 and UI EPP (12/1/2011) Appendix 9.2

Appendix VI-1 – CL&P Emergency Response Organization[97]

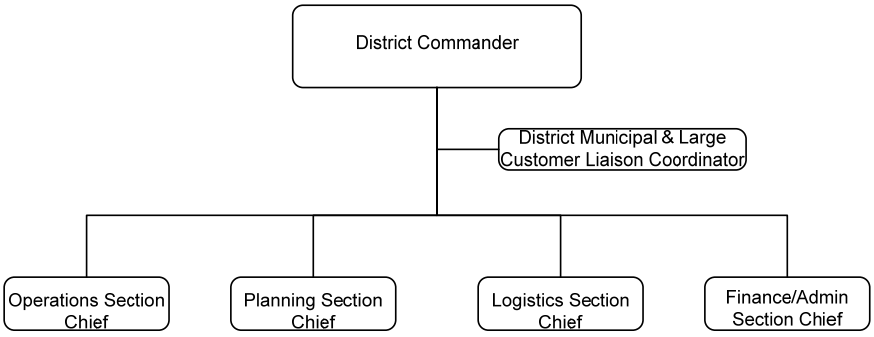




[97] CL&P ERP, Section 4, Emergency Response Organization



District Command Structure



VII. Emergency Alerts and Mobilization

In preceding chapters, this report addressed the topics of emergency plans, storm monitoring and predicting, storm preparations, and emergency organizations among other topics. The topic of this chapter – emergency alerts and mobilization – follows in sequential order. "Getting ahead of the curve" is critical in any major outage response. A good plan and well-trained response team need a proven process to alert the emergency organization and mobilize early.

"Alerts" refers to the process of raising the awareness of a pending event and directing preparation activities, and "mobilization" is the activation of command centers, pre-staging of key response teams, and bringing in resources from other locations.

A. CL&P

1. The 2011 Storms

The following table, which Liberty also discusses in Chapter II, Emergency Plans, provides CL&P's classification of service outage events.[98]

Classification of Service Outage Events

Level	Event Characteristics	Expected # Customers Likely to be Affected	Expected # of Trouble Spots	Expected Number & Type of Crews Required	Expected Duration	Expected Event Frequency	ICS Activation
Level I	Small Impact Event	< 10,000	1 to 50	1 to 25 CL&P Crews (Note 1)	< 12 hours	> 75 per year	Managed by the SOC and District personnel
Level II	Moderate Impact Event	< 20,000	51 to 450	26 to 75 CL&P Crews (Note 1)	12 to 24 Hours	< 25 per year	Managed by the SOC, District and Division Command
Level III	Serious Impact Event	< 40,000	451 to 950	76 to 100 CL&P, NU System Crews, & Mutual Aid Crews (Note 1)	24 to 48 Hours	< 10 per year	Managed by the District Incident Commander, Division Command, and Area Command
Level IV	Major System Impact Event	< 80,000	951 to 1800	101 to 175 District, NU System, & Mutual Aid Crews (Note 2)	48 to 72 Hours	< 5 per year	Managed by the District Incident Commander, Division Command, Area Command, and System Command
Level V	Extreme Event Major System Impact	>100,000	> 1800	over 175 District, NU System and Mutual Aid Crews (Note 3)	> 72 Hours	Once every 5 Years	Managed by the District Incident Commander, Division Command, Area Command, and System Command

Notes: 1. Corporate Personnel pre-positioning is unlikely except for extenuating circumstances.
2. Corporate Personnel pre-positioning is optional but more likely.
3. Corporate Personnel pre-positioning is expected.

In hurricane Irene, NU/CL&P used a hurricane checklist to guide its alert process, following the prescribed activities beginning five days before anticipated landfall.[99] This process engaged all

[98] CL&P ERP , Section 1, page 23

of the key functional team leaders and command staff members in a timely manner. Regular updates from the weather vendor were a part of these alerts.

CL&P System Operations classified Irene as a Level 5 Event on Tuesday, August 23, five days before landfall.[100] This level means that CL&P expected the storm to affect over 100,000 customers and cause more than 1800 trouble spots. CL&P did not discuss the storm level during the pre-storm calls, but did discuss it during the response phase.[101] Three days before the landfall of Irene, CL&P issued an "all hands" alert, cancelling all vacation.

CL&P first began mobilizing for Irene when it requested outside crew help on Wednesday, August 24, four days before landfall. On Thursday, it sent a message to Division and District management to begin preparations in accordance with the ERP. CL&P fully activated the EOC (Area Command) on Friday, two days before Irene hit. Also on that Friday, CL&P initiated the plan to turn off all automatic overhead distribution circuit ties, and worked with an outside logistics firm to provide for satellite locations. On Saturday, the day before landfall, CL&P had the district storm rooms staffed and ready at 6:00 p.m., the NU Environmental EOC opened, and it assigned 250 down wire guards to work centers. CL&P ramped up staffing at the EOC in the early morning hours of Sunday, and mobilization was complete prior to landfall.[102]

CL&P does not have a checklist for winter storms comparable to the hurricane checklist.[103] However, it followed a disciplined process to alert the emergency organization of this potential threat. The October snowstorm hit with only a few days' warning. CL&P escalated its weather monitoring on Thursday, October 27, based on changing weather forecasts, and notified Division management of the potential of a nor'easter. On Friday, CL&P initiated conference calls with Division and District management and put 100 percent of the storm responders on call. The storm hit on Saturday, October 28.

On Thursday, October 27, CL&P escalated its weather monitoring because of the change in the forecast. On Friday, CL&P requested outside resources, and on Saturday, October 29 – the day the storm hit – activated the EOC by noon and the district storm organization that afternoon.[104] Given the earlier-than-expected arrival of the storm, CL&P mobilized in a timely manner.

2. Conclusions

1. CL&P alerted the response organization in an effective manner, but there are opportunities for improvement. (See Recommendation 1)

In hurricane Irene, NU/CL&P used a hurricane checklist to guide its alert process, and followed the prescribed activities beginning five days before anticipated landfall. This process engaged all of the key functional team leaders and command staff members in a timely manner. Regular updates from the weather vendor were a part of these alerts. CL&P System Operations classified

[99] Responses to audit request Nos. EL–001 and AG–014
[100] Response to audit request #EL–001
[101] Interview Nos. 23 and 24, January 3, 2012
[102] Response to audit request #EL–001
[103] Interview #75, March 14, 2012
[104] Response to audit request #EL-013

Irene as a Level 5 Event, but did not discuss this during the pre-storm calls. CL&P does not have a checklist for winter storms comparable to the hurricane checklist. Nevertheless, it followed a disciplined process to alert the emergency organization of this potential threat.

2. CL&P mobilized the emergency organization in a timely and efficient manner in both storms.

CL&P first began mobilizing for Irene when it requested outside crew help on Wednesday, August 24, four days before landfall. It fully activated the EOC (Area Command) on Friday, two days before Irene hit. On Saturday, the day before landfall, CL&P had the district storm rooms staffed and ready. It ramped up staffing at the EOC in the early morning hours of Sunday, and mobilization was complete prior to landfall.[105] The October snowstorm gave very little warning due to the nature of the storm, but CL&P responders were critical of the job Telvent did in providing updated information. It is commendable that CL&P requested outside resources the day before the storm hit.

3. Recommendations

VII-CL&P-1 Develop a checklist for winter storms similar to the one it has for hurricanes and use the event classification levels to guide preparations during the alert phase.

A systematic approach to escalating activities prior to an event is very important, and the hurricane checklist is a good tool. CL&P has the experience in-house to develop a similar tool for winter storms. Furthermore, CL&P should make repeated reference to the predicted event level to ensure that all response teams are aware of the expected extent of damage.

B. UI

1. The 2011 Storms

United Illuminating has a relatively small emergency organization, given the size of the service area. As a result, it easily communicated and accomplished alerts and mobilization. In Irene, it activated the storm plan and took steps to secure additional resources on Tuesday, August 23, five days before expected landfall. UI alerted the response organization using the 1-5 event levels designation.[106] The table below lists the event classifications.[107]

[105] Response to audit request #EL–001
[106] Interview #08, January 20, 2012
[107] Selected data, UI EPP, 6a, page 41

UI Event Classification Table

CATEGORY	EVENT LEVEL 1	2	3	4	5
Customer Outages	<10,000	<25,000	<150,000	<200,000	>200,000
Feeder and Circuit Lock-Outs	<5	<10	<20	<50	>50
OMS Outage Orders	≥20	>75	>400	>1,000	>2,000
OMS Trouble Orders	≥50	>100	>500	>500	>1000
Wire Down Orders	>25	>50	>100	>250	>1000
Estimated Restoration Duration	<24 hours	<48 hours	3 – 5 days	6 – 8 days	>8 days

In advance of Storm Irene, UI first prepared for a Level 3 event, and then changed that to a Level 4 on August 25. UI escalated the predicted level for the October snowstorm from a Level 1 to a Level 2 on October 28, and then escalated that to a Level 3 on October 29.[108] Comparing just the Customer Outages for these two events, UI was close in its prediction for both storms as shown below.

- Irene: 143,873 actual; Level 4 Range: 150,000 – 200,000
- October snowstorm: 19,000 actual; Level 3 Range: 25,000 – 150,000

In responding to Irene, on Wednesday, August 24, UI opened the storm center, initiated communications with the towns, and began Storm Planning meetings/calls the next day. When outages began increasing at 10:30 p.m. August 27, UI called in additional dispatchers, and a skeleton storm center staff began managing these outages at midnight. Tropical storm force winds started at 2 a.m. on Sunday and continued until 10 p.m. that day. Full storm center staffing did not arrive until 6:00 a.m. Sunday.

In the October storm, UI began tracking the storm on Thursday, October 27. On Friday, October 28, 9:30 a.m., it began preparing for a Level 1 event and escalated that to a Level 2 at 2:00 p.m. the same day. At 2:00 p.m. Saturday, UI escalated to Level 3. By that time, UI was experiencing significant outages. Also at 2:00 p.m. Saturday, UI opened the storm center and activated the Wires Down process.

2. Conclusions

1. UI alerted and mobilized the emergency organization with two notable exceptions. (See Recommendation 1)

United Illuminating has a relatively small emergency organization, given the size of the service area. As a result, it easily communicated and accomplished alerts and mobilization. UI managed the alerts and mobilizations well except it was late fully staffing the EOC in both storms. In

[108] Response to UI audit request Liberty - 011

Irene, outages began increasing at 10:30 p.m. on Saturday, August 27. Tropical storm force winds started at 2 a.m. on Sunday and continued until 10 p.m. that day. Full storm center staffing did not arrive until 6:00 a.m. Sunday. In the October storm, at 2:00 p.m. Saturday, UI escalated to Level 3. By that time, it was experiencing significant outages. Also at 2:00 p.m. Saturday, UI opened the storm center and activated the Wires Down process.

3. Recommendations

VII-UI-1 Amend the EPP and change UI's practice to ensure that it opens the EOC prior to the onset of major events.

In the case of major events that provide advance notice, such as a hurricane, UI should fully staff the EOC a minimum of 12 hours before impact. In any event in which there is enough notice to begin tracking the storm at least 12 hours in advance of impact, it should fully staff the EOC before outages increase.

VIII. Recruitment and Deployment of Outside Resources

Recruiting and deploying outside resources are critical elements in a timely and effective storm response. No utility has the staff to the level needed to respond to major outage events. They must depend on outside resources to complete restoration in a timely manner. The two storms that hit Connecticut in 2011 are examples. This chapter explores the issues and performance in this important response area.

Utilities affected by major storms use mutual assistance and outside contractors to supplement their normal staffing. "Mutual Assistance" is the agreement between utilities for not-for-profit assistance during major emergencies.

As is always the case with large storms such as Irene and the October snowstorm, a number of utilities and mutual assistance companies expected, then experienced the effects of, the storms. In such a situation, the utilities and mutual assistance groups that might otherwise provide assistance were unable or unwilling to offer help, at least in advance of or in the early stages of the storm response. Due to the large number of utilities impacted and the amount of resources needed, the Edison Electric Institute (EEI, the industrial group of investor-owned utilities) worked with all mutual assistance groups in an attempt to develop a process to move more resources into stricken areas.[109]

Several additional issues affected the availability of outside assistance:[110]

1. With the increasing numbers of mergers, the affiliation between operating companies becomes a factor. Companies who once were more readily available to provide assistance are now bound first to their affiliated companies.
2. Mutual assistance groups have agreements with their member companies that they will not send assistance outside the bounds of the mutual assistance group until it is certain that members of the group do not need help.
3. It is a generally accepted practice (although no official constraint) that utilities will not request resources until they sustain damage.
4. In at least one case, the governor of a nearby state would not allow any crews to leave the state until all customers were restored, even though the crews in question did not have a restoration assignment.

CL&P made timely payments for contract line crews for work done during Irene. CL&P processed more than 3,200 invoices following Hurricane Irene. The CL&P purchase orders stipulated that it would pay invoices within 30 days, and CL&P paid the majority of these invoices within that period. In cases where CL&P challenged the original invoice, payment came later than thirty days.[111] UI reported twenty invoices solely related to line contractors and mutual assistance during Irene. As of November 14, 2011, UI had paid all but five of these invoices. The

[109] CL&P Interview #75, March 14, 2012
[110] CL&P Interviews: #2, December 15, 2011; #34, January 5, 2012; and #75, March 14, 2012; UI Interviews #6, January 19, 2012, and #7, January 20, 2012.
[111] CL&P response to audit request #AG – 055

dates of the other five were September 5, 19, and 29, October 17, and November 3. UI reported that in some cases it made partial payments after it received documentation.[112]

A. CL&P

1. Acquisition of Outside Resources

NU/CL&P is a member of three Mutual Aid (or Mutual Assistance) organizations – New York Mutual Assistance Group (NYMAG), Northeast Mutual Assistance Group (NEMAG), and the Edison Electric Institute (EEI). In addition, NU/CL&P has connections with other mutual assistance groups such as Mid-Atlantic Mutual Assistance (MAMA), and Southeast Electric Exchange (SEE). In the response to these two storms, CL&P relied on NU to acquire assistance from other utilities by working through these groups.

In addition to mutual assistance utilities, NU/CL&P relied heavily on contract line crews for help. The NU Mutual Aid Director acted as a broker working with contractors and the operating companies. Between the two storms, NU/CL&P brought in approximately 3,000 outside line and tree crews, including mutual assistance utility crews and contract crews. CL&P says that the NU Mutual Aid Director had "free rein," and that he secured crews from "everywhere and anywhere." When NU made a request for outside help, it was ready to commit to taking the crews at that time.[113] This is very important in acquiring crews when a strong demand is expected.

In Irene, NU/CL&P made the first request for outside assistance four days before landfall. More resources were available during Irene. In the October snowstorm, on Friday, October 28, CL&P acquired 30 contract crews to report on Sunday, October 30.

CL&P furnished the following information on outside line crews requested and received.[114]

Hurricane Irene - CL&P Line Crew Summary
Landfall on August 28, 2011
Outside Distribution Line Crews

	Additional Requested	Additional Committed	
24-Aug	200	186	54
25-Aug	300	249	54
26-Aug	500	346	54
27-Aug	500	375	54
28-Aug	**500**	**316**	**218**
29-Aug	500	402	293
30-Aug	600	363	326
31-Aug	600	390	373

[112] UI response to audit request #OCC – 20
[113] Interview #75, March 14, 2012
[114] Response to audit request #AG – 052

1-Sep	800	661	527
2-Sep	1200	908	842
3-Sep	1100	1086	1052
4-Sep	1100	1066	1066
5-Sep	1100	1083	1083

The following is a summary of CL&P's outside distribution line crews for the Nor'easter that affected CL&P on October 29, 2011.[115]

On Friday, October 28, NU participated in the 10:30 a.m. New York Mutual Aid Group (NYMAG) call. No utilities asked for crews. Later that afternoon, CL&P acquired 30 contract crews for 7 a.m. Sunday morning.

On Saturday, October 29 (the day the storm affected CL&P) NU participated in the 8 a.m. Northeast Mutual Aid Group (NEMAG) call. No utilities asked for crews. CL&P opened the Emergency Operations Center before 2 p.m. At the New York Mutual Aid Group call at 5 p.m. that afternoon, CL&P asked for 650 crews. Due to the regional threat, no one had any to offer. CL&P also began reaching out directly to contractors and other utilities.

On Sunday, CL&P continued to reach out directly to other firms. At the 10 a.m. NYMAG call, it increased the request to 1,500 crews, and made the same request at the 5 p.m. NEMAG call. Again, due to the regional impact of the storm, no one had any to offer.

Each day thereafter, CL&P continued to reach out and acquire crews to reach the 1,500-crew target, contacting 109 organizations. NU executives contacted the leadership of several other utilities personally and secured additional help.[116] In addition, CL&P got the vast majority of the tree crews from alliance firms.

Below is a timeline of outside line and tree crew totals at approximately 6 a.m. each morning. These data do not include CL&P's normal complement of transmission and distribution line crews.

Sunday 10/30/2011 - 28 line crews, 110 tree crews
Monday - 147 line and 185 tree crews
Tuesday - 253 line and 284 tree crews
Wednesday - 399 line and 470 tree crews
Thursday - 679 line and 628 tree crews
Friday - 947 line and 630 tree crews

As can be seen, in Irene CL&P significantly increased the requested number of outside resources five days after landfall. In October, CL&P did not request any mutual assistance crews until 5:00 p.m. on the day of impact, even though they had previously engaged 30 contract crews and opened their operations center six hours after the morning call.

[115] Response to audit request #AG – 060
[116] CL&P Interview #73, March 12, 2012

2. CL&P Deployment of Outside Resources

CL&P districts made requests for outside assistance to Area Command, and Area Command then passed them to the NU Mutual Aid Director. The CL&P Logistics Team Chief also worked closely with the Mutual Aid Director in securing outside crews. As NU secured crews and CL&P received crew rosters, CL&P allocated and deployed them based on the requests from the districts and the actual number of committed crews. CL&P closely coordinated this process during both storms, and it worked well. CL&P had some problems with the "on-boarding" of outside crews. "On-boarding" refers to the process of routing incoming crews through a "gateway," or "deployment point," for safety and orientation briefing before sending them to the assigned area. Although there is a provision for this process in the ERP, CL&P did not use the deployment points. CL&P sent the crews directly to the assigned work center. During Irene, some delays occurred in communications between the Logistics team and the Food and Lodging group, partly because CL&P did not use deployment points. CL&P changed the tracking process on incoming crews and set up staging areas and satellite offices to help with this problem.[117]

3. Conclusions – CL&P Outside Resources

1. CL&P followed a reasonable process in the payment of line contractors that assisted during Hurricane Irene. The timeliness of payments did not affect the response of contractors to the October snowstorm.

The process followed agrees with the general practice in the utility industry. CL&P made timely payments, with the only delays being when there was a question about the invoice. There was no documentation of a later lack of response due to payment issues.

2. CL&P made a determined effort in acquiring outside resources, but the results were disappointing, and for the most part beyond its control. There are several opportunities for improvement. (See Recommendations 1 and 2)

Both of the storms were regional in nature, which meant that neighboring utilities and mutual assistance groups were unable to provide help. NU/CL&P relied heavily on mutual assistance and contract line crews for help. The NU Mutual Aid Director acted as a broker working with contractors and the operating companies. Between the two storms, NU/CL&P brought in approximately 3,000 outside crews, including mutual assistance utility crews and contract crews. CL&P says that the NU Mutual Aid Director had "free rein," and secured crews from "everywhere and anywhere." When NU made a request for outside help, it was ready to commit to taking the crews at that time. This is very important in acquiring crews when a strong demand is expected. NU executives contacted the leadership of several other utilities personally and secured additional help. There are several key issues in the Mutual Assistance process, issues in the interaction of the mutual assistance groups and governmental influence, which limit access to crews. CL&P was late in discovering the extent of damage and help required in Irene and as a result significantly increased the requested number of outside crews five days after Irene's landfall. CL&P was not aggressive in seeking outside help in advance in the October snowstorm. There was enough of a threat late Friday and early Saturday to justify a specific request for

[117] Interviews #73, March 12, 2012; #74 and #75, March 14, 2012; and #76, March 16, 2012

outside help in addition to the 30 contract line-crews already acquired, especially in light of the experience with storm Irene only sixty days before.

3. Unnecessary delays occurred because of CL&P's decision not to use deployment points. (See Recommendation 3)

There were more outside resources brought into CL&P in these two storms than in any time in history. Although there is provision for this process in the ERP, CL&P did not use the deployment points to on-board incoming crews. CL&P sent the crews directly to the assigned work center directly. During Irene, some delays occurred in communications between the Logistics team and the Food and Lodging group, partly because CL&P did not use deployment points. CL&P changed the tracking process on incoming crews and set up staging areas and satellite offices to help with this problem.

4. Recommendations

VIII-CL&P-1 Work with EEI and other Mutual Assistance Groups to improve the present process, and work with PURA in an attempt to avoid problems such as the one involving a governor not allowing crews to leave his state.

CL&P should address items 1-3 with mutual assistance groups, and item 4 with PURA:

1. With increasing numbers of mergers, the affiliation between operating companies becomes a factor. Companies who once were more readily available to provide assistance are now bound first to their affiliated companies.
2. Mutual assistance groups have agreements with their member companies that they will not send assistance outside the bounds of the mutual assistance group until it is certain that the group will not need help.
3. It is a generally accepted practice (although no official constraint) that utilities will not request resources until it sustains damage.
4. In at least one case, politics became involved and the governor of a nearby state would not allow any crews to leave the state until utilities restored all customers in state, even though the crews in question did not have a restoration assignment.

VIII-CL&P-2 Adopt an aggressive plan to avoid the mistakes made in Irene and the October snowstorm in requesting outside help.

CL&P should focus on improving situational awareness, especially in the area of extent of damage and help needed. It should adopt an aggressive approach to acquiring outside help in storms with little advance notice, similar to the approach in preparing for a hurricane except on a compressed timeframe.

CL&P should develop or acquire a predictive model and strengthen the damage assessment process to have a better awareness of damage extent and resources required. CL&P should develop more of a sense of urgency in preparing for a likely major event.

VIII-CL&P-3 Follow the deployment point process as outlined in the EPP when large numbers of outside resources are incoming.

CL&P should make any necessary revisions to make this process better and more easily adaptable, train responders on its use, and then follow the plan in large events such as Irene and the October snowstorm.

B. UI

1. Recruitment of Outside Resources

In Irene, UI began its search for outside crews on Tuesday, August 23, five days before landfall, seeking to obtain line and tree crews. These efforts continued throughout the restoration effort. On Friday, UI contacted twelve contractors – all of which were committed to other utilities.

UI is a member of NEMAG and EEI. UI relied heavily on NEMAG for help securing outside line crews, and the results were disappointing. The UI Manager, Restoration, and the Incident Manager handled the requests for outside resources. In Irene, they participated in their first NEMAG conference call on Thursday, August 25, three days before landfall. All NEMAG members were holding their crews at that time. On Friday, UI requested 100 crews from NEMAG and increased this request to 200 crews on Saturday. Irene made landfall on Sunday. NEMAG held one conference call each day, and UI continued with their request for 200 crews through Thursday, September 1. NEMAG received requests for 5,000-6,000 FTEs (Full Time Equivalents – equivalent to one worker), and had only 200 FTEs available. UI also inquired about help from states to the west – Kansas, Wisconsin, Indiana, and Missouri. Sunday night, UI received 24 overhead line crew FTEs and 98 tree-crew FTEs, although it obtained none of these through NEMAG. On Tuesday, August 30, 35 line crew FTEs arrived, and on Wednesday, 10 line crew FTEs and 13 tree-crew FTEs arrived. On Thursday, 8 tree crew FTEs arrived, and on Friday, 30 line crew FTEs and 41 tree crew FTEs arrived. An additional 16 line-crew FTEs arrived on Saturday, September 3. This was the last of the outside resources that came into the UI service area during Irene. The total outside help for Irene was 115 line FTEs (slightly over 50 crews), and 160 tree FTEs (approximately 75 crews).

In the October storm, UI participated in a NEMAG call at 8:00 a.m. on Saturday, October 29, the day the storm affected the area. All companies were holding crews, and no utility made requests for additional crews. Between 7:00-8:00 p.m. Saturday, UI placed calls to 13 different contractors, leaving messages on voice mail except one contract firm that said it would call back if it had crews available.

On Sunday, October 30, UI participated in a NEMAG conference call at 9:00 a.m., requesting 15 crews and received commitments for 10. This was the last attempt by UI to bring in outside resources. The October snowstorm impact on UI was considerably less than what it received in Irene; therefore, UI did not need a large amount of outside resources.

2. Deployment of Outside Resources

Due to the comparably compact nature of the UI service area, the deployment of the incoming crews was not an issue. The outside crews arrived over a period of six days, and this eased the deployment process. UI broke the service area into three geographic areas – West, Central, and East. Each area contained five to six towns. UI crews were in one area, "internal contractors" (those who work on UI property on a full-time basis) were in another area, and Mutual Assistance crews from other utilities and "external contractors" worked in the third area. The purpose in doing this was for control.[118]

3. Conclusions – UI Outside Resources

1. UI followed a reasonable process in the payment of line contractors that assisted in Hurricane Irene. Payment timeliness did not affect the response of contractors to the October snowstorm.

The process followed agrees with the general practice in the utility industry, UI made timely payments, with the only delays being when there was a question about the invoice. There was no documentation of a later lack of response due to payment issues.

2. UI made a determined effort in acquiring outside resources, but the results were disappointing, and for the most part beyond its control. There are several opportunities for improvement. (See Recommendations 1 and 2)

Both of the storms were regional in nature, which meant that neighboring utilities and mutual assistance groups were unable to provide help. UI relied heavily NEMAG for line crews for help, and received very little if any. The UI Manager, Restoration, and the Incident Manager handled the requests for outside resources. During Irene, UI brought in more than 125 outside crews, including mutual assistance utility crews and contract line and tree crews. There are several key issues in the Mutual Assistance process, issues in the interaction of the mutual assistance groups and political influence, that limits access to crews. UI relied on one conference call per day, with NEMAG as its primary source of outside help. To its credit, UI had some success when it looked to states in the west and found help.

4. Recommendations

VIII-UI-1 Work with EEI and other Mutual Assistance Groups to improve the present process, and work with PURA in an attempt to avoid problems such as the one involving a governor not allowing crews to leave his state.

UI should address items 1-3 with mutual assistance groups, and item 4 with PURA:

1. With increasing numbers of mergers, the affiliation between operating companies becomes a factor. Companies who once were more readily available to provide assistance are now bound first to their affiliated companies.

[118] UI Interview #11, February 8, 2012

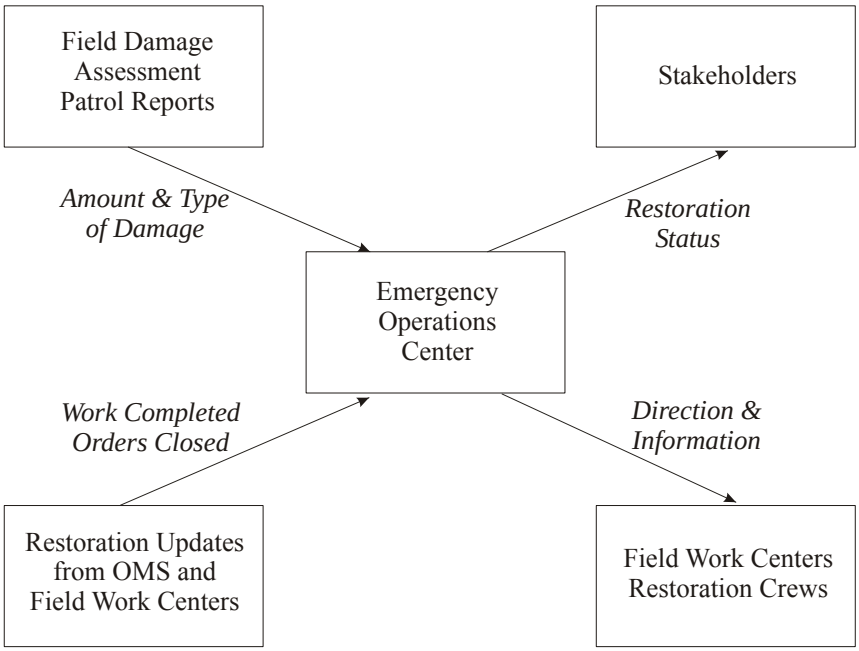
2. Mutual assistance groups have agreements with their member companies that they will not send assistance outside the bounds of the mutual assistance group until it is certain that the group will not need help.
3. It is a generally accepted practice (although no official constraint) that utilities will not request resources until it sustains damage.
4. In at least one case, politics became involved and the governor of a nearby state would not allow any crews to leave the state until utilities restored all customers in state, even though the crews in question did not have a restoration assignment.

VIII-UI-2 Join other mutual assistance groups.

New York Mutual Assistance Group (NYMAG) and Mid-Atlantic Mutual Assistance (MAMA) are two groups in close proximity to the UI service area. UI should also explore joining groups less likely to be affected by the same storm, such as the Southeastern Electric Exchange, the Mid-West Mutual Assistance Group, and the Texas Mutual Assistance Group.

IX. Damage Assessment and Restoration Status

Response team leaders need information. They need to know how much damage the system sustained, and they need to know the status of the restoration effort (e.g., number of circuits restored and orders completed). The diagram below depicts the overall flow of damage assessment and restoration status information.



To lead effectively a restoration effort, storm team leaders must promptly receive complete, thorough damage information. They also depend on ongoing status updates from the field and outage management systems. This chapter addresses how CL&P and UI performed in assessing damage and maintaining situational awareness of the progress of the restoration.

1. CL&P

a. Emergency Plan Directives

The CL&P Emergency Response Plan (ERP) assigns the responsibility for restoration status updates on district analyzers, the district operations section chief, and the district planning section chief. At area command, this responsibility lies with the planning section chief.[119]

[119] CL&P ERP, Section 2, 3.7.2, Section 4, 4.2.1, Section 4, 6.2.1, and Section 4, 6.3.1

Emergency plan section ME-EP-2010 Rev. 3, dated 9-27-2010, Damage Assessment Patrols, contains the requirements for damage assessment. A central team organization is in place and provides additional patrol team support to the districts. CL&P implemented the central team support organization in 2001. The main positions identified and described in the procedure are a Centralized Patrol Coordinator and a Divisional Patrol Coordinator.

The duties of the Centralized Patrol Coordinator are to:

- Coordinate training of Centralized Patrol Team members
- Store and maintain equipment required during performance of patrol duties
- Coordinate vehicle acquisitions and allocation for patrollers
- Provide Centralized Patrol Teams to perform patrols of distribution lines and facilities.

The Centralized Patrol Coordinator also maintains a Centralized Patrol Team Assignment Tracking Log and a Centralized Patrol Team Roster.

The duties of the Divisional Patrol Coordinator are to:

- Direct Divisional Patrol Team and Centralized Patrol Teams assigned to Division and assign patrol routes to team members
- Provide logistical support to Patrol Teams including provision of all patrol maps, forms and data utilization
- Forward information from Patrol Reports to Divisional Analyzing Team
- Continuously evaluate need for additional Patrol support.

The emergency plan uses the term “Divisional.” The Division storm organizations do not have storm teams or Patrol Coordinators in place. The teams in the field are district teams managed by the District Patrol Coordinators.

On the Area Command storm organization charts, the Centralized Patrol Coordinator reports to the Logistics Chief through the General Unit Leader. The Division charts are not clear on the reporting chain. The division plan does not mention the position of Divisional Patrol Coordinator. On the District storm organization charts, the Patrol Coordinator reports to the Planning Section Chief.

When CL&P makes the decision to begin opening the Emergency Operations Center (EOC), the Emergency Operations Group initiates the centralized patrol function by a conference call to key personnel. Members of the Centralized Patrol Team may be from any department.

When CL&P decides to begin staffing the Divisional Incident Command Center, it also normally determines the initial need for Divisional Patrol Team support. It may subsequently determine the need for Divisional Patrol Team support at any time. CL&P draws Divisional Patrol Team members from technicians, meter and service personnel, cable splicers, electricians, and circuit owners.

For normal storms, the districts patrol backbone circuits with their district teams. CL&P generally uses central teams for side-tap patrolling in larger storms. At the District level, patrol personnel give assessment information to analyzers for preparation of work packets and work

planning. In addition to marking a circuit map with a red pencil, the Patrol Team completes Form 760 "Damage Assessment Patrol Report."

b. 2011 Storm Performance Findings

CL&P implemented the damage assessment procedure in the 2011 storms. Central Patrol dispatched about 176 patrollers,[120] or 88 two-person teams, in each storm. The districts also dispatched 118 two-person local district teams and five one-person teams. CL&P has 1,019 circuits on the system (3.44 circuits per two-person team deployed). Liberty concluded that the amount of CL&P patroller resources deployed was adequate. In addition, Central Patrol used patrol contractors for the first time in the snowstorm. Three to four contractor companies provided 107 teams (214 contractors).

Central Patrol Team Performance

The Central Patrol Coordinator managed the process with two reports that serve as co-workers and alternates. They conducted training to 316 individuals in 2010.[121] They also conducted additional training in 2011. The Patrol Coordinator and the Logistics Chief have joint responsibility for patroller training. The Logistics Chief forwards training needs to the Patrol Coordinator, who lines up the actual training. The Training Department conducts training using e-learning modules.

The Patrol Coordinator maintained a list of central patrollers available from all internal resources.[122] The Patrol Coordinator used patrollers from the other NU companies, contractors, and retirees on the teams. Team makeup consisted of an A and a B person. The A person was fully qualified, trained, and experienced. The B person had at least the basic safety training. The B person functioned as a driver and could also have been receiving some on-the-job training. CL&P seldom used one-person teams. A one-person team investigated trouble tickets rather than patrolled circuits. There was an overlap in the resources between different functions. For example, some of the Wires Down people or Town Liaisons also worked as damage assessment patrollers.

The Central Patrol had lists of individuals, not predetermined teams. The Patrol Coordinator paired up people and assigned them to teams and locations when they reported. CL&P realizes now that this is a weakness and slowed down the deployment speed. It is now considering maintaining a listing of predetermined teams matched with districts.

Other than providing and tracking the teams, Central Patrol was not involved in the damage assessment process during the storms. The districts manage the deployed teams. The districts that Liberty interviewed were pleased with the process of using central patrol teams and the quality of the team members. The District Patrol Coordinators were not involved with determining the number of central teams that were necessary, but they felt comfortable with the number of teams they received.

[120] Audit Request #OCC-15
[121] Audit Request #OCC-15
[122] There were 288 people on the list as of 2/14/12 per Audit Request Liberty-94

Utilities use damage assessment information in two manners, system-wide and locally. In the system-wide use, utilities total the data and estimate resource requirements. In the local use of damage assessment, utilities determine the damage for each individual outage and provide the ETR (estimated time of restoration) and work order packet for that outage. CL&P's Central Patrol is not involved in any processes that use the damage assessment information on a system-wide basis. Thus, CL&P loses an opportunity to use available initial damage assessment information to develop overall crew resource requirements.

District Patrol Team Performance

Each of the 14 districts used their local district patrollers as the first resource. District patrollers come from district employees such as service designers (technicians), projects personnel (engineers), substation maintenance personnel, underground line crew personnel, and meter services personnel.

Each district executed this process in a slightly different manner. Analyzers provided outage information to the District Patrol Coordinators. Some of the coordinators were more involved than others in this part of the process. Either the analyzers or the Patrol Coordinator prioritized the circuits. The Patrol Coordinator then assigned a team to each circuit or trouble spot. If there were more affected circuits than teams, they assigned the teams by substations.

CL&P conducted damage assessment on 16-hour daytime shifts. The teams collected data by highlighting information on paper maps. They called in priority concerns to the dispatchers. Some patrollers investigated 911 calls from the dispatchers. The patrollers also called in the underground locate information for broken poles so that work can proceed quicker. When the patrol was complete, the teams returned the marked up maps to the storm room analyzers for data entry. Most of the coordinators were involved in the data entry process. Several coordinators reported that the hardest part of the entire process was getting the data into the system and modeling EDS (Electronic Dispatch System) correctly. The teams did not use the patrol forms for reporting data. The damage assessment data entered in EDS is a verbal description of the repair items necessary for each trouble spot. The EDS system then generates a work order packet for repair of the trouble spot. Generally, the marked-up maps stayed in the storm room, not given to the crews.

The District Patrollers did not perform an analysis of resource requirements using the collected damage information. The coordinators interviewed were not aware of an analysis conducted elsewhere. Patrol Coordinators listed the quantity of broken poles and posted them on a storm board. This was the only totaled data reported.

The District Patrol Coordinator was responsible for all field team management. The plan did not define any field patrol-team group leader positions. The Centralized Patrol Coordinator pulled other District Patrol Coordinators from unaffected Districts and deployed them if more field management was needed. When the district was through with the central team, they released the team back to the EOC. If the district desired crew guides or bird dogs, the district requested this through the EOC. Many of the district patrollers were assigned to another process when the patrol work was complete.

Liberty found the following concerns and inconsistencies occurred during the 2011 storms:

- Some District Patrol Coordinators estimated the percent of lines patrolled on a regular basis while others did not.
- Some teams gave the marked-up maps to the crew foremen for use. Most maps remained in the storm room.
- The process inundates the storm room with paper. Managing the information was a challenge. CL&P's use of technology in the process was low. One coordinator had two patrollers who used laptops with air cards rather than paper maps. They could enter the data straight into the EDS system. The Coordinator felt this is the best way to go for the future.
- Several of the District Patrol Coordinators had additional storm duties.
- Either the patroller training requirements or the expectations are inconsistent. The District Patrol Coordinators interviewed were pleased with the quality of the patrollers sent to them, but other interviewees often mentioned patroller expertise as an issue.
- Process improvement and process ownership is weak or remote. The District Patrol Coordinators do not participate in peer team meetings or lessons learned processes as a group.

Restoration Status Performance

CL&P reported that it followed the ERP in monitoring restoration status during Irene and the October storm. The CL&P district analyzers interpreted the outage information from OMS. The district incident commander or planning section chief ensured that damage assessment information was received. The planning section chief managed the overall effort of collecting, analyzing, processing, and reporting restoration information. The planning section chief also had the responsibility to see that the restoration projections were accurate and timely. The operations section chief analyzed the damage and crew availability data, analyzed the estimated restoration times for the district, and assisted in the development of the Incident Action Plan (IAP).

During the two storms, the area planning section chief analyzed the data on damage, crew availability, and estimated restoration completion times. This position also estimated personnel requirements, requested additional resources, and developed the area command IAP.[123]

There were breakdowns in this process, as CL&P had problems in both storms with situational awareness. CL&P was late in discovering the extent of damage and help required during Irene. As a result, this significantly increased the requested number of outside crews five days after Irene's landfall. CL&P was late in getting all patrolling complete, finishing eight days after impact in Irene, and nine days after impact in the October snowstorm. This delay affected the accuracy of restoration projections, which was a significant issue in both storms. Another issue was the communication from the field to the command center as jobs were completed. The

[123] CL&P response to Liberty audit request #25, CL&P ERP, Section 2, 3.7.2, Section 4, 4.2.1, Section 4, 6.2.1, and Section 4, 6.3.1

process was labor-intensive; there were no mobile data terminals in the field vehicles, and information had to be entered manually. This also caused a delay in updating restoration status,

c. Conclusions

1. CL&P has in place the basic structure of a centralized damage assessment process.

CL&P's Damage Assessment Patrol procedure defines the roles of Centralized Patrol Coordinator and field Patrol Coordinator. It also establishes training requirements, team maintenance requirements, and basic patroller deliverables in the field. A centralized patrol or damage assessment function is an industry best practice. CL&P implemented the central patrol team concept in 2001.

2. CL&P did not use the damage assessment data on a system-wide basis to estimate resource requirements.

The basic circuit patrol responsibilities defined in the Damage Assessment Patrol procedure have a targeted focus on getting the work-order packet information entered and prepared. The storm plans do not contain information on procedures to total the data or the use of the overall damage assessment information for resource requirement determination. CL&P lost an opportunity to use available initial damage assessment information to develop overall crew resource requirements.

3. The patrolling processes at the district levels were inconsistent.

In general, the overall damage assessment process did not have strong process ownership management. The centralized functions were limited to providing trained teams. Other than training on an as-requested basis, Central Patrol was not involved in process management during or after the storms. There is a lack of peer involvement with the District Patrol Coordinators as a group to define and improve the process. There is a lack of any central lessons learned process for the patrol function. This resulted in inconsistencies such as:

- Processes were inconsistent across the districts
- The paper process overwhelmed some districts; data entry backlogs resulted
- Some of the districts Incident Commanders have a lack of respect for the process and potential
- Districts did not make consistent use of technologies.

4. CL&P has a good plan for updating restoration status, but did not perform well.

There were breakdowns in this process, as CL&P had problems in both storms with situational awareness. CL&P was late in getting all patrolling complete, finishing eight days after impact in Irene, and nine days after impact in the October snowstorm. This delay affected the accuracy of restoration projections, which was a significant issue in both storms. Another issue was the communication from the field to the command center as jobs were completed. The process was

labor-intensive; there were no mobile data terminals in the field vehicles, and information had to be entered manually. This also caused a delay in updating restoration status,

d. Recommendations

IX-CL&P-1 Develop a process to use damage assessment information in a statistical manner for overall crew resource-requirement projections.

CL&P did not collect and use the wealth of data available on the system level. It is an industry best practice to use statistical damage assessment data to predict accurately overall resource requirements and associated system restoration timelines.

The implementation of this recommendation may involve revising the reporting relationships. At the district level the patrolling function reports through the Planning Chief involved in restoration planning. At the division level, the organizational plan does not make the location of the patrol reporting relationship clear. At the area (CL&P) level, the patrolling function reports through the Logistics Chief rather than the Area Planning Chief. At this system level, CL&P views damage assessment as another resource to be provided to the field rather than as a critical process involved with overall system restoration planning.

IX-CL&P-2 Improve the damage assessment processes at the district level.

The processes at the district level are inconsistent. The districts reported numerous problems. A central process owner and a process management plan would improve district level consistency.

CL&P has initiated some changes in the processes.[124] These changes listed below have a different process owner for each one, which reflects the fragmented nature of the damage assessment process ownership at CL&P.

- Revise the patroller job description to require technical and or distribution system experience and modify the training program to include a certification to help ensure distribution system technical expertise, e.g., distribution circuit maps.
- Based on revised patroller job description, evaluate the number of resources available in the state and develop a strategy to meet operating requirements.
- Develop a proposal to implement the pilot program that enables corporate patrollers to use EDS in the field with the use of laptops and air cards.

IX-CL&P-3 Reinforce aggressively the need for accurate, timely damage and restoration updates from the field.

The CL&P plan is good, but the execution was not. Storm leaders should set targets for completion of damage assessment patrols. The section chiefs charged with the responsibility for the collection and analysis of status update data should exercise stronger leadership to ensure prompt and accurate information from the field.

[124] Audit Request AG-38

2. UI

a. Emergency Plan Directives

The 2006 UI EPP assigns the responsibility for restoration status updates to the Classification Center Supervisor and Classification Center Coordinator.[125]

UI's damage assessment guidelines are in Chapter 5 of their 2006 EPP. Liberty used these guidelines to evaluate the damage assessment performance in the 2011 storms. UI filed a revised damage assessment plan on December 1, 2011. The damage assessment guidelines in the revised plan are essentially the same.

The EPP contains several process diagrams that describe and clarify the damage assessment process. It also contains detailed job descriptions and training information for Circuit Patrol Supervisors, patrollers, clerks, and drivers.

Staffing resources and scope for performing damage assessment vary depending on the type of storm that UI predicts. The Incident Commander will notify the Personnel Coordinator of what resources to procure for the level and type of event expected.

Once UI enters outages in the Outage Management System (OMS), the system predicts the devices that would operate based on the customer call information or Supervisory Control and Data Acquisition (SCADA) system. UI assigns Damage Assessors circuits to patrol based on this information starting with the mainline. The Assessors report their findings to the Damage Assessor Supervisors who enter the details of the outages into OMS. The damage assessment information is prioritized prior to release to construction crews with municipal priorities first and then largest outages.

After UI identifies the mainline issues, the Damage Assessors investigate side tap outages on the affected circuits and report their findings. The Damage Assessors then begin their post-storm inspections on the least affected circuits, followed by the circuits that sustained the most significant damage. During these inspections, the Damage Assessors look for any potential hazards or threats to the electric system infrastructure that may cause a future outage. UI collects this information in post-event work packets that it hands to construction resources for permanent repair.

b. 2011 Storm Performance Findings

UI implemented the damage assessment process in both storms. In the Irene storm (the most extreme storm for UI in 2011), UI deployed 70 two-person patrol teams.[126] The team breakdowns were:

- 24 UI teams on the day shift
- 21 UI teams on the night shift

[125] UI EPP, Chapter 5, Part III, pages 83 – 86
[126] Audit Request AG-168

- 25 Osmose contractors on the day shift.

UI has 443 circuits (6.3 circuits per team deployed) and 263 of these circuits sustained damage. Liberty found that the amount of patroller resources UI deployed was adequate.[127]

The Damage Assessment Team Lead managed the overall damage assessment process. They had two Damage Assessment Coordinators that were direct reports. Damage assessment was a 24-hour operation using a day shift and a night shift. The Damage Assessment Coordinators directly managed the teams. They gave the teams their patrolling assignments (circuit maps) for the shift, and the teams gathered notes on maps and forms. UI then gave the notes along with the maps to other storm personnel called Classifiers who entered the data and printed packets for the work crews. UI entered all data manually. UI patrolled mainlines first, and then patrolled side taps. After completion of the formal patrolling, some of the assessors worked with outside crews. They led the crews to the work and made sure of a clean sweep of all outages on the circuits they worked. After the storm, the assessors performed a post-assessment sweep of each circuit to locate items needing repair that did not cause any outages.

UI used two-person teams with drivers from Meter Services and assessors who were field technicians, customer engineers, or other experienced employees. UI did not use retirees. There were both internal UI teams and contractor (Osmose) teams in place. An Osmose foreman directed the contractor teams and reported to the UI Damage Assessment Coordinators. The Osmose teams were familiar with the system. UI teams patrolled both day and night shifts. Osmose teams did not patrol at night due to a lack of proper lights and equipment.

UI used the Automatic Metering System (AMR) to check on individual customers. The AMR meters did not have active power-off or power-on call-in capability. Rather, UI pinged each meter to determine the power status.

During the 2011 storms, the Damage Assessors completed the backbone circuit patrols within two days.[128] UI did not total the damage found (poles, crossarms, etc.) for use in estimating system-wide resource requirements.

With regard to restoration status performance, UI said it followed an "interim plan." It is not clear if there were any changes to the restoration status task at the time of these two storms. UI did report that job completion information from the field came back "in batches" as opposed to real-time reports from the field. The UI process for receiving this information and updating the outage management system was labor-intensive and cumbersome. Delays resulted in updating restoration status.[129]

[127] While this number is double the CL&P per circuit numbers, the miles per circuit average less than half of the CL&P circuit miles.
[128] Ibid
[129] UI response to Liberty audit request #13

c. Conclusions

1. UI had in place a centralized, structured damage assessment process.

UI's plan contained good documentation with several process charts, detailed position descriptions, and checklists. A Damage Assessment Team Lead managed the overall damage assessment process.

2. UI did not use the damage assessment data on a system-wide basis to estimate resource requirements.

The current process does not collect or use this data. For the 2011 storms, there was not any process in place for totaling up of the damage found (poles, crossarms, etc.) for use in estimating resource needs. It is an industry best practice to use statistical damage assessment data to predict accurately overall resource requirements and associated system restoration timelines.

3. UI did not have a clear plan in place for restoration status updates, and performance in this area was not adequate.

UI followed an "interim plan" during these two storms. Job completion information from the field came back "in batches," and the UI process for receiving this information and updating the outage management system was labor-intensive and cumbersome. Delays resulted in updating restoration status.

d. Recommendations

IX-UI-1 Develop a process to use damage assessment information in a statistical manner for overall crew resource-requirement projections.

A new function listed in UI's revised 2011 plan is the Planning Analyst function. The Planning Analyst assists with storm restoration planning by using the damage assessment data and producing a resource requirements plan. This new function should improve data analysis in the damage assessment process.

IX-UI-2 Verify that the 2011 EPP adequately covers restoration status updates, and address the issues identified during the two storms.

UI should provide field crews with mobile data terminals and improve the process to increase the frequency of field feedback.

X. Communications and Outage Information

Storms present unique challenges for utility customer service. Many customers can simultaneously lose power, causing a flood of calls to the utility. The bigger the storm in terms of customers affected, the higher the number of customers trying to contact the company.

Solutions have evolved over the years, with the development of various technologies and service providers, to help utilities better respond to a sudden, extreme, and often extended peak in call volume associated with a storm or outage. Most utilities have embraced the use of Interactive Voice Response (IVR) technology to offer self-service outage reporting and status updates via telephone. However, the number of calls can exceed in-house capacity quickly during a large outage. After-hours outages can be especially challenging as more customers are at home and fewer agents are on-hand to answer calls. Generally, it is cost prohibitive to configure an in-house IVR system large enough to handle the largest spike in call volume. Attempting to staff a call center, or to outsource to a center large enough to handle these calls, also is cost prohibitive. A more economical approach is to outsource or offload overflow to a third party IVR when call volumes threaten to exceed capacity—effectively renting capacity as needed. Most large electric utilities in the United States have adopted this approach, contracting with a high volume outage handling IVR service to handle overflow.

To be adequately prepared for the high volume of calls into a call center during a large outage, utilities should also have adequate supply of experienced agents on hand to respond. To assist with the need to ramp up staffing beyond normal staffing levels, customer service organizations should have a call-center resource plan that it activates during major storms or large outage events. Integrated with this plan should be a staffing model that will provide guidelines for adding resources, based on the predicted severity of the event, projected call volumes, the timing, and expected duration. In certain situations, when weather makes travel difficult, a pre-storm staging strategy for call center agents becomes prudent. Typically the pre-storm planning processes request customer service representatives (CSRs) and other contact center personnel to come to the centers prepared to spend several days away from home, if necessary, and arrange for cots or rooms in a nearby hotel, along with meals and other logistics.

In addition to responding to customer inquiries and outage notification calls, utilities must be prepared to communicate storm restoration status to the general public as well as local and state officials and community leaders. One of the most vital functions of a utility's corporate communications department during a major storm is to make sure that all employees present the same information about storm restoration to their contacts outside the company. In addition, it must effectively disseminate storm restoration status information to stakeholders—state and local government officials, large industrial customers, the media, employees, and customers. The goal is to deliver the same message to the press, mayors, legislators, city officials, and the next customer calling into the call center.

To manage and disseminate information effectively, corporate communications must work closely with the Emergency Operations Center (EOC) to gather information on storm restoration progress, the number of customers out of power, and projected restoration times. Ultimately, the outage management system is the repository and source for this information. It effectively links

the field with other areas of the company to manage the restoration effort and communicate progress.

An effective strategy is to time storm restoration progress-reports for release around the local news media cycles, early morning, noon, 5 p.m., and 10 p.m., so the media can feature the reports on local radio and television newscasts. Equally important is the need to coordinate with operations prior to each release so the numbers are fresh and accurate. Concurrently, call center representatives and other key employees working with community and public officials, key accounts, and state emergency agencies can receive this same message. More recently, social media has provided additional communications channels for companies and customers. Utility corporate communications must now be prepared to effectively leverage these new channels during storms and large outages.

Community Relations is another key utility function during a major storm, specifically charged with keeping state and local officials informed. This role usually falls to community relations officials, quite often filled by district or division management. No one knows their communities better than the people who work in them day-in and day-out.

Before a storm even starts, community relations personnel begin contacting elected officials, community leaders, and key customers to start the flow of communication. During the storm, the community relations can assist local emergency and other governmental agencies by providing critical infrastructure information, offering restoration progress updates, and redirecting resources to address emergency issues and community priorities.

On an ongoing basis, it is important to play an educational role in communities regarding storm restoration. An excellent way to involve the community and open the lines of communication between local officials and the company is to host community workshops promoting storm response awareness. These forums also provide an opportunity for the utility to gather feedback and learn expectations. To be effective at community relations, utilities need to emphasize training for community relations representatives and other employees actively interfacing with the community and public. Training should familiarize employees with sources of outage information and with how best to interact with the public, governmental officials, and community leaders.

This section of the report provides a description and evaluation of CL&P's and UI's event communications and performance of its call centers. Liberty's focus was on the performance of these systems and processes during the 2011 storms. However, Liberty also examined the modifications or enhancements made since the storms. Liberty's objectives were to:

- Examine whether CL&P and UI demonstrated the ability to communicate effectively with customers and other stakeholders. This includes examining call center staffing and determining whether the performance of these centers was effective and efficient.
- Determine whether customers could reach the utility during the storms to report outages.
- Determine whether CL&P and UI kept key stakeholders informed during the storms.

- Determine whether CL&P and UI communicated effectively with the public with regard to matters that may have contributed to the length of restoration times or that dealt with public safety.
- Determine how CL&P and UI employed industry best practices.
- Identify any areas that might be suitable for adoption of industry best practices.

Liberty explored each of these objectives with representatives from both utilities. The results of this assessment are presented on the following pages. Each utility is discussed separately in sections that present background, findings, conclusions, and recommendations.

A. CL&P

1. Customer Contact Center Operations

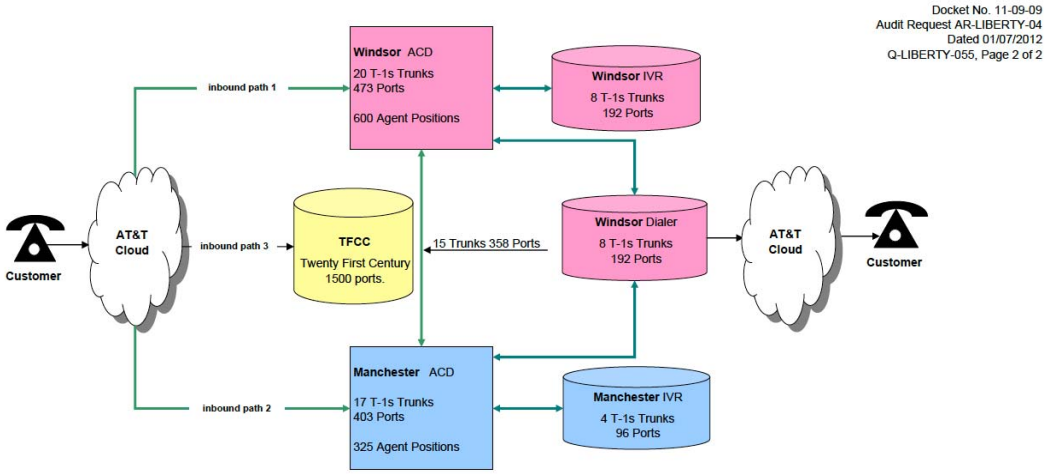
CL&P's contact center operations report to the vice president of Customer Experience and Chief Customer Officer, who reports directly to the president and chief executive officer of CL&P. Northeast Utilities (NU) created the Customer Experience organization in 2008 when it moved customer service functions from the operating companies to the NU Service Company. NU intended this change to increase the focus of the organization on better serving the needs of customers and various other stakeholders. NU's Customer Experience organization strives to deliver a consistently compelling customer experience to customers located across three states, operating under three different regulatory environments.

In late 2008, NU completed a project that resulted in the consolidation of six customer contact centers to two centers located in Windsor, Connecticut, and Manchester, New Hampshire, both supported by a new customer information system (C2). Operated in a virtual mode during major storms, this configuration enables the company to support customer outage reporting and inquiries from any of its territories through either or both centers.[130]

Customers calling CL&P are routed to the Windsor Customer Experience (CE) Center. When call volume exceeds Windsor CE Center capacity, calls are automatically routed to the Manchester CE Center.

The Windsor CE Center operates off an Aspect Spectrum Automatic Call Distributor (ACD). As depicted in the following chart, the Windsor CE Center is supported by 20 dedicated inbound T-1 private line services[131] (473 ports) and 8 dedicated T-1 private line services feeding an Aspect IVR (192 ports). A similar but slightly smaller configuration is in place for the Manchester CE Center. Outbound calls are initiated from an Aspect outbound calling system located in the Windsor Data Center using eight separate outbound T-1 private lines services.[132]

[130] Response to Witt-043.
[131] T-1 is a communications scheme of certain capacity and speed.
[132] Response to Liberty 055 Attachment A.



NU contracts with Twenty First Century Communications (TFCC) to accept incoming calls in the event NU's internal phone infrastructure becomes overloaded. NU can manually overflow calls to TFCC's IVRs during high volume periods. TFCC provides scripting and messaging similar to NU's to help customers, whose phone number the system can identify and match, report a power outage and receive estimated restoration times (ERT). Any callers that cannot be identified by TFCC are provided an option to leave a message. TFCC routes these "exception" messages back to NU for resolution, including emergency calls.[133] NU activated TFCC services for both storm Irene and the October snowstorm.

CL&P can monitor its 800-network traffic to verify that calls are terminating successfully in its CE Centers using AT&T's Business Direct services.

CE staffs its contact centers to handle calls from 7:00 am to 7:00 pm Monday through Friday and from 7:00 am to 4:00 pm on Saturday. During these business hours, call center representatives handle customer calls relating to service, billing and collections, and calls to report power interruptions. Upon calling CL&P's toll-free number customers enter the Automatic Call Distributor (ACD) and hear a company greeting and outage messaging (if activated). Calls then proceed to the IVR for call classification and self-service. Callers can request to speak with an agent and the system transfers them to an agent queue. Emergency calls (reporting gas odor or downed wires) received at any time of the day are immediately queued to an agent group. Otherwise, all other call types will request authentication to provide self-service options or additional account information. At any point in the call flow, in the IVR or the ACD, customers can abandon their call.

CL&P also maintains a toll-free emergency number and 19 local emergency phone numbers that are distributed to fire, police, and emergency personnel across Connecticut. These calls are moved to the top of the call queue for priority handling in the contact centers. In addition, there

[133] Response to Liberty-100.

is another dedicated line for emergency 911 calls for use by qualified emergency response dispatchers. This line rings directly in the Systems Operations Center (SOC).[134]

Management forecasts staffing levels to fit projected workload derived from historical call volumes, known events, and seasonal variations. On a day-to-day basis, the Windsor CE Center establishes service level goals to answer 80 percent of all calls within 30 seconds, with an average speed of answer of 60 seconds of less.

CL&P's service level goals are consistent with other utilities. Based on these service levels, management determines the number of employees required to handle projected call volumes. This is a common call center staffing approach used by other utilities and other industries. On the basis of seat capacity, average call handle time, service level goals, and agent availability, NU can handle approximately 2,000 to 3,000 calls per hour at maximum staffing (during normal business hours) and up to 15,000 per hour using IVR self-service.[135] NU has adequately sized the total contact center capacity to handle day-to-day call volumes.

Storm Irene Response

CE has formal Emergency Operations Procedures (Storm Plan) for both contact center locations.[136] It formalized these plans for both centers in 2011 and tested with smaller storms prior to storm Irene. CE's Storm Plan includes pre-storm planning checklists as well as detailed descriptions of roles and responsibilities to guide personnel during large power outages or other emergencies. The plan also designates a Customer Experience Emergency organization and details levels of supervision, lines of authority, and channels of communication.

Typically, CE's Emergency Operating Plans are activated when the Emergency Operations Center (EOC) is activated for one of the Operating Companies. CE can also activate emergency plans sooner if call volume and other factors dictate the need for additional phone center support above and beyond normal staffing.

Guided by the Storm Plan's pre-storm checklist, CE's Storm Team undertook numerous measures in preparation during the week leading up to projected landfall:[137]

- Daily pre-storm conference calls within CE
- Formal monitoring of the weather
- All telephony systems and overflow options were tested
- CE Emergency Operations Plan was activated to assign alternate storm duties and establish the Escalated Response Team
- Two days prior to the storm, CL&P initiated 1.1 million automated outbound calls to inform customers of storm preparations, provide important safety reminders, and offer guidance for customers with medical conditions.
- Prepare to close for regular business on Monday, August 29, 2011
- Participated in daily CL&P Operations Preparations & Communication conference calls

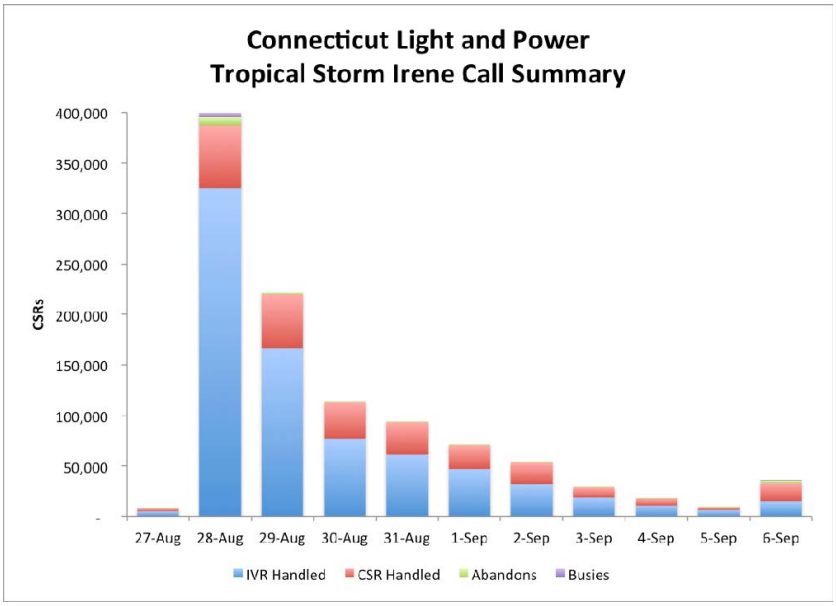
[134] Response to Liberty-035.
[135] Liberty Interview #49.
[136] Response to Witt-046
[137] Response to CSU-001.

- Drafted outbound messaging in anticipation of major event
- Removed global restoration message from IVR
- Notified employees of 12-hour storm staffing schedules ahead of the storm.

CL&P, Yankee Gas, and WMECO were closed for normal business starting on Sunday, August 28, 2011, as NU focused on storm damage assessment and restoration efforts. This included closing the walk-in centers in Berlin and Hartford, suspending service disconnects, and instructing CSRs to only handle emergency calls. Normal business operations were suspended through noon on Thursday, September 1. CL&P returned to full operations on Tuesday, September 6.

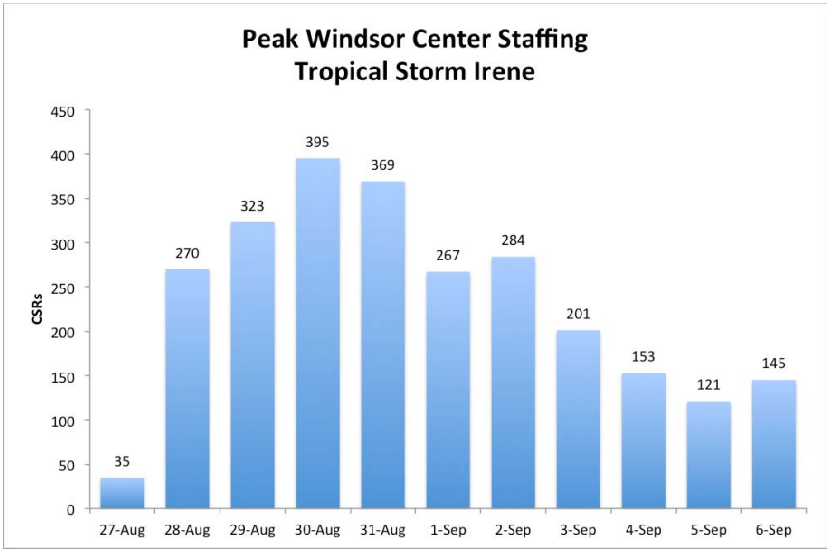
Unlike other weather events, storm Irene affected each of NU's service territories. Resources were required to support outage calls from all three states. During a storm, NUSCO's two CE Contact Centers act as a single, virtual center, with calls answered by the next available representative. Staffing was also supplemented in the Windsor center through additional resources from the billing and collections departments.

CL&P scheduled CE employees to work extended 12-hour shifts, beginning on Sunday, August 28, 2011, to provide 24-hour coverage during the storm. In the first 24 hours of the storm, the contact centers handled approximately 476,000 calls. Outages peaked on August 28, 2011, at 9:00 pm with 671,000 customers without service. NU handled more than 1 million calls throughout the duration of the storm, more than 70 percent of which were self-served.[138]



[138] Response to AG-03 and CSU-002.

The following chart details the peak staffing for each day of storm Irene. CE was able to secure considerable staffing to handle incoming calls. CL&P's staffing levels peaked on the 4th day of the storm, a Tuesday.[139]



Throughout the storm, CE continued to monitor weather on an hourly basis. CE conducted twice-daily conference calls to review staffing, crew welfare, technology, restoration priorities, and deliver status from other CE Emergency Operations teams. Upfront messaging for inbound customer calls was also reviewed and updated twice a day. Training tips and reminders on various relevant topics were distributed as refreshers to all CE employees throughout the storm.

Early in the storm, CE manually cutover to Twenty First Century Communications high-volume overflow IVRs. CE created the Exceptions Group to address any calls that could not be handled automatically by Twenty First Century Communications' IVR (TFCC), CL&P's high-volume overflow vendor. During a large storm, such as Irene, call volumes can quickly exceed CL&P capacity. At this point, outage calls will be forwarded to TFCC for automated handling. If TFCC can find the incoming phone number in its database, an outage ticket is automatically created and forwarded to CL&P's outage management system. If TFCC cannot match the phone number it is recorded on an exceptions log that is forwarded every 30 minutes to CL&P for manual processing. Each exception represents a reported outage in which TFCC was unable to associate an account with the phone number. As a result, CL&P must contact the phone number associated with each exception to identify the correct CL&P account and then manually enter an outage in the outage management system. This can be a lengthy process.

CE staffed the Exceptions group with 14 individuals from the C2 Systems Support group. During Irene, CL&P received 14,830 exceptions from TFCC, of which 1,270 were identified as an emergency such as wires down or tree on wire. At times, CE assigned as many as 30 people in

[139]Response to CSU-002.

12-hour shifts to work the exceptions queue until it completed all exceptions, representing a significant manual effort. It worked all exceptions within 2.5 days.[140]

However, had CL&P designed a different call flow for TFCC, exceptions could have been routed in real-time back to live agents for immediate handling, thereby eliminating the exceptions backlog and subsequent extensive manual effort to record outages. Of real concern though are the 1,270 emergency calls that could not be matched in real-time. Even though it gave these calls top priority for follow-up by the exceptions team, they did not handle these calls in real time. During a storm, emergency calls should be routed back immediately to CL&P's contact center for prompt handling.

CE also established director-level presence in the Emergency Operations Center (EOC). CE's Director of Customer Experience Support was assigned to represent CE in the EOC. This position participated in conference calls, worked with Corporate Communications team members on customer messaging and outbound campaigns, and helped communicate restoration status information back to CE Communications Leads to package for contact center representatives (talking points).

CE also conducted several special outreach efforts during the storm including:[141]

- Medical hardship customers without power were contacted and provided a referral to Red Cross for assistance (pre-recorded calling campaign)
- Nursing homes were contacted regarding restoration efforts (live calling campaign)
- Outreach to towns in eastern Connecticut to confirm power restoration (pre-recorded calling campaign)
- Sent close to 500,000 outage updates via text messaging to CL&P customer mobile phones.

A group of employees, primarily in-house attorneys, staffed the Escalated Response Team to deal with difficult calls, complaints, issues needing special attention, and customers asking to speak with supervisors or company executives. This process worked very well during storm Irene and continued in the October snowstorm.

In retrospect, CE's contact centers performed well throughout the storm and very few contact center issues were encountered:

- This was the first time CE used TFCC's overflow services. As a result, CE had no clear-cut rules or thresholds for when to start and stop TFCC overflow services, aside from all trunks busy. As a result, some customers experienced busy signals during a brief period of time at the onset of the storm. Customers had approximately 4,500 calls blocked on August 28, from 7:00 am to noon.[142] In hindsight, CE could have cutover to TFCC sooner and further minimized busy signals.

[140] Response to Liberty-100.
[141] Response to CSU-001.
[142] Response to CSU-002.

- A couple of days into the storm CE realized that the upfront messaging on TFCC's IVR was not the same as that of the internal IVR. As a result, CE was not seeing the benefit of that message (callers hanging up after they have heard the message). CE addressed this issue following the storm and made sure that messaging was consistent during future storms, including the October snowstorm.

October Snowstorm Response

Beginning as early as Friday, CE began to supplement staffing for the weekend. It added ten CSRs to the Saturday schedule (afternoon) and placed 15 more on paid standby (in each center).

Other pre-storm preparations included:[143]

- Daily pre-storm conference calls within CE leadership
- Formal monitoring of the weather
- All telephony systems and overflow options were tested
- IT was notified to prepare to overflow calls to Twenty First Century Communications
- Prepared to close for regular business on Monday, October 31, 2011
- Participated in CL&P Operations Preparations & Communication conference calls
- Drafted outbound messaging in anticipation of major event
- Removed global restoration message from IVR

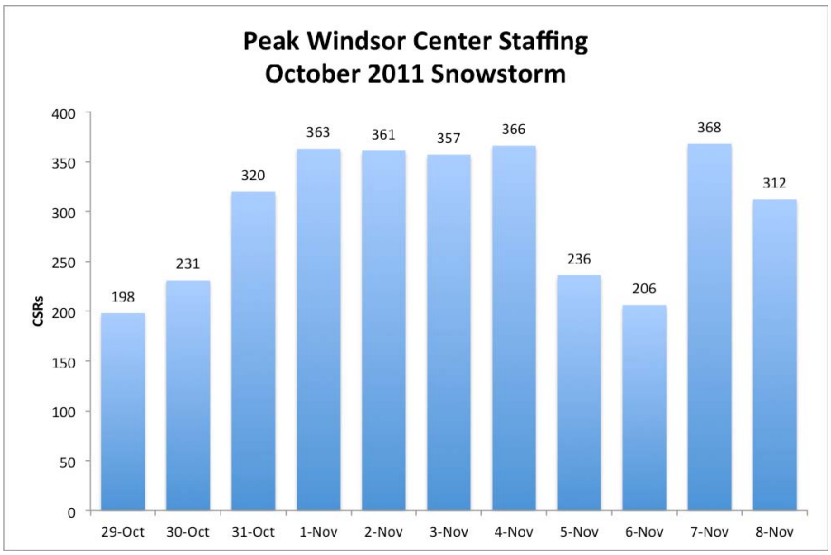
CE held a Storm Call at 1:00 pm on Saturday to evaluate storm conditions and predictions. At this time, it activated the CE Storm Plan. CE also extended the schedules for CSRs already on-site, added 10 more CSRs at each center, and called in the 15 on standby. From Saturday on, CE scheduled its employees to work extended 12-hour shifts to provide 24-hour coverage during the storm.

Unlike storm Irene, CE did not decide to preposition employees in the CE Centers. It made the decision to call in "all hands" on Saturday afternoon, after it activated the Storm Plan, as the number of outages climbed and conditions worsened. Unfortunately, worsening conditions also made it challenging for employees to get to the contact center. As a result, the Windsor CE Center's staffing levels were at their lowest during the highest volume of calls.

Pre-positioning employees in the contact centers ensures that employees are not trying to get to work during or after the storm. Rather, employees are in the centers ready to respond when customers begin to lose power.

Ramping up to full staffing proved to be a lengthy and somewhat onerous process. CE first initiated an Everbridge automated notification asking all CE employees to report for storm duty, followed up by blast pages. To reach everyone, the CE Storm Staffing Team ended up having to call 200 to 250 employees that had not responded to the notification, further delaying the ramp up to full staff. The Windsor Center did not reach near-peak staffing until the fourth day of the storm. Center staffing levels actually peaked on the tenth day of the storm.[144]

[143] Response to CSU-001.
[144] Response to CSU-109.



The CE Storm Team booked a half a dozen hotel rooms ahead of the storm, for employees who did not feel comfortable driving in storm conditions. However, the hotel lost power in the storm so employees were unable to use the rooms. Cots were provided in the Center as well.

CE focused more on employee welfare during this storm, recognizing what they were asking of employees. It made provisions for three meals a day to all Windsor employees, as well as snacks and refreshments. CE also distributed Meals-Ready-to-Eat to employees to take home with them, because many employees had no power at home. It conducted stretching sessions frequently during the storm, led by CL&P's Well-Aware coordinator. On November 3, CE brought in therapists to help employees deal with the stress caused by the storm. Therapists remained on site through November 8. CE also hired two massage therapists to provide 10-minute massages to employees on November 3 and 4.

Expecting a high volume of callers over the weekend, CL&P reprogrammed its IVRs to the "after-hours" mode, informing callers that CL&P was handling emergency calls only. This remained in effect until Monday, November 7. It also placed the following upfront message on the IVR to alert callers to the storm:

> *As of 4 p.m. on Sunday, the early nor'easter has caused unprecedented damage throughout [Connecticut/Western Massachusetts/New Hampshire]. As we work to restore the majority of customers within seven days, there may be customers in hardest hit areas where outages could last longer. We are continuing damage assessments and are working with town leaders on emergency response activities. As on location assessments are completed, we will use that information as the basis for restoration projections. We are working around the clock and will have additional support from other utilities. To report an immediate emergency such as burning wires or any other situation requiring a 911 response, or to report a*

> *power outage, please stay on the line. Please, always stay away from all downed wires and electrical equipment. For shelter information please dial Infoline at 211. Thank you for your patience."*[145]

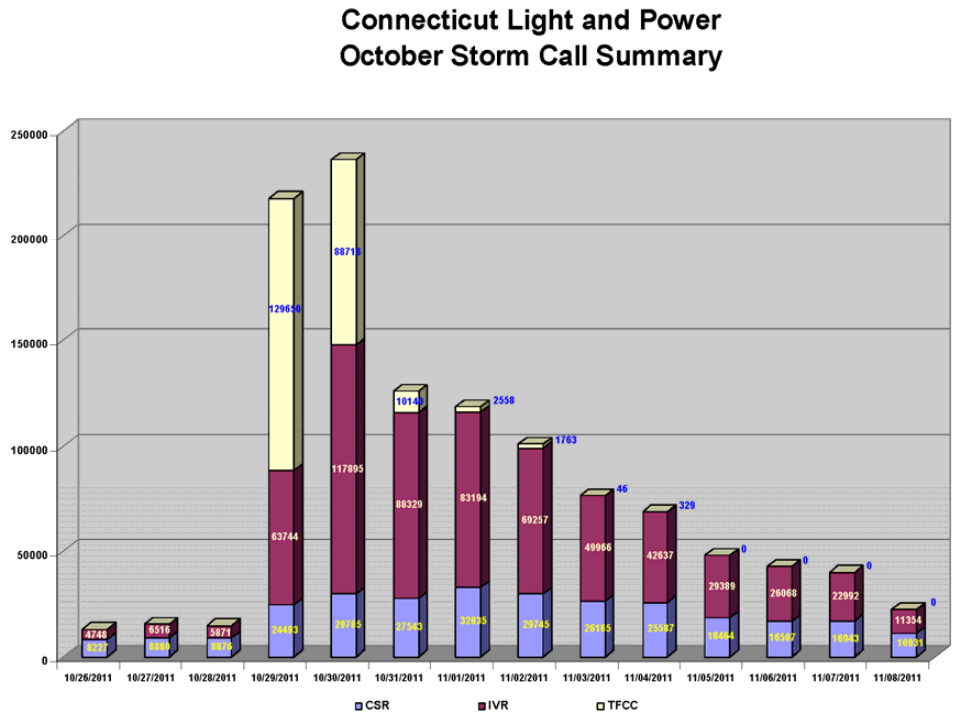
As with storm Irene, CL&P, Yankee Gas, and WMECO closed for normal business as NU focused on storm damage assessment and restoration efforts. This included closing the walk-in centers in Berlin and Hartford, suspending service disconnects, and instructing CSRs to handle only emergency calls. The Contact centers suspended normal business operations through 1:00 pm on Monday, November 7, 2011, and returned to full operations on Thursday, November 10. The Berlin Business Office reopened on November 7, while the Hartford Business Office did not re-open until November 14.

On Monday, October 31, CL&P initiated a pre-recorded outbound dialing campaign to notify customers of damage assessment activities and to set expectations for an extended outage:

> *Hello. This is an important message from Connecticut Light and Power. With the widespread impact of the weekend nor'easter, we are working tirelessly to ensure power outages are restored as safely and as quickly as possible. Damage assessments are ongoing and we are working closely with town leaders on emergency response activities. As on-site damage assessments are completed, the information will be used as the basis for restoration projections. We are working to restore the majority of customers within seven days, however, it may take longer for restorations in the hardest hit areas. We have more than 350 line and tree crews working, we anticipate over 600 additional crews joining us from other utilities, and we continue to request crews. If you see a downed power line, please always assume it's live, don't go near it, and never drive over a power line. We understand how difficult it is to be without electricity and we are working around-the-clock to restore your power. Please call us at 1-800-286-2000 to report an emergency situation. Thank you.*[146]

On Saturday and Sunday, CL&P received 469,908 calls, nearly half of which were handled by Twenty First Century Communications, CE's high-volume overflow IVR.[147] Calls averaged about 10,000 calls per hour for that 24-hour period, about five times more than handled on a day-to-day basis. By the end of the storm, the Windsor CE Center handled more than 1.1 million calls. The following chart details calls handled by day for the storm.[148]

[145] Response to AG-111-BULK, page 4.
[146] Response to AG-111-BULK, page 4.
[147] Response to CSU-019.
[148] Response to Witt-043.



CL&P customers may have encountered busy signals during a brief period on the first day of the storm, Saturday, October 28, 2011, from 3:00 pm to 5:00 pm, at which point call volume jumped from 4,000 calls per hour to 30,000 calls per hour. Approximately 9,600 busy signals were recorded in two hours.[149] While NU does contract with TFCC to provide high-volume overflow services, CE personnel must manually switch call routing to invoke the service. The individual charged with this responsibility during the October Snowstorm had difficulty getting to the Windsor Contact Center to change the call routing. Once on site, it successfully cutover call routing to TFCC.

Throughout the storm, CE continued to monitor weather on an hourly basis. CE conducted twice-daily conference calls to review staffing, crew welfare, technology, restoration priorities, and deliver status from other CE Emergency Operations teams. CE reviewed and updated upfront messaging for inbound customer calls twice a day. As appropriate, CE distributed training tips and reminders to its employees on relevant topics during the storm.

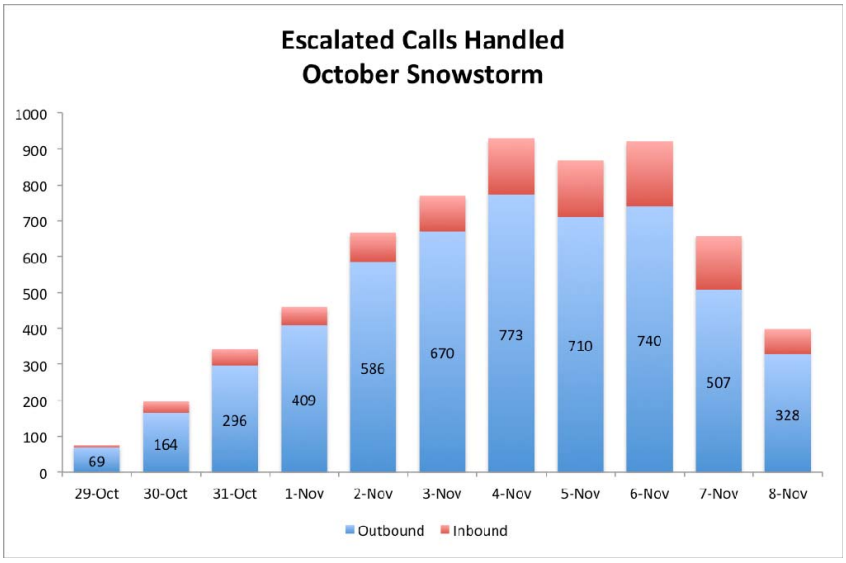
CE again established director-level presence in the Emergency Operations Center (EOC). CE's Director of Customer Experience Support represented CE in the EOC. This position participated in conference calls, worked with Corporate Communications team members on customer messaging and outbound campaigns, and helped communicate restoration status information back to CE Communications Leads to package for contact center representatives (talking points).

[149] Response to CSU-019, page 3 of 14

It also conducted several special outreach efforts during the storm including:[150]

- Medical hardship customers without power were contacted and provided a referral to Red Cross for assistance (pre-recorded calling campaign)
- Nursing homes were contacted regarding restoration efforts (live calling campaign)
- Outreach to towns in eastern Connecticut to confirm power restoration (pre-recorded calling campaign)
- Sent nearly 500,000 outage updates via text messaging to CL&P customers' mobile phones.

During the October storm, CL&P received many more exception calls from TFCC that had to be addressed manually—52,370 exceptions, of which it identified 8,610 as an emergency, such as wires down or tree on wire. CE staffed the Exceptions group with 14 individuals from the C2 Systems Support group but also brought in other resources, due to the high volumes. At times, it assigned as many as 30 people in 12-hour shifts to work the exceptions queue until it completed all exceptions, representing a significant manual effort. It worked all exceptions within four to five days.[151]



The Escalated Response Team also handled more than 6,300 escalated calls from customers during the storm as customers became frustrated with the slow restoration times and missed commitments. By the sixth or seventh day of the storm, escalated calls represented 1 to 2 percent of daily call volume.

CE used in-house attorneys and other employees skilled in dealing with difficult situations to handle supervisor and executive requests. The Escalated Response Team worked 12-hour shifts,

[150] Response to CSU-001.
[151] Response to Liberty-100.

staffing as many as 30 employees during the peak of the storm. The team handled escalated calls live and through callbacks, usually within an hour.

CE's Director in the Storm Room was also key in getting information from the field to the Escalation Team, especially town-level information, such as the daily plan. This information was key in handling these calls.

In summary, CE's Windsor Contact Center experienced few issues during the October Snowstorm:

- CE was not able to staff the center as quickly as necessary at the beginning of the storm due to quickly changing conditions and a delayed decision of when to issue the "all hands on deck."
- A few thousand customer calls were blocked due to the delay in manually cutting over to TFCC, but only during a very brief period.
- TFCC could not handle many outage calls automatically, resulting in more than 50,000 exceptions that CE worked manually, many of which (8,600) were emergency calls. Significant manpower was required to resolve exceptions over the course of five days.

While CE's contact centers performed extremely well in both storms, CL&P does have several opportunities to improve its telecommunications to handle better customer calls in future large outage events. Liberty discusses these opportunities in the recommendations section at the end of this section.

2. Corporate Communications

To set expectations ahead of storm Irene, CL&P Corporate Communications proactively reached out to the media with customer-focused communications, such as news releases, public service announcements, and social media posts. At the same time, the Customer Experience organization initiated more than 1 million automated pre-recorded calls to inform customers about pre-storm preparations, safety, and medical guidance.

To expand its social media presence, CL&P launched a Facebook page the Friday before the storm made landfall in Connecticut. Adding a Facebook page was a logical extension; CL&P had been using Twitter and YouTube since the year prior for a variety of topics. Facebook proved quite popular, people visited CL&P's page more than 40,000 times and it attracted more than 8,000 "likes" before the end of the storm. Facebook became a place for customers to vent, however, it afforded CL&P opportunities to participate in the conversation and respond individually offline when necessary.

More than 200 status updates were "tweeted" during the storm and NU Twitter followers grew substantially, from 2,000 to more than 6,300. CL&P added 11 widely viewed YouTube videos.

In total, CL&P's Corporate Communications issued 13 news releases prior to and during storm Irene. The following table summarizes the information released by Corporate Communications regarding the number of customers without power:[152]

Date	Title
August 25	As Hurricane Irene Strengthens, CL&P is Getting Ready — Are You?
August 26	You Just Bought a Home Generator. Now What?
August 27	CL&P Opens Emergency Operations Center
August 28	CL&P Scheduling Crews for Around the Clock Restoration
August 28	CL&P Deploys All Available Crews to Begin the Restoration Effort
August 29	CL&P Restores Power to Over 288,000 Customers in 24 Hours
August 30	CL&P Continues to Make Significant Progress in Restoring Power
September 2	CL&P Alert to Homeowners
September 3	CL&P Announces Customer Relief Efforts and $1 mil Storm Recovery Donation
September 4	Restoration Continues Through Holiday Weekend
September 4	99 Percent of CL&P Customers Have Power
September 5	CL&P Expects to Complete Restoration by Tuesday
September 6	Nearly All CL&P Customers Affected by Irene Have Power

CL&P's Corporate Communications issued a post-storm news release on September 11, 2011, "CL&P Senior Executive to Lead Post-Storm Municipal Interface Initiative."

CL&P has well-established relations with the media and often welcomes media crews into the Emergency Operations Center (EOC) during storms to film segments. This practice continued through both storms. During storm Irene, CL&P introduced Skype (Internet Video-conferencing) to enable NBC affiliates to conduct EOC-based interviews remotely. This gave the media a chance to "humanize" the story without having to send a reporter. It expanded this practice during the snowstorm. CL&P also actively encouraged media participation in twice-daily press conferences, on-location coverage, and one-on-one's with executives.

To gather material for media and public dissemination, Corporate Communications embedded a communications lead in the EOC. CL&P has established a communications room located just outside the EOC with a view of the EOC. This room is equipped with flat-screen TVs to let the communications liaison monitor news reports, weather, and keep an eye on the EOC.

Communications coordinator also participated in the EOC conference calls. Communications conference calls were scheduled following the EOC calls to relay information to the Communications team leads and others. Communications also worked closely with the Customer Experience Director embedded in the EOC to craft upfront IVR messaging and outbound calling campaigns. Additionally, Corporation Communications personnel were also instrumental in packaging EOC information updates into "talking points" for the Contact Center employees.

[152] c-lp.com website.

Both Corporate Communications and CE Communications Coordinator also worked closely with the Town Liaison Coordinator to tap into town-level storm status, conditions, and needs. During a storm, each Town Liaison is charged to work closely with town emergency officials and local operations to create daily town plans and priorities. This information would then be incorporated into CSR talking points and other internal communications.

The CL&P Emergency Response Plan includes a chapter dedicated to Communications. More detailed emergency communications procedures are documented in the Emergency Response Plan's Index of Operating Procedures (M3-EP-1001).[153] In addition, Corporate Communications maintains an EOC Media Book and other storm procedures and checklists for major storm communications activities.[154]

As defined in the ERP, Corporate Communications assigns a Communications Manager to the EOC to develop strategies for communication and media relations activities. The Media Liaison reports to the Communications Manager and is responsible for coordinating the activities of Corporate Communications personnel engaged in media contacts and media relations, social networking and employee communications.

While CL&P issued press releases on a daily basis, the releases did not communicate restoration estimates until five days into the storm (September 4), at a point when 98 percent of customers had already been restored. This placed pressure on other communications channels, such as the contact center, website, and social media to provide more detailed estimates. The following table summarizes the message presented in each release, as well as the projected restoration times.

	Message in News Release	**Anticipated Restoration Date**
August 25	Preparedness	Pre-storm
August 26	Safety	Pre-storm
August 27	Crews on standby	Pre-storm
August 28	650,000 out, storm in-progress	No estimate
August 28	622,000 out, crews deployed	No estimate
August 29	515,300 out	No estimate
August 30	354,000 out	No estimate
September 2	Alert: Customer-owned equipment damage	No estimate
September 3	Storm fund donation	No estimate
September 4	98% Have power; 27,000 out	99% by midnight Mon
September 4	99% Have power; 11,600 out	100% by midnight Wed
September 5	2,300 out	100% by Tuesday
September 6	100 out	No estimate

After storm Irene, Corporate Communications updated storm communications materials, including media contacts.

[153] Response to Liberty-064.
[154] Response to Witt-021.

CL&P Corporate Communications did not have as much time to prepare for the October snowstorm. Outreach began on Friday, October 28 with discussions with media outlets regarding storm preparations. On Saturday afternoon, Corporate Communications started 24-hour coverage in the EOC communications room. CL&P's first press release announced the opening of the EOC. In total, CL&P issued 22 news releases during the snowstorm:[155]

Date	Title
October29	CL&P Opens Emergency Operations Center
October30	CL&P Updates Storm Damage Information
October30	Clean-up Begins After Historic Nor'easter Leaves Nearly 770,000 CL&P Customers Without Power
October31	It's Halloween and Trick or Treating May be Challenging
October31	CL&P Continues Power Restoration Efforts
October31	CL&P Continues Power Restoration Efforts; 204,000 Customer Restored So Far
November 1	CL&P Explains Who Owns What
November 1	CL&P Crews Make Progress Overnight and Restoration Efforts Continue
November 2	Media Alert: CL&P Delivers Water to Emergency Shelters
November 2	CL&P Provides Restoration Estimates for All Towns
November 3	CL&P Pushes Toward 99 Percent by Sunday Night
November 3	CL&P and Mutual Aid Crews Make Progress on Thursday
November 3	CL&P Alert to Customers
November 4	CL&P Approaching 300,000 Without Power
November 4	1,800 Utility Crews Continue to Make Progress
November 5	Restoration Efforts Continues Across CL&P Territory
November 5	Over 2,140 Crews Working Today to Restore CL&P Customers
November 6	Update from CL&P
November 6	CL&P Pushing to Restore 99 Percent of Customers Statewide by Midnight Tonight
November 7	CL&P Restoration Efforts Continue Non-Stop
November 8	Nearly 2,700 Utility Crews Continue to Restore Remaining CL&P Customers
November 9	CL&P Completing Restoration Efforts

In addition to the distribution of media releases during the October snowstorm, Corporate Communications responded to more than 700 media contacts, including 33 with Spanish media outlets and coordinated more than 150 live interviews with news media, including 25 via Skype.[156] Throughout the course of the 11-day storm, Corporate Communications involved communications professionals from CL&P, NU, Transmission, and Yankee Gas to respond to media inquiries and social media.[157]

CL&P continued to expand usage of its social media channels during the snowstorm. It issued more than 400 tweets and Twitter followers increased by 79 percent. Facebook "Likes" increased

[155] cl-p.com website.
[156] Response to AG-009.
[157] Response to AG-076.

to 9,361 and CL&P responded to hundreds of comments on Facebook. In addition, CL&P posted 90 times on Facebook, including adding more than 30 photos of the storm. It added 14 more videos to YouTube and promoted these videos on Facebook and Twitter.

CL&P issued many more media releases during the October snowstorm, usually two or three each day. Early on in the storm, CL&P warned customers that it could be "a week or more" before it restored power. It released detailed restoration estimates for all towns affected on the fifth day of the storm (November 2), at a point when nearly half of customers had been restored (48 percent). The following table summarizes the 22 news releases issued throughout the October snowstorm:

	Message in News Release	**Anticipated Restoration Date**
October29	Safety, storm in progress	No estimate
October30	831,000 out	Week or more
October30	770,000 out	Week or more
October31	Safety	No estimate
October31	150,000 restored	Week or more
October31	204,000 restored	Week or more
November 1	Alert: Customer-owned equipment damage	No estimate
November 1	265,000 restored, restoration projections for 50 towns, all by tomorrow	Estimates for when 99% will be restored, 50 towns
November 2	Water delivered to shelters	No estimate
November 2	400,000 restored, estimates for 149 towns	Estimates for when 99% will be restored, all towns Vast majority by Sunday
November 3	433,000 out, estimates for 149 towns	99% by Sunday night
November 3	361,000 out, estimates for 149 towns	Estimates for 149 towns
November 3	Customer Alert	No estimate
November 4	310,000 out, estimates for 149 towns	99% by Sunday night
November 4	253,000 out, estimates for 149 towns	99% by Sunday night
November 5	143,000 restored	99% by Sunday night
November 5	214,000 out	99% by Sunday night
November 6	64,000 out, missed 99% goal	100% by Wednesday
November 6	Goal to restore 99% by Midnight	99% by midnight
November 7	2 Executives Assigned to two areas	No Estimate
November 8	9,000 (<1%)	No Estimate
November 9	50 customers out	No Estimate

While CL&P was able to announce restoration predictions by town, it also made an overall projection as to when it would restore 99 percent of customers (as CL&P did during storm Irene). At some point, the 99 percent restoration goal turned into a commitment to restore 99 percent of customers in each town by Sunday night, a much more aggressive goal than restoring 99 percent of all affected customers. CL&P failed to achieve the goal, further frustrating

customers and municipal leaders. Ultimately, it restored all customers on Wednesday, November 9, eleven days after the storm.

The extended duration of the restoration effort inconvenienced and frustrated customers and municipal officials. Public frustration was further exacerbated by CL&P's very public missed commitment as well as challenging relations with towns and communities. Liberty discusses community relations in more detail in the following section.

Corporate Communications made every effort to gather useful information to release to the public and the media. However, this was a challenging task during both storms due to the delay in getting status updates and restoration estimates from the field.

Corporate Communications did effectively coordinate with other groups to gather and disseminate storm restoration information. Corporate Communications was an active participant in EOC conference calls, and it took control of the "storm message" for the company. When possible it pressed Operations for anticipated restoration times and worked closely with Town Liaisons to gather town-specific information. CL&P Corporate Communications took advantage of traditional and non-traditional communications outlets during both storms. In essence, the mechanics were in place and working well, however the message was not necessarily what customers, the public, and community leaders wanted to hear.

3. Community Relations

At CL&P, the community relations responsibility generally falls to the Account Executive Management team, reporting to Customer Relations & Strategy. CL&P assigns account executives by geographical areas served. They generally live within or close-by their territories and become very familiar with the needs and concerns of commercial and industrial constituents. Account executives normally attend city events and planning meetings, community leader meetings, and any franchise and rates meetings. Other participation includes local community leader clubs, school boards, and charities, with a goal of establishing a company presence in the local community.

Following the March 2010 storm, CL&P identified a need to strengthen community relations efforts during large storms. During the March 2010 storm, several account executives were embedded in certain towns to work more closely with town EOCs and community leaders. The towns really liked the approach, so CL&P decided to expand the program so that it would cover all 149 towns in any future storms.

In September 2010, shortly before Hurricane Earle was projected to hit, the Account Executive team recruited about 100 NU employees who could serve as Town Liaisons, if needed. It provided two training lessons along with town assignments. Hurricane Earle did not hit, so deployment was not necessary. In early 2011, CL&P conducted four Town Liaison training sessions, one in each region, to further build the program.[158]

[158] Response to AG-008 and Interview #51.

During a storm, Town Liaisons report to Town Liaison Coordinators who report to the Area Municipal & Large Customer Coordinator in the EOC. CL&P's Emergency Plan Operating Procedure "Municipal & Customer Liaisons, M3-EP-2021" governs the Town Liaison process and was in place during the 2011 storms. CL&P sent copies of CL&P's Emergency Plan, revised in June 2011, to each town. In addition, Account Executives delivered additional copies to town leaders on subsequent visits.[159]

In preparation for Hurricane Irene, CL&P took steps to confirm the availability of assigned Town Liaisons, conducted refresher training, and updated municipal contact information. At the same time, account executives provided daily updates on storm tracking and CL&P preparations. After landfall, CL&P deployed 90 Town Liaisons to towns that had requested support and had opened an EOC.[160]

Town Liaisons generally met with town or emergency officials twice daily to share restoration status information and to coordinate town priorities. Town Liaison Coordinators met with and briefed Town Liaisons three times a day. Town Liaisons also met with their respective Operations Managers on a daily basis to create the daily plan.

Following storm Irene, CL&P conducted a formal transition with each town to turn town support over from the Town Liaison to the Account Executive. As requested, CL&P personnel participated in town debriefing sessions or town meetings regarding the storm.

CL&P conducted a formal post-storm critique process to gather lessons learned and identify opportunities to improve the Town Liaison program. It held post-storm debriefings with 40 towns and sent a detailed survey to all 149 towns. CL&P senior management also solicited feedback from municipalities through post-storm presentations at each of the 14 Connecticut Councils of Government. Preparation of a Lessons Learned document was in process when the October Snowstorm hit.[161]

A debrief of Town Liaisons suggested CL&P provide each Town Liaison with primary circuit maps, laptops with air cards, and additional training. By Thanksgiving, it provided all Town Liaisons circuit maps for their towns, as well as training on how to read the maps and refreshers on the storm restoration process. When the October snowstorm hit, CL&P deployed more than 100 Town Liaisons, all equipped with laptops and air cards.

Conceptually, the Town Liaison process is a good one, however, CL&P's was still in development when both storms hit. While CL&P did make adjustments and improvements in between the storms, the program was still relatively new and untested. The challenge was made more difficult with the information challenges presented during the storm, i.e., the delay in getting information from the field regarding outage restoration progress, the lead time to secure assistance from outside resources, and the need to balance the needs of one town versus many.

[159] Response to AG-008.
[160] Response to EL-009.
[161] Response to AG-075.

In addition, critical infrastructures, such as water treatment plants, lift stations, gasoline stations, hospitals, and nursing homes, were not easily identifiable in the outage system. This left many towns in difficult situations—without drinking water or water treatment facilities, gas stations unable to pump gasoline, schools and polling locations without power, etc. This made it difficult to prioritize restoration efforts, and in some cases, creating public relations issues.

A decentralized approach such as this also brings inherent challenges to provide assistance and communications in a consistent fashion. In addition, this was a new approach for everyone—Town Liaisons, CL&P Operations Personnel, and communities. Deploying 149 individuals, many of which had never served in this manner before, was a bold move. On top of this, CL&P had not clearly set expectations with communities about the role of the Town Liaison. Neither had CL&P established a list of critical infrastructure in each town, so there were challenges managing each town's priorities with CL&P restoration priorities.

Lessons learned regarding the Town Liaison Program:[162]

- CL&P had not clearly established municipalities' restoration priorities before the storms. In the future, CL&P should to meet annually with municipal officers to discuss and confirm priorities. These priorities should be flagged on CL&P's circuit maps and in EDS and CL&P should strive to communicate estimated restoration times until the critical infrastructure has been restored.
- Regional partnerships or associations may be necessary, as some towns do not have Emergency Operations Centers.
- Towns need timely and accurate restoration status information. CL&P has developed Town-Level tools that provide access to outage status information.
- Town Liaisons need timely and accurate restoration status information. CL&P will provide additional Town Liaison training, Handbook, laptops and air cards.
- Town Liaisons need to establish a relationship with the municipality in advance of the storm. CL&P will pre-assign Town Liaisons and designate a back up who will meet periodically with town leaders to develop an-ongoing relationship.

Post-storm feedback was generally very positive on the idea of a town liaison, however opinions varied widely on how well the program achieved town objectives.

4. Communicating Outage Information

Traditionally, electric utility customers have called the utility to report problems or interruptions in their electric service. In most cases, customers simply wish to make sure the utility is aware of their outage or problem and want to find out when the utility will restore service. Advances in computer technology and telephony have presented options for communicating service outage information to and from customers. Nearly commonplace now, utilities have embraced the use of Interactive Voice Response (IVR) technology to allow self-service outage reporting via telephone, largely as a self-defense measure to help cope with the spike in call volumes associated with large outages. Utilities also have leveraged Interactive Voice Response

[162] Response to AG-038.

technology to enable two-way communications, allowing customers to report outages as well as obtain customer-specific restoration status information from the utility.

The growth of the Internet, mobile computing, and internet-capable telephones have made it necessary for utilities to offer outage information on company websites. Most electric utilities in the United States are providing some level of outage information on the corporate web site, at the most basic, listings of affected areas and number of customers out of service. Many utilities have also established self-service outage reporting through the web site, providing yet another way for customers to let the utility know they are without power. Not surprising, web access is becoming very popular during a large outage. While individual residences may be without power, businesses and public areas may have power and many cell phones have Internet access, giving the public access to the website, even during a large outage event.

Additionally, advanced metering technologies and distribution automation are beginning to present opportunities to identify customer locations that have lost power. Ultimately, automation will identify outages, reducing the need to rely on customers to report outages. In fact, utilities with this level of notification can proactively contact customers, especially critical care customers, to let them know that the company knows about the outage, provide the expected restoration time, and preempt a significant number of customer calls and website visits.

The management of outage information is critical to effective communications both within and outside the utility. By reporting individual outages, customers continue to play an important role in determining the extent and location of an outage, and will continue this role until the utility deploys distribution automation to the meter. Whether the customer speaks with a representative or self-reports the outage through telephone technology, the call creates a “trouble ticket” in the outage management system. Outage management systems automate trouble order management and expedite the analytical process, helping utilities more quickly identify outages and begin restoration.

Outage systems present the capability to predict affected devices by using algorithms to relate trouble tickets to the electric device schema. By automating the sorting and analyzing of outage tickets, management can better determine and dispatch the appropriate resources to restore service. Many outage systems disable or limit device prediction during a large event because the algorithms become less predictive.

While lights-out calls from customers are good indicators that damage exists and provide a feedback mechanism to tell whether trouble remains on the system, a complete and thorough damage assessment gives a utility the best chance of properly planning and executing the restoration. The planning function allows the utility to provide accurate and specific estimations of restoration time as the effort progresses. Qualified and trained individuals acting in their storm role perform damage assessment.

Just as critical, the restoration planning process plays a role by developing initial estimates of restoration time (ERTs). The utility must incorporate these estimates into the outage management system in a timely manner so that other employees, customers, corporate communications, community relations, and other interested stakeholders can share this

knowledge. Equally as important, the utility must update the estimates of restoration time in the outage management system as more information becomes available. Accuracy is a key concern as the outage system usually serves as "the source" for the number of affected customers and storm restoration status for other areas of the company, including call centers, emergency operations centers, public relations, and regulatory relations.

Outage systems often have the ability to initiate automated customer callbacks, in conjunction with the utility's telephony. Adjunct to the damage assessment process, the automated call-back process attempts to contact all customers with open trouble tickets at the time the company believes that it has restored power. If pockets of customers remain without power, the utility may redeploy assessors to investigate and submit supplemental damage reports.

a. Outage Management Systems

CL&P installed its outage management system, Electronic Dispatching System (EDS), in 2004. EDS (Oracle Network Management System) is a detailed network model of the distribution system. Electrical connectivity is provided from the Geographic Information System (GIS) that is the source of this network model. The system combines the locations of outage calls from customers, and uses a rules engine to predict the locations of outages. While it upgraded EDS in 2007, CL&P is not running the most current version of the software.

CL&P's outage management system was fully functional during both events and performed well to provide trouble spot predictions and track asset conditions as well as predict customers affected. CL&P used EDS in a decentralized mode, in that local operation of EDS was handled within the AWCs (Area Work Centers) or within a Satellite location. EDS is operated to reflect the status of jobs and the data is used to create work pages to assign to crews within the AWC or Satellite.

The following can initiate electric trouble orders in the EDS:

- Customers calling the company's call center representatives
- Customers self-reporting trouble through the Interactive Voice Response system
- Customers self-reporting trouble through the high-volume overflow Interactive Voice Response system
- Customers self-reporting trouble through the company's website or mobile app
- Dispatchers can manually create outage orders.

EDS's analyzer module interprets each outage call and creates outage trouble spots that are associated or "tagged" to a likely electrical device, such as a transformer. CL&P's distribution electrical connectivity model groups devices using relational database tables that create the link for customers to transformers, transformers to fuses or other protective devices, devices to circuits, and so forth. As new trouble reports arrive, the system continues conditional grouping of devices automatically. EDS also provides tracking of the status of system isolating devices, i.e. switches, breakers and fuses that may be open and which are closed, network tracing functions can be used to identify customers affected.

EDS information is readily available to Call Center Representatives, the Interactive Voice Response systems, CL&P's website, dispatchers, and any CL&P field or office employee that has access and has been trained to use the system.

Most utilities rely on outbound notification or callbacks to verify power restoration. During large outages there are often numerous trouble spots along a single circuit or part of a circuit. As circuits or portions of circuits are repaired, trouble tickets associated with that circuit are closed in the outage system. Power may still be off at a particular location, but since the tickets were closed by the outage system, the utility will not know that power is still off unless the customer calls back (or the utility can ping an automated meter).

Most outage systems are configured to trigger automatic callbacks upon closure of the outage ticket. In non-storm conditions, this approach generally works very well. However, during a large storm restoration priorities often negate the effectiveness of automatic callbacks. In addition, foreign crews and other supplemental crews may not have access to the outage system to update orders as they are worked resulting in a delay in closing orders, often until very late in the evening. Automatic callbacks are often disabled simply to avoid calling customers in the middle of the night.

NU's outage callback system was disabled during both storms, primarily to avoid customer confusion. Instead, during the October snowstorm CL&P conducted a number of controlled outbound calling campaigns targeted to specific areas identified by EOC EDS analysts to:[163]

- Single services identified as power-out in EDS (Saturday, November 5, 2011)
- Residents of 13 towns (with >5000 outages) (Saturday, November 5, 2011)
- Residents of 31 towns that wouldn't reach 99 percent (Sunday, November 6, 2011)
- Residents of 20 towns to confirm power restored (Monday, November 7, 2011)
- Residents of 40 towns to confirm power restored (Tuesday, November 8, 2011)
- Residents of 30 towns to confirm power restored (Wednesday, November 9, 2011)

However, the callback process whether automatic or controlled can be confusing to customers, even anger customers who are still without power after many days. Additionally, contact center representatives have to be prepared to handle calls from the customers that were contacted that are still without power.

EDS issues encountered during the 2011 storms included:[164]

- On August 28, 2011, EDS temporarily disconnected the user session. After recycling, EDS recovered resulting in an automatic reconnect of most users.
- On August 29, 2011, EDS was reaching a memory limitation. IT took steps to increase memory allocations, but during this effort EDS unexpectedly shut down. EDS was immediately restarted with increase memory, however users were without EDS for 15 minutes.
- Additionally, management limited access to EDS to avoid similar memory limitations.

[163] Response to Witt-044.
[164] Response to AG-095.

- During the October snowstorm, EDS was unresponsive and had to be restarted on November 6, 2011, leaving it unavailable for about 30 minutes.

In addition to the lack of preparedness of employees, CL&P also failed to identify "critical customers" in EDS prior to either storm. As a result, each division had to identify and prioritize critical customers on their own as the storm progressed. CL&P has since created a list of critical customers but it has not been incorporated into EDS.

Otherwise, the performance and reliability of CL&P's outage management system during the 2011 storms was generally good. EDS was fully operational during both storms, except during brief periods of preemptive maintenance.

b. Estimated Restoration Times

Another role of outage systems is to provide estimates for the time of restoration. Estimated Restoration Times (ERTs) are a critical information component of the restoration process. Customers, government officials, and the public want to understand how long the outage will last. This information is basic to determining if alternate housing will be necessary and helps residents and businesses make the appropriate plans for dealing with an extended outage. It is to the company's benefit to derive ERTs in order to determine better the level of resources required to restore the electrical system.

The absence of Estimated Restoration Times (ERTs) can generate a significant response from customers and the public, in the form of phone calls, web site visits, and contact with government officials to try to find out something, anything about the outage. The longer the company proceeds without ERTs, the more frantic and disgruntled customers will become trying to contact the company. However, offering Estimated Restoration Times (ERTs) that are grossly inaccurate can cause more damage than not offering ERTs. Inaccurate ERTs foster distrust and the perception of incompetence.

For day-to-day operations, CL&P's outage management system calculates event-level Estimated Restoration Time based on area, order type, and active order volume. EDS uses historical outage records and predefined rules to create an initial Estimated Restoration Times for each event. Field personnel can turn off the automatic assignment of event-level ERTs at any point. In fact, EDS provides the capability to turn off auto-ERTs by circuit, town, district, or division. Generally, CL&P disables auto-ERTs at the division-level during a large storm. It did so well before storm Irene arrived. During the October snowstorm, however, it did not turn off the auto-ERT until the storm was underway. Consequently, customers calling during the snowstorm, before the disabling of auto-ERT received an auto-ERT.

CL&P has the capability to issue four levels of ERT projections—event-level, district, divisional, and global. During both storms, CL&P delivered a global announcement to customers in the first few days, via the phone system, to let customers know that ERTs would not be available until it completed the damage assessment process. Once damage assessment was complete, CL&P's EOC Support Staff, under the direction of the Area Commander, prepared restoration projections at the company and district level. The Incident Commander, Area Commander, and the Public

Information Officer approved all district-level projections and messages prepared during the storms.[165]

The town-level projections used in storm Irene were created and maintained in a separate process from EDS and did not necessarily reconcile. Town-level projections were created manually through research and discussion with operations personnel, town liaisons, and town emergency personnel, as part of the process to create a plan of the day for each town.

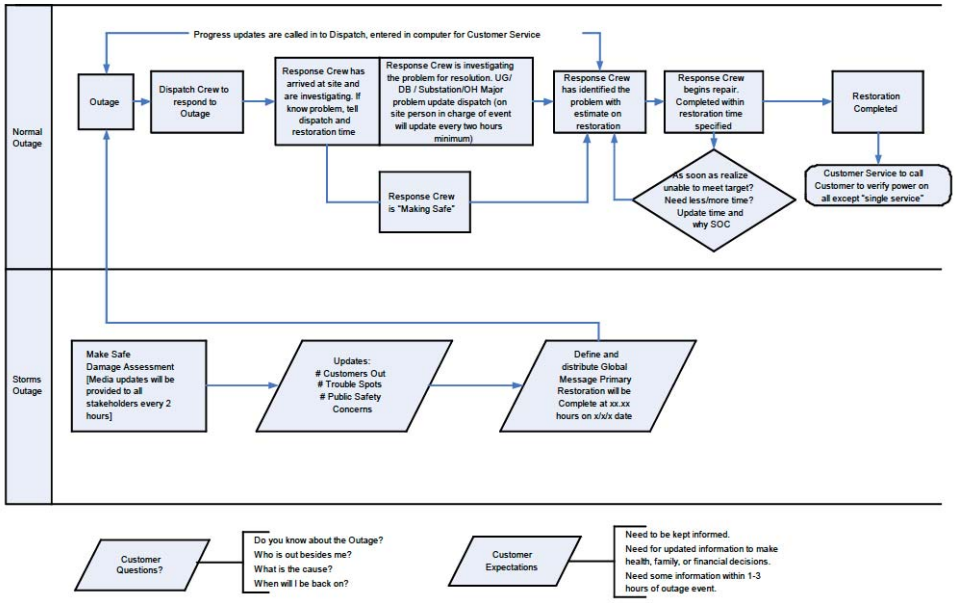
In between the two storms, CL&P started working on a website to facilitate the delivery of town-level projections. It was still in development during the snowstorm, but has since been rolled-out. The website translates EDS circuit-level outage data into zip codes and towns. CL&P has prepared other tools that pull information from EDS to the town-level that will be helpful in communicating restoration status to town emergency personnel and community leaders, include:

- Web-based town maps with critical loads—maps detailing circuits and critical infrastructure facilities (Fire, EOC, Hospitals, Police, Sewage Treatment, Substations…)
- Town-event maps detailing customers served and customers out by town. Event maps also let users zoom-in to see trouble-spot details. Maps also have the ability to overlay GPS locations of crews.

CL&P has established storm procedures to "Ensure Timely and Accurate Information for CL&P/WMECO Customer and Employees During and After Distribution System Trouble and Outage Events"[166] (see the following diagram). During a storm or blue-sky outage, response crews call in outage conditions and estimates on restoration to dispatchers after they have arrived on site and investigated. Additionally, they are required to contact dispatch as soon as they realize they are unable to meet the target. However, during both 2011 storms, for many reasons, the vast majority of outage tickets were closed after company and foreign crews returned for the day, without entering ETRs or restoration status information. This created a delay in the outage information flow, up to 12 hours in some cases.

[165] Response to AG-100.
[166] Response to Liberty-103.

Attachment 5
Process Flow
(Sheet 1 of 1)



While the above process does work well to update EDS restoration status during blue-sky or normal outages, it is not scalable in a large storm, for several reasons:

- Damage assessment process in large storms relies heavily on mobile patrols. In the 2011 storms, as many as 100 patrol teams were assigned to damage assessment. Only one in five of these teams had the ability to relay real-time conditions, and even then, cell towers were not functioning well in all areas. As a result, an inordinate number of handwritten damage assessment patrol reports had to be manually entered into EDS as event details, which was time consuming and created backlogs in the AWCs.[167] In many areas, patrol information was not updated until after the close of the shift. This delayed the process that CL&P used to project restoration estimates.
- Once restoration was underway, restoration information was not updated in EDS, in many cases, until well after the crews were finished for the day. Similar to the patrol reports, handwritten trouble-order completion information had to be manually reconciled and reflected in EDS, which was time consuming and created backlogs in the AWCs. This delayed the communications of restoration progress.
- EDS was not able to provide town-level projections, thereby making it necessary to maintain town-level projections through a separate manual process.

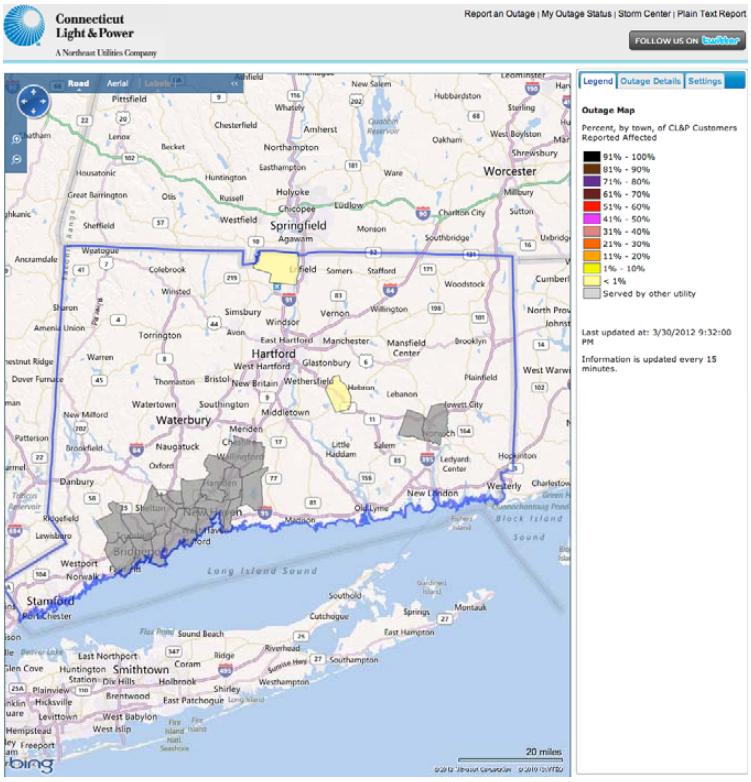
[167] Response to AG-035_SP-01, page 13.

- Call takers, who normally access EDS on a daily basis to answer customer inquiries, were instructed to ignore EDS trouble order information and to rely instead on talking points and town-level restoration projections assembled outside of EDS.
- Many of the outage tickets created through TFCC (high-volume IVR) were rejected, requiring special handling and manual entry, hours to a day later. This delayed outage ticket creation for these accounts in EDS.

CL&P needs to develop a process to enable real-time field updates of EDS trouble order information, such as damage assessment and restoration progress, including estimated restoration times.

c. Communicating Outage Information

CL&P has leveraged its public website to provide outage-related information to customers and website visitors through its Storm Center. Customers can review general information on CL&P's storm response, emergency preparedness, find out what number to call to report an outage, report an outage through the website, view a map of current outages, and view individual account outage status. The figure below provides a sample from CL&P's outage mapping website.[168]



On Friday, August 26, 2011, before the storm, NU created a webpage in the Storm Center specifically for Hurricane Irene that included messages, public service announcements, videos, a news release feed, a Twitter feed, as well as links to NU's YouTube, Twitter, and Facebook Accounts. NU updated this page frequently during the storm.

Additionally, a large Hurricane Irene graphic was on CL&P's home page to direct visitors to the Hurricane Irene page. It added other links to the "What's New" section on the home page during the storm to direct visitors to

[168] cl-p.com

information about the storm including My Outage Status, Restoration Estimates, and instructions for receiving outage updates by text message. Several items were posted to the website following Hurricane Irene, including:

- A thank you to customers (audio and PD)
- Company testimony and presentation for the legislative hearings
- Video recap of the CL&P response

During storm Irene, customers accessed CL&P's outage maps and mobile outage reporting the most frequently:

Webpage	Views
Outage Maps	1,540,726
Outage Mobile	590,002
Hurricane Irene	143,442
Estimated Restoration Times by Area	66,476
Estimated Restoration Times by Town	43,484
Storm FAQs	2,102
Storm Response	1,237
Storm Preparedness	966
Before/After a Storm	918

However, CL-P.com did not hold up to the high volumes accessing the site during storm Irene. On August 28, 2011, when the website was experiencing unprecedented use of the outage map, website response was slow. To resolve this issue, CL&P moved its outage map to an externally hosted site with more bandwidth.[169]

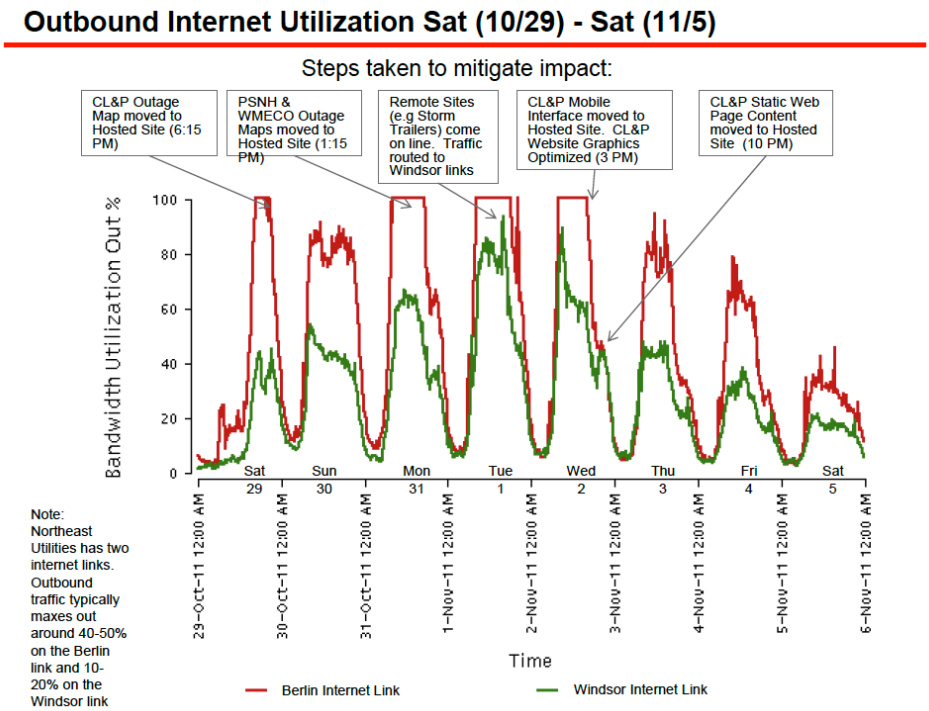
In response to the October snowstorm, CL&P added a large graphic and a paragraph about the snowstorm on its home page, similar to what it did during storm Irene. In addition, it added several links to the "What's New" section of the homepage to direct customers to storm specific information. On October 31, CL&P created a page specifically for the October snowstorm, including key messages, videos, new releases, a Twitter feed, and links to YouTube, Twitter, and Facebook accounts. It updated this page continually throughout the storm. On November 1, CL&P added a page listing restoration estimates. Several days later, it added another page with a video depicting the restoration process.

During the October snowstorm, website traffic peaked on November 1, 2011, with 3.2 million page views. CL&P's Outage Maps, Website Outage Reporting and Mobile Outage Reporting were accessed the most frequently as seen in the table below:[170]

[169] Response to AG-095, page 6.
[170] Response to CSU-038.

Webpage	Views
Outage Maps	5,142,049
Report an Outage	4,477,630
Outage Mobile	3,071,201
CL&P Homepage	2,761,391
Estimated Restoration Times	502,418
Storm Center	163,967
October Snow Storm	30,714
Storm Response	4,878
Storm FAQs	2,102
Storm Preparedness	2,052
Before/After a Storm	918

CL&P encountered similar website response issues during the October snowstorm. As seen in the following graph, unprecedented demand stressed NU's websites from October 29 through November 4, creating slow response and time-outs. The following chart depicts bandwidth use on NU's two Internet links that handle internal and external Internet traffic. As in storm Irene, CL&P moved its outage map to an externally hosted website with more bandwidth on October 29, 2011. PSNH and WMECO's outage maps were also moved to the external site the following day. Several days later, CL&P's Mobile Interface moved to the external hosted site to reduce website traffic. Additional static contact also moved to alleviate bandwidth traffic on November 2.



Since the storms, NU developed a process to move event-popular pages, like the outage maps, to an external vendor site as needed when demand begins to exceed internal bandwidth capacity. Additionally, NU has begun mirroring Storm Center and other event-popular website content on the external site to facilitate an easier and quicker cutover in periods of high demand. In addition, NU has upgraded company Internet links to increase bandwidth and has set up alarms to notify IT support personnel when website activity exceeds thresholds.

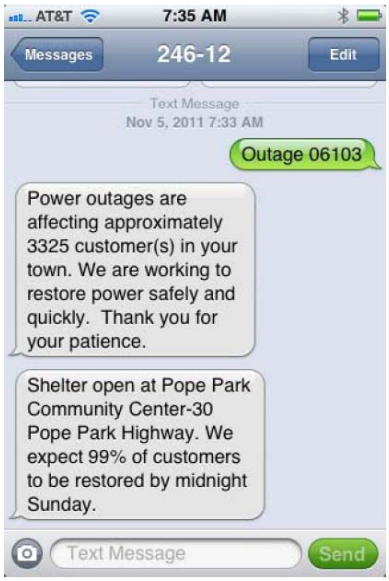
In addition to the website, CL&P took advantage of available social media channels, including YouTube, Twitter, and Facebook. Before the storm, NU launched a Facebook account that ultimately attracted more than 8,000 "likes." More than 200 status updates were "tweeted" during the storm and NU Twitter followers grew substantially during the storm, from 2,000 to more than 6,300. NU's YouTube videos were also widely viewed.

CL&P implemented a Short Messaging Service (SMS) outage-status texting application in July 2011;[171] the timing of this was very fortunate. CL&P promoted the new outage-status texting service to customers in the days prior to Irene's landfall and throughout the event with each press release, IVR message, in the media, and on the website. As a result, CL&P replied to more than 586,000 text messages during Tropical Storm Irene.

[171] Response to AG-009.

CL&P continued to promote the service prior to and during the October snowstorm. People sent more than 600,000 SMS text requests for outage information to CL&P during the October Snowstorm.[172]

The SMS service is very easy to use. Texting the word "Outage" followed by a zip code prompts a return text from CL&P with any known outage information for the town associated with the zip code. CL&P has linked the SMS service to its Town Outage interface to deliver customized text messages for more than 100 towns, including number of customers impacted, shelter locations, and restoration estimates. Sample messages delivered during the October Snowstorm are seen here.[173]



SMS text messaging is a very effective communications channel during a storm. Once callers have opted in by sending and receiving a response to the initial text request, a utility can continue sending updates as needed to update the conversation. Proactive and informative SMS communications not only reduced traffic and congestion into the phone center and website, but also ultimately increase customer satisfaction.

CL&P is exploring enhancements to the SMS Outage System that would provide account-specific outage status information to customers who text their account number or phone number of record.[174]

5. Conclusions

1. Customer Experience has a formal Contact Center Emergency Storm Plan.

NU's Customer Experience (CE) organization provides call center and other customer services to CL&P, WMECO, PSNH, and Yankee Gas. Both of CE's call centers have formal Emergency Operations Procedures. These plans were in place and used during the 2011 storms. These plans include pre-storm planning checklists as well as detailed descriptions of roles and responsibilities to guide personnel during large power outages or other emergencies. The plans also designate a Customer Experience Emergency Organization and detail levels of supervision, lines of authority, and channels of communication. The Customer Experience Emergency Operating Plans are typically activated when the Emergency Operations Center (EOC) is activated for one of the Operating Companies. CE can also activate plans sooner if call volume and other factors dictate the need for additional phone center support beyond normal staffing.

[172] Response to Witt-043.
[173] Response to Witt-043.
[174] Response to OCC-099.

2. Customer Experience's Contact Center operation adequately handled the extremely high volume of calls offered during both storms.

NU's CE organization had a high-volume IVR overflow service in place to accommodate the extremely high volume of customer calls it received in the early stages of both storms. NU has contracted with Twenty-First Century Communications (TFCC) to provide high-volume call overflow services. CL&P can manually overflow calls to TFCC's IVRs during high volume periods, specifically when internal call center trunks are full.

Because NU had a high-volume call overflow service in place, NU was able to effectively handle the extremely high volume of customers calling to report or inquire about outages during the early stages of both storms. CL&P delivered minimal busy signals to customers (only a few thousand immediately prior to the transition to high-volume overflow services).

This combined with NU's internal IVR services allowed customers to self-serve for the majority of calls (74 percent of total call volume) freeing up CSRs to handle more difficult calls and to talk with customers wishing to speak with a company representative.

3. Customer Experience had "stress tested" its telephony and supporting systems well prior to both storms to ensure that it could handle high-volume events.

On January 27, 2008, CL&P conducted a stress test using 300 CSRs with the intent to put a heavy load on the C2 system, the IVR, the CTI (screen pop) technology and the call-center telephony system. The company contracted with Empirix, an IVR testing vendor, to flood the IVR and C2 with a high volume of calls in a short period of time. The test delivered more than 80 calls per minute to the IVR, contact center technologies, and CSRs. CL&P addressed and resolved issues found during the testing prior to the C2 go-live.

4. CL&P's Storm Center web site is rich in outage information and provides an interactive self-service tool for customer-specific outage information

CL&P's Storm Center web site has evolved into an interactive, self-service tool rich in outage information for customers and other interested stakeholders. The site experienced unprecedented usage during both 2011 storms. While site access slowed down at several points during the storms, CL&P was able to move popular pages off-site to increase bandwidth and response.

Since the storms, NU has developed a process to move event-popular pages, like the outage maps, to an external vendor site as needed when demand begins to exceed internal bandwidth capacity. Additionally, NU has begun mirroring Storm Center and other event-popular website content on the external site to facilitate a quicker cutover in periods of high demand. In addition, NU has upgraded company Internet links to increase bandwidth and has set up alarms to notify IT support personnel when website activity exceeds thresholds.

5. Customer Experience and Corporate Communications provided many non-traditional communications options for customers affected by the storms.

These included social media options (Twitter, Facebook, YouTube), SMS text messaging options to get restoration status information, mobile phone outage reporting site, and customized outbound messaging to verify restoration and to alert medical customers to available services. These communications channels were well used during both storms.

6. CL&P's Corporate Communications Storm Plan for Severe Storms is incorporated into CL&P's Emergency Response Plan.

The CL&P Emergency Response Plan includes a chapter dedicated to Communications. More detailed emergency communications procedures are documented in CL&P's Emergency Response Plan's Index of Operating Procedures (M3-EP-1001). In addition, Corporate Communications maintains an EOC Media Book and other storm procedures and checklists for major storm communications activities.

7. Customer Experience and Corporate Communications established a continuous and strong presence in the EOC and were actively involved in storm coordination meetings and calls.

Customer Experience established director-level presence in the Emergency Operations Center (EOC) during both storms. CE's Director of Customer Experience Support was assigned to represent CE in the EOC. This position participated in conference calls, worked with Corporate Communications team members on customer messaging and outbound campaigns, and helped communicate restoration status information back to CE Communications Leads to package for contact center representatives (talking points).

As defined in the ERP, Corporate Communications also assigned a Communications Manager to the EOC to develop strategies for communication and media relations activities. Corporate Communications was an active participant in EOC conference calls, and it took control of the "storm message" for the company. When possible it pressed Operations for anticipated restoration times and worked closely with Town Liaisons to gather town-specific information.

8. CL&P proactively communicated with the media, public officials, customers, and the public before, during, and after both storms.

- CL&P had adequate pre-storm communications alerting customers to the impending storms and emergency preparedness concepts.
- CL&P actively engaged the media and the public throughout the storm to provide storm status and restoration progress.
- CL&P introduced several new communications channels, taking advantage of social media outlets and mobile technology to expand the ways in which the public and customers could interact and communicate with the company.
- CL&P conducted post-storm research to understand better community expectations and satisfaction with restoration performance.

- CL&P engaged town leaders and public officials in town hall meetings to gather feedback and develop lessons learned following the storms.

In essence, communications mechanics were in place. However, the extended duration of the restoration efforts and the missed commitments inconvenienced and frustrated customers and municipal officials.

9. CL&P's High Volume Overflow Service did not route callers back to the Contact Center in the event of an emergency or when outage tickets could not be created.

TFCC rejected more than 50,000 calls during the October snowstorm. However, callers were not immediately returned to CL&P's CE Center, rather they were asked to leave a phone number. Many of these were emergency calls. At times as many as 30 people were assigned in 12-hour sifts to work these exceptions, representing a significant manual effort that stretched out over five days.

However, had CL&P designed a different call flow for TFCC, exceptions could have been routed in real-time back to live agents for immediate handling, thereby eliminating the exceptions backlog and subsequent extensive manual effort. Of real concern though are the 8,610 rejected emergency calls. During a storm, emergency calls should be routed back immediately to the contact center for prompt handling.

10. While the Town Liaison approach enhanced communications between towns and the utilities during both storms, there is room for improvement. (See Recommendation 3.)

CL&P deployed its Town Liaison (TL) program during both storms. However, the process was challenging in many locations because TLs were not fully up-to-speed, causing frustration for town leaders and CL&P. On top of this, CL&P had not clearly set expectations with communities about the role of the Town Liaison. Neither had CL&P established a list of critical infrastructure in each town, so there were challenges managing each town's priorities with CL&P restoration priorities. Towns were grateful though, to have a dedicated resource available to help communicate town priorities and needs to the utilities' Storm Centers.

11. CL&P did not effectively gather Estimated Times of Restoration (ETRs) and other restoration status information from the field in either storm. (See Recommendation 5.)

The biggest communications challenge during the storms was getting good information in a timely manner from the field regarding restoration progress and estimated times of restoration. The lack of this information, its inaccuracy, or any delay created issues for all areas charged with communications—the Contact Centers, Town Liaisons, and Corporate Communications—and frustrated customers, communities and towns, and the public.

CL&P was not equipped with field technologies to facilitate real-time update of trouble status, estimated restoration times, or restoration completion. In most cases, trouble records/tickets were

updated at the end of the day, after the crews had returned from the field, thus building in a delay in communicating information to customers and stakeholders.

6. Recommendations

X-CL&P-1 Create a call center staffing model to facilitate quick ramp-up and consider staging agents in nearby hotels in preparation for a large storm, especially one that makes travel to the center difficult or unsafe.

To be prepared adequately for the high volume of calls into its call center during a large outage, CL&P should have adequate and experienced agents on hand to respond. CL&P should be prepared to fully staff centers to be able to respond to customer outage calls. To assist with the need to ramp up staffing beyond normal staffing levels, CL&P should develop a call-center resource plan that it activates during major storms or large outage events, in concert with its current Emergency Plan. Integrated with this plan should be a staffing model that will provide guidelines for adding resources, based on the predicted severity of the event, projected call volumes, the timing, and expected duration.

CL&P should also consider a prepositioning strategy for its call center agents, especially when weather makes travel difficult. CL&P's planning process should ask agents to come to the centers prepared to spend several days away from home, if necessary, and arrange for rooms in a nearby hotel, along with meals and other logistics.

X-CL&P-2 Redesign the interface between the call center technologies and Twenty First Century Communications to improve communications with customers during a large outage or storm.

CL&P should redesign the interface with TFCC to allow emergency calls and other exceptions to routed back in real-time to live agents for immediate handling, thereby eliminating the exceptions backlog and subsequent extensive manual effort. To better accommodate this strategy, CL&P should route calls to TFCC well before CL&P reaches maximum capacity.

X-CL&P-3 Enhance the Town Liaison program to create a more coordinated and consistent approach to keeping community leaders and municipal officials better informed of storm restoration status.

CL&P should continue to build on the Town Liaison program, with a focus on consistency. Each town's critical infrastructure priorities should be documented and easily identified in the outage management system. A process should be developed to revisit and update priorities with each town on an annual or as-needed basis.

The Town Liaison Tool should be enhanced to more easily communicate crew deployments and outage restoration status to both Town Liaisons and town officials.

CL&P should expand post-storm follow-up to capture feedback on the quality of the Town Liaison relationship and services provided.

CL&P should also formalize the process to secure and train employees to serve as Town Liaisons such that there are sufficient well-trained resources that have had enough opportunity to establish a relationship with the town they are serving.

X-CL&P-4 Pursue technology enhancements that will facilitate real-time updates of restoration status information into the outage system.

During large outage events, CL&P should equip its damage assessors and restoration crews (and foreign crews) with mobile data terminals, laptops, or other devices that can communicate and interact with the outage system or develop a real-time process wherein outage information is communicated from the field to a skilled EDS user in a dispatch office, operating center, or other location using cellular telephone, radio or other communications device. This will improve the likelihood that EDS trouble order data is updated in a timely manner. (Also refer to recommendations in chapter IX.)

X-CL&P-5 Develop specific, measurable goals and objectives for improving the accuracy and timeliness of outage related information provided to its constituents.

CL&P will undoubtedly experience additional outages in the future and should develop goals and objectives to improve the accuracy of estimated restoration times. CL&P should begin measuring and tracking the accuracy of Estimated Restoration Times (ERTs) as compared to actual restoration time, both on a day-to-day basis and during major outage events.

CL&P should revise outage communication procedures to provide more emphasis on the importance of providing accurate and timely estimates to customers. Procedures should include documenting the Estimated Restoration Time originally provided to customers as well as a requirement to provide on-line an updated estimate prior to expiration of any existing estimate. It should offer an explanation to the customer if the estimate changes. During each outage, CL&P should record a complete history of Estimated Restoration Times given to each customer.

Finally, CL&P should implement goals to communicate better with constituents in the aftermath of outages. It should analyze customer complaints to determine whether it is improving its accuracy in estimating restoration times. Debriefing sessions should be held with all involved employees, including crews, customer service representatives, and communications personnel. The Company should also hold meetings with city and town officials, other government agencies, and the media to review ERT accuracy after large storms.

B. UI

1. Customer Contact Center Operations

UI's Client Fulfillment organization provides services to support customer inquiry, meter reading, billing, collections, and field services. UI's Customer Care Center (CCC), located in New Haven, is supported by Aspect ACD and IVR technologies. The Aspect ACD is connected through tie lines to UI's enterprise Cisco Call Manager telephone system. During storms,

customers can use the IVR system to automatically report a power outage or service emergency and receive an estimated restoration time if available. UI also uses an Aspect Unified IP system for outbound dialing campaigns. UI also maintains production Aspect ACD and IVR systems at its Data Center for business continuity and disaster recover purposes.[175]

UI staffs its CCC to handle customer calls from 7:00 am to 7:00 pm, Monday through Friday, and from 7:00 am to 4:00 pm on Saturdays. During these business hours, call center representatives handle customer calls relating to service, billing and collections, and calls to report power interruptions. Upon calling UI's toll-free number customers enter the Automatic Call Distributor (ACD) and hear a company greeting and outage messaging (if activated). Calls then proceed to the IVR for call classification and self-service. Callers requesting to speak with an agent are transferred to an agent queue. Emergency calls (reporting gas odor or downed wires) received at any time of the day are immediately queued to an agent group. Otherwise, all other call types will request authentication to provide self-service options or additional account information. At any point in the call flow, in the IVR or the ACD, customers can abandon their call.

Calls from police and fire officials are normally routed to a dedicated phone line in the System Operations Center (SOC). During a storm, UI 911 call takers handle these calls, working under the direction of the Wire Down storm lead. Reports of downed wires and other emergencies will be entered into the Outage Management System (OMS) and prioritized for dispatch.[176]

Tropical Storm Irene Response

The Customer Care Center storm plan is integrated into UI's Emergency Preparedness Plan filed with PURA on December 1, 2011. The section that includes the Customer Service lead roles, job responsibilities, and position checklists is in Appendix 9, Operations. The plan designates lines of authority, provides an overview of the process, describes roles and responsibilities, and includes roles-based procedural checklists.

During an emergency, the Customer Service Lead reports to the Operations Team leader and is responsible for Customer Care Center operations and readiness of a back-up call center site, should UI need it. The Customer Service Lead coordinates closely with the Operations Team Leader to determine when to expand or extend shifts. The Customer Service Lead is supported by the Customer Care Center Lead who supervises and schedules CSRs and manages call volume and customer needs.

UI's Customer Care Center organization undertook numerous measures in preparation during the week leading up to projected landfall:[177]

- Dedicated phone line was set up for call center employees to get updates concerning work schedules during the storm and employee's on-call contact information was updated
- The alternative business continuity call-center site in Shelton, CT was tested and made ready in the event that call center resources needed to be relocated.

[175] Response to Liberty-55.
[176] Response to OCC-166.
[177] Response to CSU-001 and AR-Liberty-48.

- Additional headsets were ordered.
- Training resources were secured and scheduled to train non-traditional call center personnel to assist with outage calls as needed.
- The Facilities group was contacted to secure food, hotel rooms, and inflatable mattresses for Customer Care.
- Union leadership was contacted to review the storm-staffing plan.
- Staffing plans and schedules were shared with employees.
- Alternate call center site was prepared for potential use.
- The Customer Care Center was provided with information that included the list of municipal liaisons that were assigned to each town throughout the storm event.
- On August 27, 2011, an outbound message was placed to more than 4,000 UI customers coded as "medical" to advise them of the importance of having a back up plan in the event of an extended power outage. In addition, customers were advised that additional assistance would be available from Infoline at 211 or the American Red Cross.
- A dedicated escalation line from the Customer Care Center to the Storm Center in Shelton was established in the event the center needed assistance with an escalated issue.
- Communications plan was set up for updates to customers throughout the storm.

All Customer Care employees were scheduled to begin work at 6:00 am on Sunday, August 28, 2011, based on the estimated storm arrival. UI scheduled a small crew to arrive at 1:00 am that morning, in the event there were outages in the early stages of the storm. Employees were gradually released later on Sunday evening as the call volume reduced, with a small crew remaining overnight.[178]

Starting Monday, August 29, 2011, all Customer Care employees were assigned to rotating 12-hour schedules for the week to ensure 24x7 coverage throughout the storm. Training continued as needed to prepare additional resources to supplement outage call handling in the Customer Care Center.[179]

On August 31 and again on September 3, in cooperation with many of the towns in its territory, UI conducted additional outbound calling campaign to medical customers to provide the appropriate number to call for assistance within their respective towns.[180]

Customer Care employees were provided with key information and talking points daily to assist when handling customer inquiries. Some of this information included:[181]

- Directing customers to the Red Cross, 211, or their towns for assistance as needed
- Number of crews and crew locations
- Restoration time availability
- Number of outages by town

[178] Response to CSU-1
[179] Response to CSU-1
[180] Response to CSU-1
[181] Response to CSU-1

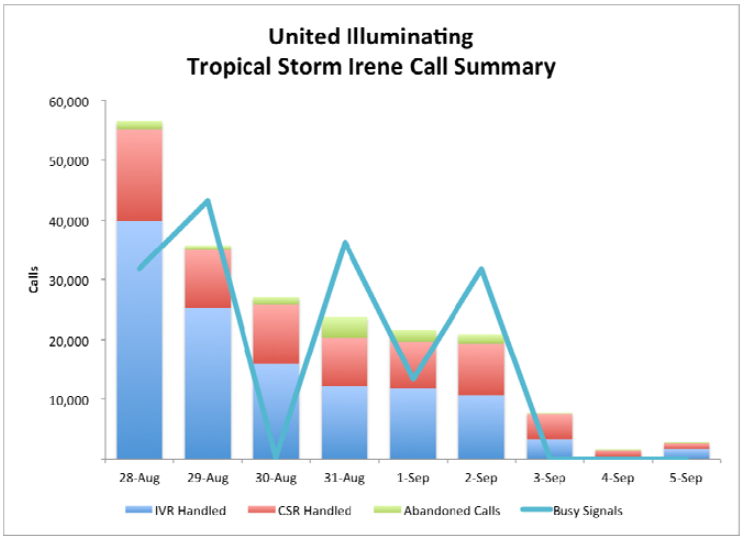
- Press release information

UI closed for normal business starting on Sunday August 28, 2011, as it focused on storm damage assessment and restoration efforts. UI instructed Customer Care CSRs to handle only emergency calls. UI resumed normal business operations on Tuesday, September 6.[182]

The following upfront message was played to callers in the first 2 days of the storm[183]:

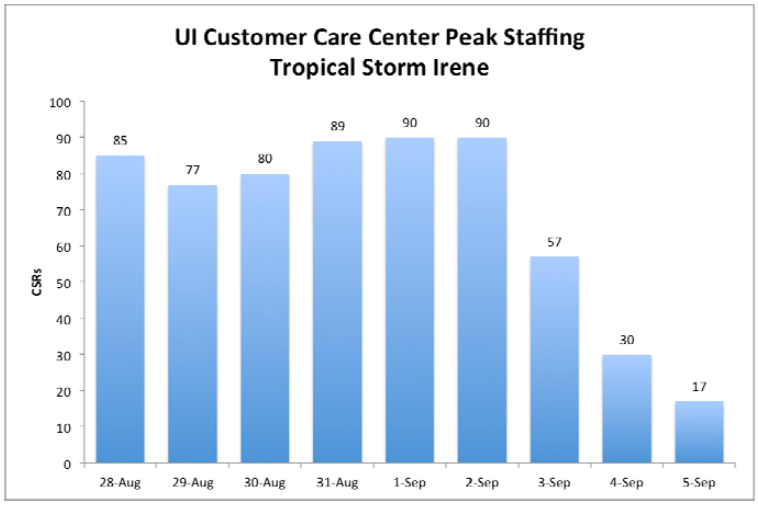
> *We are aware of the many outages in our area and our restorations crews are working around the clock. The focus to this point has been to take actions to ensure public safety. Currently, we are not able to provide restoration times. We appreciate your understanding and patience during this difficult time. Please stay on the line if you are calling to report an emergency or if your call is of an urgent nature. Thank you.*

UI received close to 200,000 calls during Tropical Storm Irene. More than 60 percent were handled through UI's Interactive Voice Response (IVR) system. UI's call center representatives handled more than 65,000 calls during the storm, with an average speed of answer of 148 seconds.[184]However, more than 14 percent of callers abandoned over the course of the storm, with the heaviest abandoning on August 31.[185] Many customers encountered busy signals throughout the storm. More than 150,000 busy signals were delivered to callers over the course of the storm, many more than actually got through to the company on several days.[186]



[182] Response to CSU-5.
[183] Response to OCC-157.
[184] Response to CSU-4.
[185] Response to CSU-4.
[186] Response to CSU-2-1.xls.

From Sunday, August 29 to Monday, August 30, it was determined that accurate restoration times were not available due to the severity of the storm. UI placed a message sharing this information on its IVR system to be heard as soon as the customers called in. The intent of this message was to minimize any inconvenience to customers who were calling in for restoration times. From Tuesday, August 31 through Saturday, September 3, restoration times were available for some customers and the IVR message was updated accordingly.[187]



The above chart details the peak staffing for each day of Tropical Storm Irene. UI's CCC was able to secure considerable staffing to handle incoming calls during the storm, especially coverage over the initial weekend.[188]

Following the storm, UI conducted a final outbound calling campaign to all customers:

> *This is a message from The United Illuminating Company, to our valued customers. On Sunday August 28th, the State of Connecticut experienced one of the worst weather events since Hurricane Gloria in 1985. As New Englanders we demonstrated our resolve and resilience when federal, state, and local government agencies partnered with the state utilities to clear streets and restore power. On behalf of the more than eighteen hundred employees of The United Illuminating Company, The Southern Connecticut Gas Company, Connecticut Natural Gas Corporation and The Berkshire Gas Company we would like to extend our gratitude to our customers for their understanding and cooperation during the recovery period.*[189]

In retrospect, UI's contact center struggled throughout the storm, even with near-peak staffing in place before the storm hit. Many customer calls were blocked due limited capacity in the Customer Care Center and the lack of an overflow IVR provider. Additionally, many customers experienced long wait times to speak with a CSR.

[187] Response to CSU-1
[188] Response to CSU-002.
[189] Response to OCC-147.

October Snowstorm Response

UI did not have as much time to prepare for the October snowstorm. Customer Care participated in a storm planning call at noon on Friday, October 28, 2011. Starting Friday afternoon, UI began to supplement staffing for the weekend. It added 15 CSRs to the normal Saturday afternoon schedule. The Company did not place any outbound calling campaigns to medical customers prior to the October 29 snowstorm.[190]

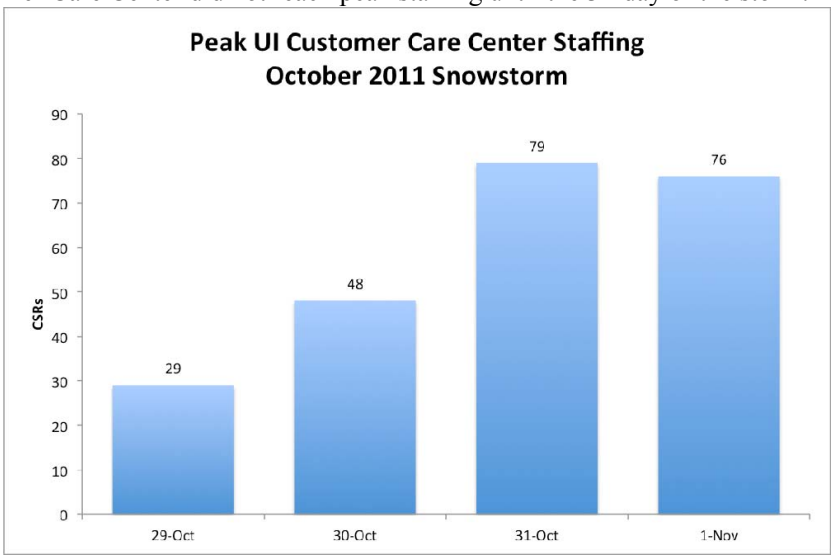
On Saturday afternoon, management began the call in process for additional Customer Care resources when call volumes climbed. Management had difficulties securing enough additional CSRs. It made the decision to call in employees as the number of outages climbed and conditions worsened. Unfortunately, worsening conditions also made it challenging for employees to get to the contact center. As a result, the UI's Customer Care Center's staffing levels were at their lowest during the highest volume of calls. Many customers experienced busy signals. Those able to get through waited on average 15 minutes to get to an agent.[191] Once the Customer Care management team had exhausted its resources, it reached outside the department to secure additional resources (union and management personnel).

Management continued to call in employees on Sunday night in an effort to secure resources for Monday morning. Long wait times were experienced again on Sunday morning, with an average wait ranging from 15 to 30 minutes. Customers also received busy signals as UI's incoming telephone trunks filled up.

On Monday, UI was finally able to fully staff the Customer Care Center. Ramping up to full staffing proved to be a lengthy and onerous process. UI assigned employees to rotating 12-hour schedules for the week to ensure 24x7 coverage throughout the storm. An internal Storm Center Hotline number was also established in the EOC to assist with escalated calls.[192]

[190] Response to OCC-147.
[191] Response to AR-Liberty-48.
[192] Response to AR-Liberty-48.

UI's Customer Care Center did not reach peak staffing until the 3rd day of the storm.



The following upfront message played to alert callers to the storm and possible long wait times during the first two days of the storm[193]:

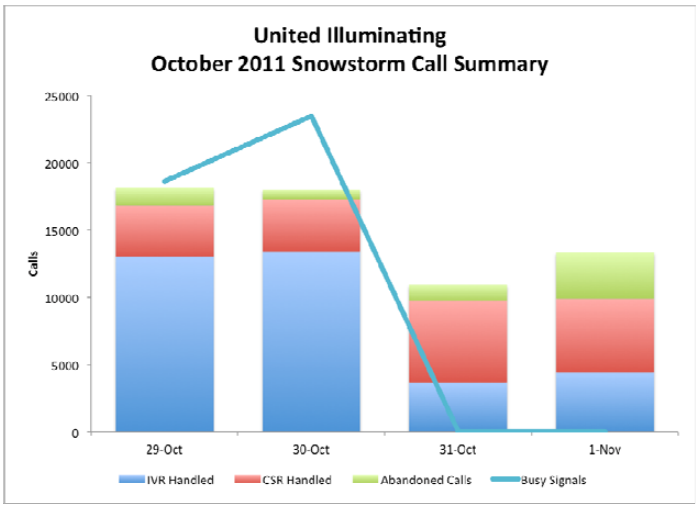
> *We are aware of the many outages in the area due to the storm, and are currently experiencing longer than normal wait times to speak to a representative. We appreciate your understanding and patience during this time. Please stay on the line if you are calling to report an emergency or if your call is of an urgent nature. Thank you.*

As with storm Irene, UI closed for normal business on Monday as it focused on storm damage assessment and restoration efforts. This included suspending service disconnects and instructing CSRs to handle only emergency calls. The Contact centers returned to full operations on Wednesday, November 2.

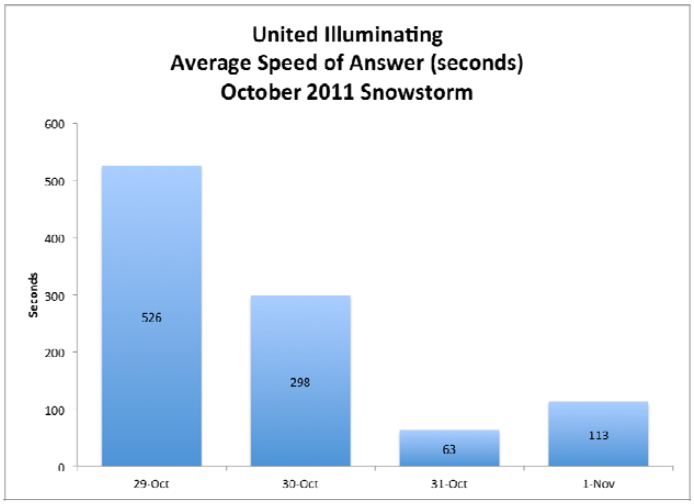
On Saturday and Sunday, UI had received 38,000 customer calls. By the end of the storm, UI's Customer Care Center CSRs handled nearly 20,000 calls, with an average speed of answer of 216 seconds. An additional 35,000 calls self-served in UI's IVR.[194]

However, more than 14 percent of callers abandoned over the course of the storm, with the heaviest abandoning on Saturday, the first day of the storm.[195] In addition, many UI customers encountered busy signals throughout the October snowstorm. Callers received more than 150,000 busy signals over the course of the storm, many more than actually got through to the company on the first two days of the storm, as depicted by the line on the following chart.[196]

[193] Response to OCC-157.
[194] Response to CSU-20.
[195] Response to CSU-19-1.xls.
[196] Response to CSU-2-1.xls.



Call answering performance, as defined by wait time, also suffered during the first two days of the storm[197]



Shortly following storm Irene, UI contracted with a third party to survey residential customers regarding their experiences with UI during the storm. More than 86 percent surveyed "strongly agreed" or "somewhat agreed" that UI worked very hard to restore power as soon as possible following the storm. Seventy-five percent were either "very satisfied" or "somewhat satisfied" with UI's handling of customers during the storm. Of those not satisfied, 39 percent indicated they would have liked power back sooner, 23 percent expressed difficulties communicating with the company, and 11 percent sited a lack of restoration estimates. Only half of respondents

[197] Response to CSU-20.

reported being "very aware" or "somewhat aware" of restoration priorities for UI when an outage occurs.[198]

UI's Customer Care Center has several opportunities to improve operations so that it is better prepared to handle customer calls in future large outage events. Liberty discusses these opportunities in the Recommendations section at the end of this section.

2. Corporate Communications

In the days leading up to storm Irene, UI held internal meetings with its storm team and within communications specifically to begin planning communications strategies based on the storm track and its potential impact on UI's service territory. Once it was clear that customers would be affected, UI immediately began implementing its communications strategy.

Prior to and during Irene, UI proactively reached out to the media and public with customer-focused communications, such as news releases, public service announcements, and social media posts. At the same time, the Customer Care Center organization initiated several automated pre-recorded calling campaigns to notify customers of pre-storm preparations, safety, and medical guidance.

UI also provided half-day safety presentations at the New Haven Regional Fire Training Academy during the week before the storm, to refresh first responder safety around downed wires and other electrical equipment.[199]

During the storm, the Company held joint press conferences with CL&P and participated in Governor Malloy's press briefings. UI's media hotline was open and company representatives provided media interviews as requested. UI issued 14 news releases prior to and during Irene and responded to 106 media inquiries, including 32 interviews on the first day of the storm.[200]The following table lists the news releases prior to and during the storm:[201]

Date	Title
August 25	As Hurricane Irene Approaches, UIL Holdings Corporation Helps Customers Prepare
August 26	Storm Checklist & Preparation Tips
August 28	UIL Holdings Corporation Urges Customers to Put Safety First as Hurricane Restoration Efforts Get Under Way
August 28	UIL Holdings Corporation Continues Restoration Efforts
August 29	UIL Holdings Corporation Expects Significant Progress with Post-Hurricane Restoration Efforts Monday
August 29	UIL Holdings Corporation Post-Hurricane Restoration Update
August 30	The United Illuminating Company Reports More Progress; Estimated Restoration Times Discussed

[198] Response to AR-Liberty-31-1.
[199] uinet.com website, August 25, 2011 Press Release.
[200] Response to CSU-8.
[201] uinet.com website.

August 31	UI Hopeful Outages Can Be Reduced to 10,000 during the Weekend
September 2	The United Illuminating Company Announces $50,000 in Relief Grants
September 2	UI Expects to Restore Virtually All Remaining Outages this Weekend
September 2	Outage Numbers Continue to Drop as CL&P and UI Push Restoration Efforts
September 3	UI's Restoration Efforts Nearing Completion
September 5	Major Restoration Complete for UI
September 4	An Open Letter to Our Customers

On September 20, UI issued a press release to announce results of a residential post-storm survey. Nearly three-quarters of survey respondents reported hearing or seeing media reports or information about the progress of storm restoration, including the number of customers without power, however only 38 percent reported the media impacts had a "positive impact" while another 34 percent indicated the media reports had "no impact, but perception remained good." When asked how respondents preferred to be contacted by UI during a storm, nearly 60 percent indicated by phone. Radio and TV were the next preferred channels, followed by text messaging and emails.[202]

Since the March 2010 storm, UI took steps to strengthen its customer and media communications:[203]

- UI hired a new Director of Corporate Communications in June 2010.
- New processes were put in place to manage media relations
- Additional communications strategies were developed to communicate to customers and the public.
- UI delivered more targeting storm preparation and safety information messaging to customers through its monthly billing inserts.

UI's storm communications plan is integrated into the UI Emergency Preparedness Plan. Several subsections of the EPP address emergency communications, communications preparedness, and public communications. Specific elements and processes of the communications plan are referenced in Appendix 4, Liaison and Appendix 3, Public Information. The plan includes lines of authority, roles and responsibilities, procedural checklists, matrices to guide incident-level communications and recommended staffing levels for each storm duty role based on the severity of the storm. Sample communications log forms are also included as well as recommended equipment, tools, and supporting systems, scaled to the storm severity.

Additionally, UI embeds more than a dozen communications professionals in the UI Storm Center during a large storm, including:[204]

- Two Liaison Team Leaders: responsible for all communications activities and coordination with public agencies and the media.
- Six Municipal Liaison Team Coordinators: responsible for coordinating communication among the municipal liaisons.

[202] Response to AR-Liberty-2.
[203] Response to AG-12.
[204] Response to AG-149.

- Two Major Account Coordinators: responsible for all communications with major accounts.
- Two PURA Representatives: communications with PURA
- Four additional State EOC Liaisons report directly to the State EOC.

While UI issued press releases on a daily basis, the releases did not communicate restoration estimates until very late in the storm when it had already restored 97 percent of customers. This placed pressure on other communications channels, such as the contact center, website, and social media to provide more detailed estimates. The following table summarizes the message presented in each release, as well as the projected restoration times.

	Message in News Release	Anticipated Restoration Date
August 28	30,000 out and growing	No estimate
August 28	106,973 out	No estimate
August 29	105,166 out	No estimate
August 29	99,268 out	ERTs by Tuesday
August 30	82,985 out	ERTs by Wednesday
August 31	60,772 out	Down to 50,000 by Wednesday, 10,000 during weekend
September 2	Storm fund donation, 21,872 out	No estimate
September 2	20,825 out	All by end of weekend
September 2	UI 22,000 out CL&P 148,000 out	UI: down to 10,000 by Saturday Morning CL&P: down to 100,000 by Saturday at midnight
September 3	97% restored, 8,861 out	End of Sunday
September 5	99.8% restored	Restoration complete
September 4	Thanks	Restoration complete
September 6	100 out	No estimate

Following storm Irene, UI's Storm Communications Plan was changed to stress the importance of regular daily briefings with all town and elected officials (local and state), to provide as much information as possible to the towns, and to indicate street locations where crews would be working the next day.[205]

UI implemented its Storm Communication Plan as designed during the October snowstorm.[206] UI's contact with public officials and emergency first responders regarding the October snowstorm first began on Friday, October 28, 2011, during the pre-storm planning call. UI developed staffing plans to man State and Federal EOCs. The Municipal Liaison Coordinator notified Municipal Liaisons to be on the alert for the opening of any municipal EOCs and all 17 municipalities were notified of the opening of UI's Storm Center, along with details regarding

[205] Response to AG-148.
[206] Response to AG-148.

weather forecasts, call center extended hours, number of crews on standby, and other critical information.[207]

UI issued an initial media release on restoration progress within 24 hours of the event. UI reported the number of customers out as of 9 am and had already reported restoration activity results. It posted this information on the external and internal websites and provided it to the Customer Care Center. This was followed by two additional media releases on progress and the completion of restoration efforts.

On Saturday, all municipalities were again notified of UI's planned storm response and UI's Major Customer Hotline was transferred to the Major Account Coordinator for the remainder of the storm. UI continued to communicate to municipalities as the storm worsened and as information was received from state and local emergency officials. By 5 pm on Saturday, UI's communication team was receiving reports from municipalities that residents were having trouble getting through to UI's call center.[208]

On Sunday afternoon, UI notified municipalities that it expected to have most customers restored by midnight on Monday. At 6 pm, municipalities were provided status reports detailing the restoration effort in their towns, including street locations where UI crews will be working to restore power on Sunday evening and Monday morning. This information was updated and sent out again on Monday morning, at noon, and late Monday afternoon. At 8:30pm, UI notified municipalities that additional outages were reported making it unlikely that UI would restore all service on Monday evening. UI released a new estimate to have most customers restored by Tuesday evening. By midnight Monday, 1.57 percent of customers were without power. UI continued to send two to three daily status reports to municipalities affected by the storm until full service was restored on Wednesday.[209]

UI's first press release was on Sunday, October 30, 2011, announcing that restoration was underway:[210]

Date	Title
October 30	UI Reports Progress Restoring Customers after Autumn Nor'easter
October 30	Electric Service Restored to Nearly 45,000 UI Customers
November 2	UI Announces Major Restoration Efforts Complete

The following table summarizes the news releases issued during the storm:[211]

	Message in News Release	Anticipated Restoration Date
October 30	18,751 out	No estimate
October 31	8,274 out	Nearly all by Midnight
November 2	Restoration Complete	Complete

[207] Response to OCC-146.
[208] Response to OCC-146.
[209] Response to OCC-146.
[210] uinet.com website.
[211] Uinet.com website.

In addition to the distribution of media releases during the October snowstorm, the Communications Storm Team responded to 14 media inquiries[212] and responded to requests for TV, radio, electronic, and print interviews. UI also used Facebook, Twitter, and YouTube to post multiple messages to customers and the public.[213]

Corporate Communications effectively coordinated with other groups to gather and disseminate storm restoration information. Corporate Communications was an active participant in EOC conference calls, and it took control of the "storm message" for the company. When possible it pressed Operations for anticipated restoration times and worked closely with Municipal Liaisons to gather town-specific information. UI Corporate Communications took advantage of traditional and non-traditional communications outlets during both storms.

3. Community Relations

At UI, the community relations responsibility generally falls to the Account Management team, reporting to UI Strategic Account Services. Account managers are assigned geographical areas to serve. They generally live within or close-by their territories and become very familiar with the needs and concerns of their municipal and business constituents. Account managers normally attend city events and planning meetings, community leader meetings, and any franchise and rates meetings. Other participation includes local community leader clubs, school boards, and charities, with a goal of establishing a company presence in the local community.

UI account managers will contact key accounts and municipalities in the likely event of a storm affecting their service territory. Storm updates are provided several times a day to keep municipal and emergency officials apprised of the restoration effort.

In the event the municipality opens its EOC during a storm, UI provides a municipal liaison to work directly with the EOC and the municipal officials. UI has designed the program such that one municipal liaison is dedicated to each town or city, year over year, to develop relationships, experience, and consistency in the storm restoration process. UI has also identified a backup pool of trained municipal liaisons that can be assigned if necessary to ensure coverage. UI's municipal liaison program was put into place in 2010.

UI's Emergency Preparedness Plan dedicates a section to the Municipal Liaison program. Specific elements and processes are referenced in Appendix 4, Liaison. The plan includes lines of authority, roles and responsibilities, a process overview, procedural checklists, and recommended staffing levels for each storm duty role based on the severity of the storm. Recommended equipment, tools, and supporting systems are also detailed, based on storm severity.

Municipal liaisons, available on a 24x7 basis, provides a direct communications link between the UI Storm Center and the towns to help address specific issues and relay restoration status progress.[214] Municipal liaisons work with municipalities to address trouble locations and areas of concern. UI municipal liaisons also communicate special situations and requests to ensure that

[212] Response to CSU-23.
[213] Response to AG-150.
[214] Response to CSU-3.

UI is aware of the status of critical facilities and can respond in a prioritized manner to outages at these locations. UI municipal liaisons are provided with hourly EOC updates on the condition of their town and relay updates to municipal officials as needed.

UI's Municipal Liaison Team Coordinator is positioned in the EOC during a storm to assist with the communications between the EOC and municipal liaisons. In the EOC, the Municipal Liaison Team Coordinator has direct contact with the Liaison Leader and the Incident Commander.

On a semi-annual basis, account managers and assigned municipal liaisons meet with their respective municipal officials to foster a relationship, to update key infrastructure priorities, and to review UI's emergency response plans. Municipal liaisons also participate in annual training, Emergency Preparedness Plan (EPP) drills and After Action Reviews. Municipal liaisons also attend UI sponsored training seminars for municipal officials and participate in municipal EOC training exercises.[215]

In August 2010, UI hosted a storm response related informational breakfast for all of its municipal customers. Municipal liaisons also attended this breakfast. Account managers, electric system managers, the manager of restoration, and other UI managers were also presenting at the breakfast and available to meet with municipal customers. A host of topics was covered including UI's storm restoration process and priorities, storm safety, and OMS capabilities.[216] The Commissioner of the State of Connecticut Department of Emergency Management Homeland Security also presented an overview of the State's Hurricane Preparedness Plan. More than 150 individuals from all 17 municipalities attended the meeting.[217]

It provided refresher training for Municipal Liaisons on June 17, 2011 and June 23, 2011. More than 60 employees participated in this training.[218] Timing of the training was good. Municipal Liaisons were well prepared when Tropical Storm Irene made landfall.

UI implemented its communication plan and applied it during pre-storm planning for Irene when the Municipal Liaison Team Coordinators first informed their assigned towns of UI's contingency plans regarding the storms. Municipal Liaisons worked with towns, supporting the restoration effort, until all customers were restored.

After Irene, UI held meetings with the Municipal Liaison Team Coordinators, Account Managers, and Municipal Liaisons for all 17 municipalities beginning on September 12, 2011. UI Executives also met with Town Officials in all 17 municipalities to assess the Municipal Liaisons process and identify areas where communication can be improved.[219] Lessons learned regarding the municipal liaison program:[220]

[215] Response to CSU-32.
[216] Response to AG-8-1.
[217] Response to CSU-33.
[218] Response to AG-152.
[219] Response to AG-146.
[220] Response to EL-9.

- The volume of emergency calls from the municipal EOC through municipal liaisons was much higher than anticipated during the storms, making it challenging to communicate with UI's Storm Center to track and update status of these calls.
- More than half of the towns served by UI had never opened an EOC prior to the storms. As a result, many of the critical infrastructure priorities had not been coordinated within the municipality and UI's storm restoration process was new to them.
- Municipalities expressed a need to have more control on where UI crews would be working within their towns, including the need to coordinate with public works and tree removal crews.
- ERTs should be provided sooner.
- Many residents were calling the municipalities because they could not get through to UI's Customer Care Center and the lack of ERTs, in addition to the inability to access storm information on UI's website, was making it difficult for municipal officials to answer resident questions.
- Municipal officers would like more information from UI regarding the location of crews working within their town and information about the circuits that are out. A map with trouble spots would help towns direct police patrols and other services to the right locations.

The Municipal Liaison program worked more smoothly during the October snowstorm. Municipal Liaisons had become very familiar with their towns during Tropical Storm Irene—they knew who to work with and how to help. In addition, UI incorporated some changes to the program as a result of the lessons learned following Irene. One important change was to provide towns with a list of the streets where crews would be working the following day. This helped towns better coordinate resources to support the restoration process.

Storm Center personnel, Municipal Liaisons, and other UI employees spent considerable effort to gather storm and restoration status information affecting towns so that it could be shared with Towns/Municipalities, the Contact Center, and other stakeholders. UI was also challenged to manage the high volume of emergency calls logged at EOCs and communicated through MLs to the Storm Center (due to Contact Center accessibility issues).

The challenge was made more difficult with the difficulties getting through to UI's Customer Care Center, the lack of ERTs and storm status information, and the need to balance the needs of one town versus many. In addition, many town officials shifted priorities of critical facilities during the storms, making it necessary to shift field resources, further delaying restoration.

4. Communicating Outage Information

Traditionally, electric utility customers have called the utility to report problems or interruptions in their electric service. Nearly commonplace now, utilities have embraced the use of Interactive Voice Response (IVR) technology to allow self-service outage reporting via telephone and to allow customers to report outages as well as obtain customer-specific restoration status information from the utility.

Additionally, advanced metering technologies and distribution automation are presenting opportunities to identify customer locations that have lost power. Utilities with this level of notification can leverage these technologies during storms and proactively contact customers, especially critical care customers, to let them know that the company knows about the outage, provide the expected restoration time, and preempt a significant number of customer calls and website visits.

a. Outage Management Systems

OMS (Oracle Network Management System) is a detailed network model of the distribution system. Electrical Connectivity is provided from the Geographic Information System (GIS) that is the source of this network model. The system combines the locations of outage calls from customers, and uses a rules engine to predict the locations of outages. OMS facilitates outage prediction, identification, resource assignment, and restoration reporting. OMS also provides an internal workflow management tool and communication medium to various staff members associated with the restoration effort. OMS is integrated with UI's SAP Customer Information System (CIS) and provides the outage count information depicted on the UI website. Following Tropical Storm Irene, UI issued a Request for Information (RFI) to several vendors to explore potential OMS technology improvements.[221]

The following activities can initiate electric trouble orders in the OMS:

- Customers calling the company's call center representatives
- Customers self-reporting trouble through the Interactive Voice Response system
- Dispatchers can manually create outage orders.

OMS's analyzer module interprets each outage call and creates outage trouble spots that are associated or "tagged" to likely electrical devices, such as a transformer. UI's distribution electrical connectivity model groups devices using relational database tables that create the link for customers to transformers, transformers to fuses or other protective devices, devices to circuits, and so forth. As new trouble reports arrive, the system continues conditional grouping of devices automatically. OMS also provides tracking of the status of system isolating devices, i.e. switches, breakers and fuses that may be open and which are closed, network-tracing functions can be used to identify customers affected.

OMS information is readily available to Call Center Representatives, the Interactive Voice Response system, UI's website, dispatchers, and any UI field or office employee that has access and has been trained to use the system.

Most utilities rely on outbound notification or callbacks to verify that power has been restored. During large outages there are often numerous trouble spots along a single circuit or part of a circuit. As circuits or portions of circuits are repaired, trouble tickets associated with that circuit are closed in the outage system. Power may still be off at a particular location, but since the tickets were closed by the outage system, the utility will not know that power is still off unless the customer calls back (or the utility can ping an automated meter). However, since UI has

[221] Response to OCC-324.

deployed Automated Meter Reading (AMR) technologies, it has the capability to "ping" a meter to determine if the power is on or off. This capability was used extensively during both storms.

This is a much more efficient way to determine service status, since the callback process can be confusing to customers, even anger customers who are still without power after many days, often creating escalated calls in the contact center.

UI updated its critical facilities lists on August 27, 2011, just prior to Tropical Storm Irene. The list was updated through the Municipal Liaison program. The Municipal Liaison Team Coordinator meets with municipal officials on an annual basis to review priorities and changes. During an event, the Municipal Liaison will work with town contacts to determine the current status of priority facilities as well as communicate this status to the EOC. The EOC too maintains a copy of these critical facilities by town. This list is referred to as outages occur to identify if a priority facility has lost power. EOC then works through the Planning Team Leader to prioritize damage assessment and restoration priority.[222]

During Tropical Storm Irene, UI noticed capacity issues with OMS during the storm. For the remainder of the storm, UI limited access to key users to avoid issues. Since the storms, UI has issued an RFI to certain vendors for developing a methodology of integrating technology and process to enhance UI's restoration processes.[223]

Otherwise, the performance and reliability of UI's OMS during the 2011 storms was generally good. OMS performed well to provide trouble spot predictions and track asset conditions as well as predict customers affected.

b. Estimated Restoration Times

Another role of outage systems is to provide estimates for the time of restoration. Estimated Restoration Times (ERTs) are a critical information component of the restoration process.

For day-to-day operations, UI's outage management system calculates event-level ERTs based on area, order type, and active order volume. OMS uses historical outage records and predefined rules to create an initial ERT for each event. Field personnel can turn off the calculation of event-level ERTs at any point. Generally, UI disables ERT calculations during a large storm and did so at the beginning of both storms.

UI has the capability to issue four levels of ERT projections—event-level, district, divisional, and global. During both storms, UI delivered a global announcement to customers in the first few days, via the phone system, to let customers know that ERTs would not be available until the damage assessment process was completed. Once damage assessment was complete and UI had a better idea of the level of resources available, UI's EOC support staff was able to project estimates at the circuit level. As restoration progresses, UI was able to estimate to the feeder-level and ultimately at individual customer locations.[224]

[222] Response to Liberty-57.
[223] Response to OCC-141
[224] Response to AG-9.

OMS is updated by the EOC to provide ERTs and completed repairs. These updates are based on the status of the notification within OMS, which indicates if crews are en-route, on-site, or if the outage has been restored. UI's IVR attempts to deliver the status and ERTs to customers calling in during a storm, if the system can identify and match the caller to a CIS account.[225]

Earlier in 2011, UI made a focused effort to improve the process in the field and System Operations Center (SOC) to provide estimates of restoration during "blue-sky" outages and smaller storms. Beginning in June 2011, UI began measuring the frequency with which ERTs were recorded in OMS. This information was reported monthly as a Power Delivery and System Operations metric. Through November 2011, UI achieved an 85.2 percent success rate for reporting ERTs, well surpassing its goal of 75 percent.[226]

However, UI's process to update OMS restoration status and provide estimates of restoration during blue-sky or normal outages, was not scalable in both of these storms, for several reasons:

- Damage assessment process in large storms relies heavily on mobile patrols. Information collected during the patrols was handwritten, requiring manual entry into OMS. This can be a time consuming process, often delaying the process to project restoration estimates.
- Once restoration was underway, restoration information was not updated in OMS, in many cases, until well after the crews were finished for the day. Similar to the field surveys, handwritten trouble order completion information had to be manually reconciled and reflected in OMS, which again can be time consuming and create backlogs. This too can delay the communications of restoration progress.

In the post-storm customer research survey conducted following Irene, 91 percent of residential customers surveyed indicated that it was "very important" or "somewhat important" to receive an estimated outage duration when they call UI to report an outage. Of these, 50 percent indicated a preference for "real-time estimates" while another 35 percent preferred a "larger window of time up-front which incorporates unforeseen delays and issues".[227]

While in both storms UI based restoration projections on damage patrols and work schedules, in the future UI plans to rely on OMS automation to calculate and provide ERTs up until the restoration crew is on-site. At that point, UI will require crews to provide and/or validate ERTs in OMS.[228]

UI has identified the need for an OMS upgrade. As part of the upgrade, additional allied projects were identified to enhance internal and external communications, including installing mobile data terminals in damage assessment and line construction vehicles, which would allow for faster communication for damage assessment from the field along with earlier and more accurate knowledge of completed restoration times. On November 1, 2011, UI released a request for information (RFI) to explore options.[229]

[225] Response to OCC-158.
[226] Response to OCC-142.
[227] Response to AR-Liberty-38-2.
[228] Response to OCC-142.
[229] Response to AG-9.

c. Communicating Outage Information

UI has leveraged its public website to provide outage-related information to customers and website visitors through its Storm Center. Customers can review general information on UI's storm response, emergency preparedness, find out what number to call to report an outage, view a map of current outages, and view a table summarizing customer outages by town. The figure below provides a recent sample from UI's outage mapping website.[230]



During the first three days of Tropical Storm Irene, UI received an abnormally high number of hits to its outage map, more than 10x normal hit rates. To alleviate a slowed response, UI took the outage map offline on August 28 and replaced it with a table of affected customers by town, which was manually updated on an hourly basis.[231] In addition, UI replaced its normal home page with the outage table for the duration of the storm, thereby making it easy for visitors to view outage restoration progress. While the outage map was ultimately brought back online on August 30, UI continued to feature the outage table on its home page until restoration was completed on September 5.

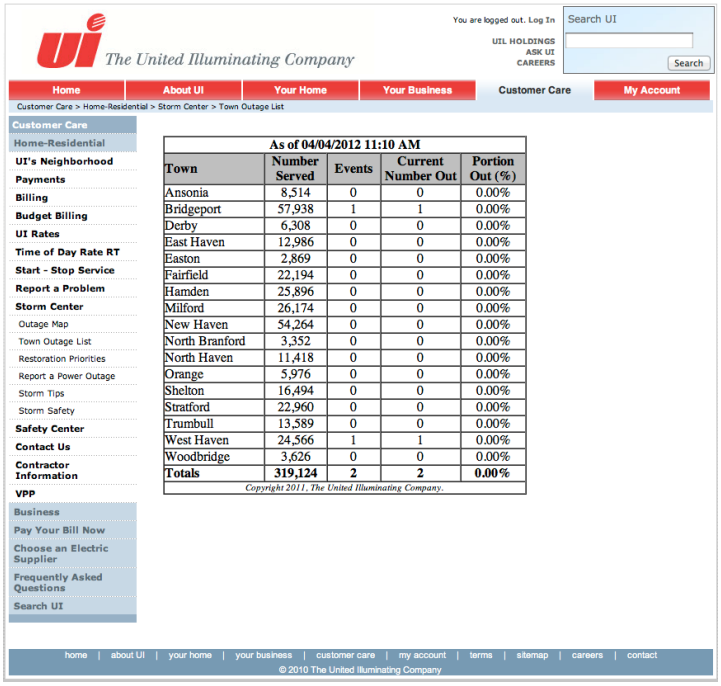
In total, UI's website logged more than 200,000 page views during Tropical Storm Irene.[232] UI's website continues to feature the outage table today.[233]

[230] uinet.com
[231] Response to EL-5.
[232] Response to CSU-7.
[233] Uinet.com.

During the October snowstorm, UI website traffic peaked with 63,871 page views.[234]

UI did not experience any issues with regard to the outage map during the October snowstorm. The challenges that occurred during Tropical Storm Irene have been reviewed and the Company is implementing technology to address capacity constraints to avoid similar issues in future storms.[235]

UI used social media channels Facebook, Twitter, and YouTube to disseminate information during the storms. Generally the same information that was posted in media releases and on the website was posted to social media channels.[236]



UI is exploring ways to improve the outage information communicated through its website, specifically to increase the interactivity to allow customers to explore outage status information by hovering over a particular town on the map. This is part of the request for information for restoration process enhancements and technology that was issued on November 1 2011.[237]

5. Conclusions

1. UI's call center was unable to ramp up staffing as quickly as needed to respond to the call volumes encountered during the October snowstorm.

The UI Emergency Preparedness Plan, filed with PURA on December 1, 2011, includes a section dedicated to Customer Service. However, UI's Customer Care Storm Plan does specify how the center will be staffed during an emergency or large storm.

[234] Response to CSU-38.
[235] Response to OCC-148.
[236] Response to CSU-37.
[237] Response to AG-9.

While UI did fully schedule Customer Care Center resources in advance of Tropical Storm Irene, this was not the case during the October snowstorm. Initially, UI predicted a much smaller storm and the Contact Center staffed the weekend accordingly. However, conditions changed on Saturday and call volumes climbed quickly as customers lost power. CCC management scrambled to call-in additional CSRs, a process that took several hours, and ultimately was not very successful. Still short of staff, management asked for and got volunteers from other departments. However, these employees had to be trained, further delaying the staffing ramp-up. As a result, UI was short staffed for the weekend, when call volumes were very high. Many callers received busy signals, experienced long waits, or abandoned before getting through to the Company.

2. UI customers had difficulties reaching the company to report a loss of power or to inquire about restoration status during both storms.

UI did not have any high-volume overflow IVR options in place to accommodate the extremely high volume of customer calls it received in the early stages of these storms. Due to the volume of callers trying to reach UI and the unavailability of overflow options, UI's telecom trunk capacity (lines into the call center) was exceeded for much of the storms, creating long wait times, a high level of abandons, and busy signals for many callers.
Callers wishing to report an emergency situation, such as a downed line or burning wire, had to wait in queue along with other callers, or continue redialing to get through. Unable to get through to UI, many customers called town officials and 911 services.

UI's Storm Center web site experienced unprecedented usage during Tropical Storm Irene. While site access slowed down at several points during the storms, UI was able to temporarily remedy the problems. In addition, the website did not provide estimated restoration times, so customers were forced to call the Company to find out more about the outage.

UI had not sufficiently "stress tested" its telephony system, website, or outage system prior to either storm to ensure that it could handle the high level of calls/visits typically encountered in a large storm or outage.[238]

3. UI's Communications Storm Plan is incorporated into UI's Emergency Preparedness Plan.

Several subsections of the EPP address emergency communications, communications preparedness, and public communications. Specific elements and processes of the communications plan are referenced in Appendix 4, Liaison and Appendix 3, Public Information. The plan includes lines of authority, roles and responsibilities, procedural checklists, matrices to guide incident-level communications and recommended staffing levels for each storm duty role based on the severity of the storm. Sample communications log forms are also included as well as recommended equipment, tools, and supporting systems, scaled to the storm severity.

[238] Response to Liberty-42.

4. UI proactively communicated with the media, public officials, customers, and the public before, during and after both storms.

As defined in UI's EPP, Corporate Communications assigned a Communications Manager to the EOC to develop strategies for communication and media-relations activities. UI's Communications Lead was an active participant in EOC conference calls, and it took control of the "storm message" for the company. When possible, pressed Operations for anticipated restoration times and worked closely with the Municipal Liaison Lead to gather town-specific information.

- UI had adequate pre-storm communications alerting customers to the impending storms and emergency preparedness concepts.
- UI actively engaged the media and the public throughout the storm to provide storm status and restoration progress.
- UI took advantage of social media outlets to expand the ways in which the public and customers could interact and communicate with the company.
- UI conducted post-storm research to better understand customer expectations and satisfaction with restoration performance.
- UI engaged town leaders and public officials in post-storm meetings to gather feedback and develop lessons learned following the storms.

In essence, communications mechanics were in place. However, the extended duration of the restoration efforts and the lack of estimated restoration times inconvenienced and frustrated customers and municipal officials.

5. While UI's Municipal Liaison approach enhanced communications between towns and the utilities during both storms, there is room for improvement.

Storm Center personnel, Municipal Liaisons, and other UI employees spent considerable effort to gather storm and restoration status information affecting towns so that it could be shared with Towns/Municipalities, the Contact Center, and other stakeholders. UI was also challenged to manage the high volume of emergency calls logged at EOCs and communicated through MLs to the Storm Center (due to Contact Center accessibility issues).

The challenge was made more difficult with the difficulties getting through to UI's Customer Care Center, the lack of ERTs and storm status information, and the need to balance the needs of one town versus many. In addition, many town officials shifted priorities of critical facilities during the storms, making it necessary to shift field resources, further delaying restoration.

6. UI did not effectively provide Estimated Times of Restoration (ETRs) to customers in storms.

UI suppressed ETR calculations in OMS early in both storms. ETR calculation was not reinstated until several days into the storms, well after the damage assessment was complete and restoration was underway. As a result, early communications were vague, leaving customers and municipal leaders with little information on which to plan.

UI's day-to-day outage restoration process encourages field crews to set ETRs, provide status, and close outage tickets in a timely manner, albeit manually (via radio/phone). However, UI has not been successful scaling this process up during a large storm.

UI is currently investigating technologies to improve the flow of outage restoration-status information and ERTs to/from the field.

7. UI successfully used its automated meter reading (AMR) technologies to ping meters to verify restoration status and update OMS.

Storm Center personnel used the Utilinet AMR application to communicate with installed revenue meters during the storm to confirm restoration status. This was especially helpful in the later stages of the storm to address thousands of "wire down" trouble tickets received.

6. Recommendations

X-UI-1 Create a call center storm staffing process to facilitate quick ramp-up of call takers during a large outage.

To be adequately prepared for the high volume of calls into its call center during a large outage, UI should have adequate and experienced agents on hand to respond. UI should be prepared to staff up quickly to be most responsive. UI should develop a call-center resource plan that it can activate during major storms or large outage events, in concert with its current Emergency Preparedness Plan. The staffing model should provide guidelines for adding resources, based on the predicted severity of the event, projected call volumes, the timing, and expected duration.

UI should also explore options to automated and expedite the call-in process for CSRs, as well as consider assigning rotating storm duty assignments to ensure that it can adequately staff the Customer Care Center during a storm.

UI should also create a process to facilitate the addition of employees from other departments and the Gas Companies to the Customer Care Center, so that these employees can assist with outage calls during peak calling periods. Periodic outage call handling refresher training should be delivered to these employees to minimize the ramp-up lead-time.

X-UI-2 Redesign call center technology to improve communications with customers during a large outage or storm.

UI must make it easier and quicker for callers to report an emergency, especially during large outages. UI should alleviate telephony capacity restraints so more customers can report outages sooner and eliminate blocked calls (busies).UI should consider outsourcing or offloading overflow to a third-party IVR when call volumes exceed capacity—effectively renting the capacity when needed. Many large investor-owned electric utilities in the U.S. have adopted this approach to handle overflow.

Liberty understands that the Company is in the process of researching outsourced IVR technologies and has identified Twenty First Century Communications as a major vendor serving utilities across the country. UI is in the process of working with the vendor to determine next steps to implementing a solution.[239]

X-UI-3 Rigorously test call-handling technology, website, and Outage Management System to ensure the technologies operate to expectations and specifications.

As UI implements options to improve Customer Contact Center telephony it should incorporate stress testing to ensure that the new technologies are working as expected and that UI is delivering a good customer experience. Equally important is the need to make sure the new technologies can handle the high call volumes typically associated with a Level 3 or Level 4 storm.

UI should pursue a testing procedure or service to "stress" test call center technologies and supporting outage call handling systems to ensure they are capable of handling the high volume of transactions generated by extremely high call volumes. For example, confirming that OMS operates as desired while receiving and analyzing an extremely high volume of outage tickets. A holistic testing approach will eliminate failures in background systems as well as front-facing technologies, thereby creating a better company response and a better customer experience.

X-UI-4 Enhance the Municipal Liaison program to create a more consistent approach to keeping community leaders and municipal officials better informed of storm restoration status.

Dedicated Municipal Liaisons and staff at the State EOCs have proven to be very effective. UI should continue to build on the Municipal Liaison program, with a focus on consistency. Each town's critical infrastructure priorities should be documented and easily identified in the outage management system.

UI should develop tools to facilitate better communication between Mutual Liaisons and the EOC. Including tools to communicate crew deployments and outage restoration status.

UI should expand post-storm follow-up to capture feedback on the quality of the Municipal Liaison relationship and services provided.

X-UI-5 Pursue technology and process enhancements that will facilitate real-time updates of restoration status information in the outage system and enable more timely ETRs.

During large outage events, UI should equip its damage assessors and restoration crews (and foreign crews) with mobile data terminals, laptops, or other devices that can communicate and interact with the outage system or develop a real-time process wherein outage information is communicated from the field to a skilled OMS user in a dispatch office, operating center, or other location using cellular telephone, radio, or other communications device. This will improve

[239] Response to Liberty-41.

the likelihood that OMS trouble order data is updated in a timely manner. (Also refer to Chapter IX.)

UI should develop a process to manage restoration projections on a global, district, street-by-street, and individual customer level during a storm. This includes procedures to address ETR calculation, accuracy, and communication.

XI. Support Organizations

The structure and performance of support organizations play an important role in a utility's response to a major storm. Emergency organizational structure of support functions vary from utility to utility. Some define "logistics" very broadly, encompassing many of the support functions. Others define it more narrowly, and only include food, lodging, and perhaps one or two more. Liberty reviewed the following support functions at CL&P and UI for the 2011 storms: Food/lodging, Transportation, Materials, Environmental, Communications, Safety, Security, IT, and Facilities.

A. CL&P

1. Staffing and Performance

The chart below shows the CL&P staffing levels for support functions during the two storms.[240]

CL&P Support Staffing

Support Function	Hurricane Irene	October Snowstorm
Food/Lodging	218	278
Transportation	23	29
Materials	86	84
Environmental	44	37
Communications	20	19
Govmnt/Regulatory	5	5
Safety	23	23
Security	5	5
IT	120	120
Facilities	43	25
TOTAL	587	625

Given the size of the workforce for both storms, CL&P staffed the support functions appropriately. CL&P made good use of NU and CL&P employees whose normal job assignment was not in operations.

Of the ten support functions listed above, the CL&P Logistics Section Chief was responsible for all except Governmental/Regulatory and Safety. In addition, the logistics group was responsible for five other functions – Vegetation Management, Analyzing, Outside Line Resources, Damage Assessment, and Wires Down. Logistics provided resources for these five functions as requested by the divisions, but was not accountable for the performance functions. Logistics served as an "agent" to the Area Commander and the Divisions in these five areas.[241] During the Irene response, there was a lag in communications from the logistics chief to the food/lodging people,

[240] CL&P response to Liberty audit request #039
[241] CL&P ERP, Section 4 Emergency Response Organizations, Logistics, 4.3; Interviews #22, January 3, 2012 and #76, March 16, 2012

as large numbers of outside crews began to arrive. To help with this, CL&P changed the procedure during the October storm to provide more assistance from the system level.[242] Other than this, there was no indication of problems with the CL&P support functions under the Logistics Chief.

CL&P put a strong emphasis on public and worker safety, and the results were very good in both storms. Safety representatives report to System Command. In these two storms, there was a minimum of one safety representative in every district. Safety group requested "upwards of 20" for both storms and eventually got them. They conducted safety briefings at hotels, work centers, satellites, and staging areas. This worked well. CL&P did not use deployment points (gateways) for incoming crews. Crews arrived at work center, the work center called the safety group, and CL&P sent a safety representative to conduct orientation.[243]

System Command handled governmental and regulatory coordination, and there were no indications of problems in this area.

2. Conclusions – CL&P Support Functions

1. CL&P staffed its support functions appropriately and performed these functions well, but there are opportunities for improvement. (See Recommendation 1)

CL&P staffed support functions appropriately. CL&P made good use of NU and CL&P employees whose normal job assignments were not in operations. There are too many functions assigned to the Area Logistics Chief. A delay in communications in Logistics occurred during Irene. CL&P put a strong emphasis on public and worker safety, and the results were very good in both storms. CL&P did not use deployment points (gateways) for incoming crews. Crews arrived at the work center, the work center called the safety group, CL&P sent a safety representative to conduct the safety briefing. (See Chapter VIII, Recommendation 3)

3. Recommendations – CL&P Support Functions

XI-CL&P-1 Reduce the number of support functions assigned to Area Logistics. (See also Chapter VI, Recommendation 2)

The Area Command organization should include team leaders with specific accountability for performance in functions such as Vegetation Management, Wires-Down Coordinator (including specifically the road clearing work with municipalities), Damage Assessment, and Field Services.

[242] Interviews #2, December 15, 2011, and #73, March 12, 2012
[243] Interview #29, January 4, 2012

B. UI

1. Staffing and Performance

UI provided a list of all employees called from other areas of the company to handle storm roles.[244] There were over 1,000 names on the Irene list, and approximately 700 on the October snowstorm list. A number of these employees filled roles other than support roles under review in this chapter. The lists include the names of employees who filled support roles in Transportation, Environmental, Safety, Security, Purchasing/Logistics, Supply Chain, IT, and Facilities/Food. Given the size of the UI service area and number of crews brought in to assist, the number of support people was appropriate. The UI support functions worked well during both storms.

2. Conclusions

1. UI did a good job in staffing and performing necessary support functions during both storms.

Given the size of the UI service area and number of crews brought in to assist, the number of support people was appropriate. The UI support functions worked well during both storms.

3. Recommendations

None

[244] UI response to Liberty audit request #005

XII. Field Restoration

A. CL&P

There are three primary goals of any utility's response to a major outage event:

1. Safety – protecting the public and restoration workers
2. Communications – effectively keeping stakeholders apprised of what to expect and when to expect it.
3. Restoration – restoring power efficiently and as quickly as possible

This chapter explores the "third leg of the stool" – the crucial element of field restoration. Pre-event preparations (including the emergency plan, training, drills, etc), alerts and mobilization, and emergency organizations have the purpose of guiding and supporting the "bottom line" – the restoration of power to the customer.

This chapter covers three specific areas:

restoration workforce – the number of line and tree crews
restoration practices – staging sites, work hours, switching and tagging, etc.
restoration performance – rate of restoration

1. CL&P Field Workforce

Line and Tree Workers in the Response to Irene and the October Storm

CL&P used 1,334 line crews for the Irene response.[245] In the October snowstorm, it used 1,803 line crews.[246] In the CL&P terminology, a crew is two workers, so the total line crew FTEs (full-time equivalents) for the two storms was 2,668 for Irene, and 3,606 for the October snowstorm. Tree crew FTEs were 1,110 for Irene and 1,740 for the October storm. The table and bar graph below compare CL&P's staffing with that of other utility outages.

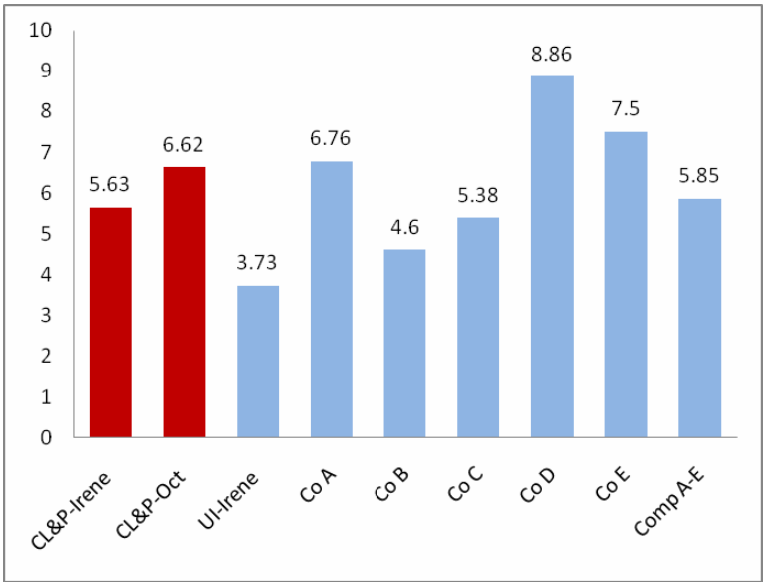
Toolworkers and Peak Customer Outages

	Peak Customer Outages	Toolworkers (Line and Tree)	Toolworkers per 1,000 Customer Outages
CL&P – Irene	671,000	3,778	5.63
CL&P – Irene	807,228	5,346	6.62
UI – Irene	143,873	536	3.73
Company A	480,883	3,250	6.76
Company B	427,000	1,965	4.60
Company C	1,800,000	9,691	5.38
Company D	133,000	1,179	8.86
Company E	320,000	2,399	7.50

[245] CL&P response to Audit Request OCC-050
[246] CL&P response to Audit Request OCC-051

Composite A-E	3,160,883	18,484	5.85

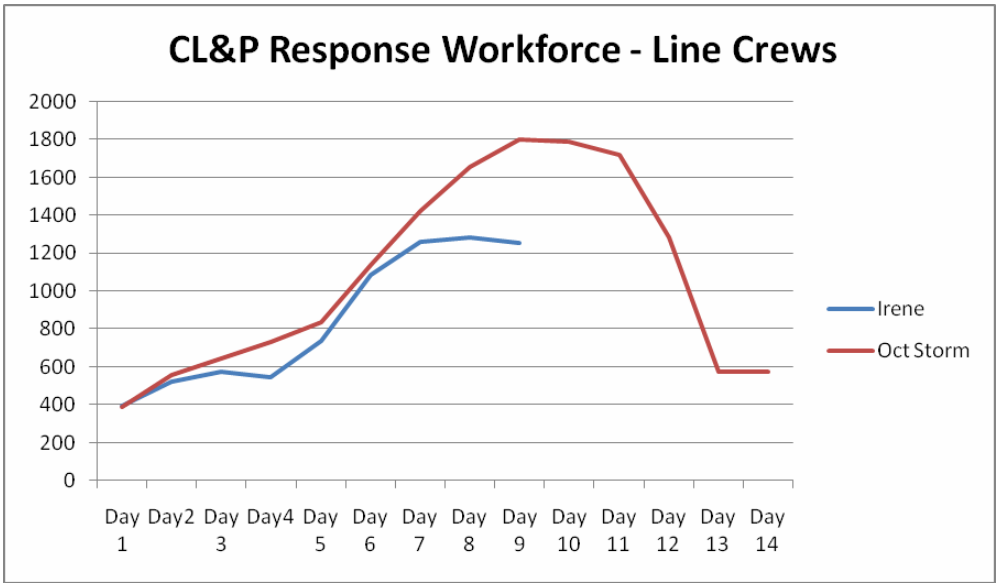
Toolworkers per 1,000 Customer Outages[247]



For each event, Liberty analyzed separately the number of "tool workers" (line, service, and tree working personnel) for the peak number of customer outages, and compared that to other utilities in responding to major events. This metric is general in nature, and Liberty used it as just one measure to gauge the adequacy of the number of workers used in responding.

The CL&P workforces for the two events compare favorably to those of other utilities responding to major outage events. The time required to get this amount of help on site is the major factor. Chapter VIII covered the CL&P efforts involved in recruiting outside help. It was several days into the restoration before significant outside help arrived. The graph below demonstrates that fact.

[247] CL&P Responses to Audit Requests # OCC-50 and #OCC-51, UI Response to Audit Request #EL-006, Liberty data

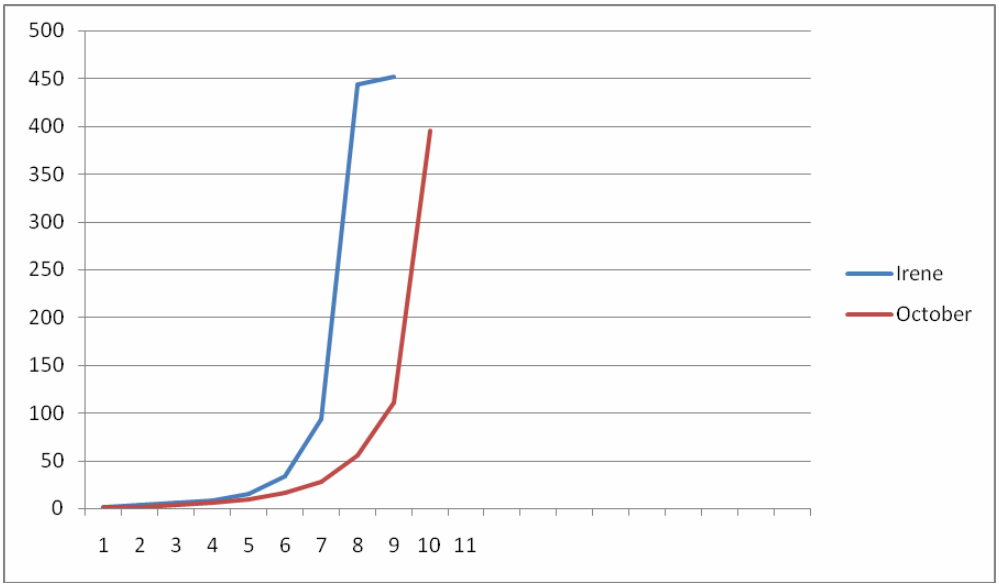


The rate of increase in incoming workers rose significantly beginning in day 5 of both storms. Four days into the restoration, CL&P in Irene had less than 50 percent of the workforce that it eventually put together. Four days into the October snowstorm, CL&P had less than 40 percent of the eventual crews.[248] This was a significant factor in the restoration performance in both storms.

Liberty analyzed the staffing on a daily basis, comparing the number of customers still out to the number of "tool workers" on site.

[248] CL&P responses to audit requests # EL-003 and # AG-044

CL&P Tool Workers per 1,000 Customer Outages Daily

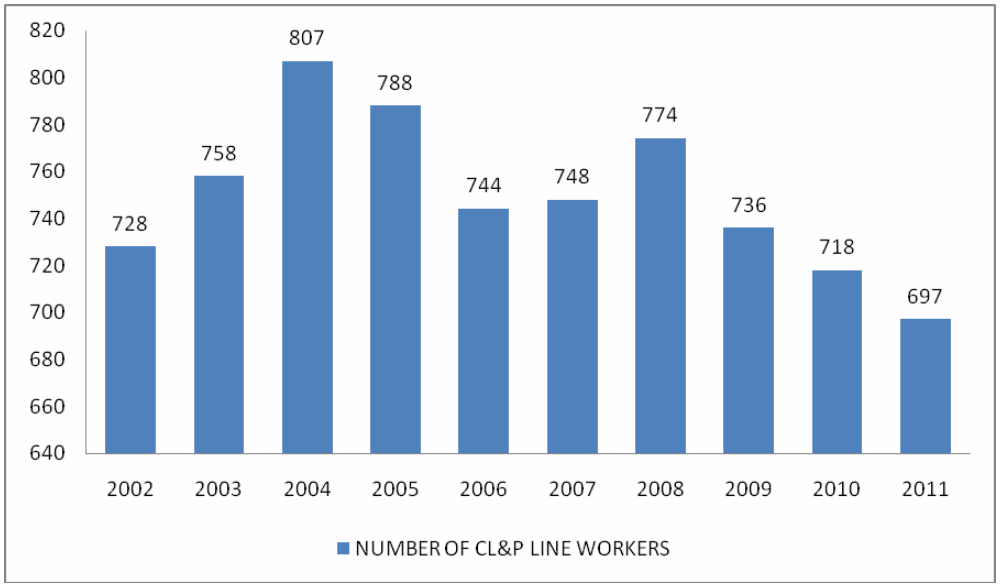


This graph confirms that there was a delay in receiving outside crews, and the situation was worse in October than it was during Irene. It also shows that CL&P was diligent in continuing to seek outside help. In Irene, on the sixth day CL&P reached the level of 50 tool workers per 1,000 customers out. They did not reach that level in October until the eighth day. Reaching that level by the third day of the restoration is an aggressive, but achievable target under better circumstances.

CL&P lineman staffing

The bar graph chart below depicts the CL&P line worker staffing level over the past ten years.

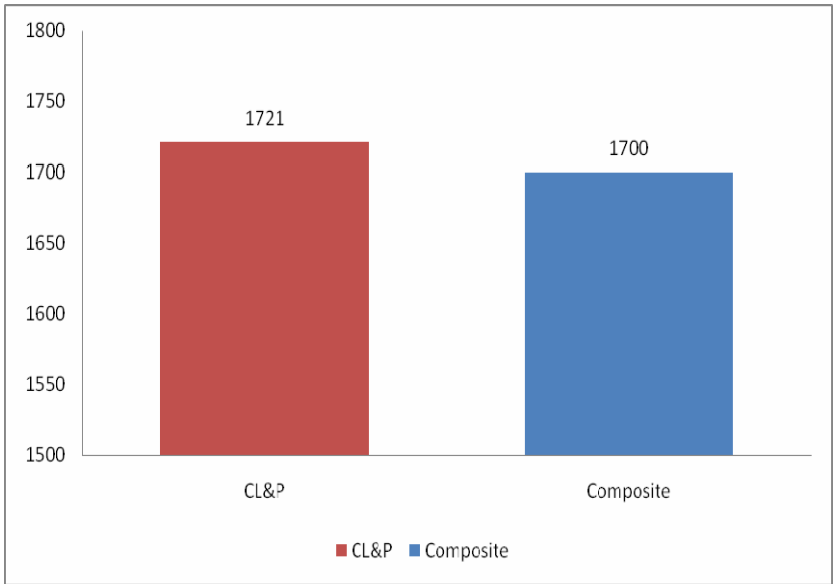
CL&P Line Worker Staffing



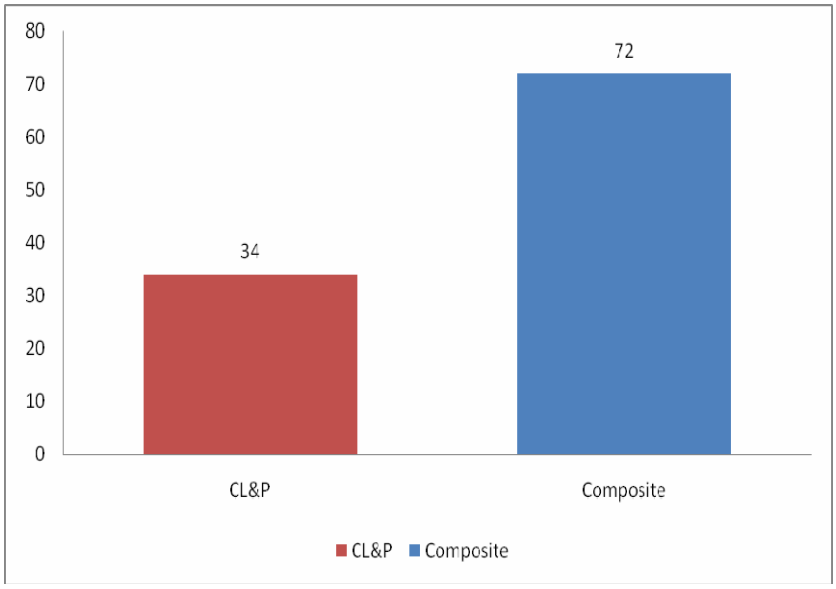
The number of CL&P line workers is at its lowest level in ten years – down 110 workers from its highest level in this period. CL&P uses line contractors to augment its staffing, and the graph above does not include these workers.

Liberty analyzed the 2011 CL&P line worker staffing based on the number of customers and miles of distribution line per line worker. The charts below compare CL&P to a composite of other utilities.

Customers per Line Worker



Miles Distribution Line per Worker



The above charts[249] show that the CL&P line-worker staffing compares well to that of other utilities. While CL&P is slightly higher on numbers of customers per worker, it is significantly lower on miles of distribution line per worker. The main reason for the large disparity is the high customer density of the CL&P service area. It takes fewer miles of line to serve a large number of customers.

Utilities do not determine line worker staffing based on the numbers needed for a response to a major outage event. Rather, they base it on normal revenue and maintenance workload, routine storm response requirements, and other factors such as productivity and process improvements.

In a major outage event, a successful response depends on a number of factors such as a good plan, the recruitment and early deployment of adequate numbers of outside workers, and good processes to manage this workforce. CL&P's normal lineman staffing is a key ingredient in its routine line work, but was not a major factor in the length of the restoration time.

CL&P plans to replace line workers lost through attrition to maintain existing staffing levels in accordance with PURA's direction in the last rate case. These replacements will be fully qualified at the time they assume their duties.[250]

2. Restoration Practices

CL&P followed the widely accepted practice of scheduling the main workforce during daylight hours, and maintaining a skeleton crew organization to handle emergencies during the night. It followed the practice of sixteen hours at work with eight hours off for rest. CL&P changed that practice just a few years ago, and has worked every major event since then on this schedule. Prior to that, CL&P workers did not take the required eight hours rest, and were on double time for the duration.[251] It was also a practice in the past to work local personnel during the night; CL&P changed this practice. The schedule followed in Irene and the October storm is the safest and most efficient practice.

CL&P assigned experienced personnel to supervise the field crews. Outside crews had their own supervision, but CL&P "bird dogs" were with them to help them move from one location to another and to assist the crew supervisor. One CL&P manager reported that the largest ratio in his district was 14 crews to 1 supervisor.[252] Some district incident managers broke the local crews down and assigned linemen as "bird dogs" to help the outside crews. This is a utility best practice. CL&P also opened "satellite commands" with an incident manager. [253] This was a good approach to improve the crews-to-supervisor ratio. There were some delays in getting these satellite centers open, as this was the first time CL&P had used this approach.

CL&P sent dispatchers from the System Operating Center to district command centers to direct the switching and tagging process. This is a utility best practice, and provided CL&P with an

[249] Liberty data and CL&P responses to audit requests: Liberty 001 and AG 089
[250] CL&P response to audit request # OCC-341
[251] CL&P Interview #1, December 15, 2011, and #17, December 27, 2011
[252] CL&P Interview #20, December 27, 2011
[253] CL&P Interview #25, January 3, 2012

effective and safe procedure in a task that often results in a bottleneck and delay in restoration. There were no reports of delays or bottlenecks caused by waiting for switching or clearance. The procedure also ensured that it did the work safely.

CL&P made good use of staging sites and satellite command centers to provide a location for crew trucks after hours, provide meals, material, fueling, and conduct daily safety briefings. Crews took most morning and evening meals at the hotel, and CL&P gave a sandwich meal to each worker for the mid-day meal on site.

CL&P used local electricians to reconnect services or tack them to the pole. This was the first time this has been done, and it worked well. This is a unique and proactive approach to a time-consuming restoration task. It is a best practice that more utilities should use.

A challenge faced by all utilities in major outage events is receiving regular, timely updates from field crews. With a large number of crews from different locations and different work procedures, it is difficult many times to get regular updates of restoration status during the day. CL&P used daily reports that crews turned in at the end of the workday, but had difficulty in getting status updates during the day. This affected the situational awareness of the response leadership on an ongoing basis during the day.

The routine procedure for assigning repair work is to use the OMS order. In major events such as Irene and the October snowstorm, assigning work in this method can cause inefficiencies and delay the restoration. Many utilities switch to a different approach in major events with widespread damage, assigning crews to specific substations, feeders, towns, or geographic areas. CL&P began restoring backbone feeders with priority to critical customers (e.g., hospitals, etc.). It has its critical circuits identified. The majority of districts moved crews around, assigning orders based upon number of customers affected. There was an effort, where possible, to keep the same crew on a circuit until it was totally restored.

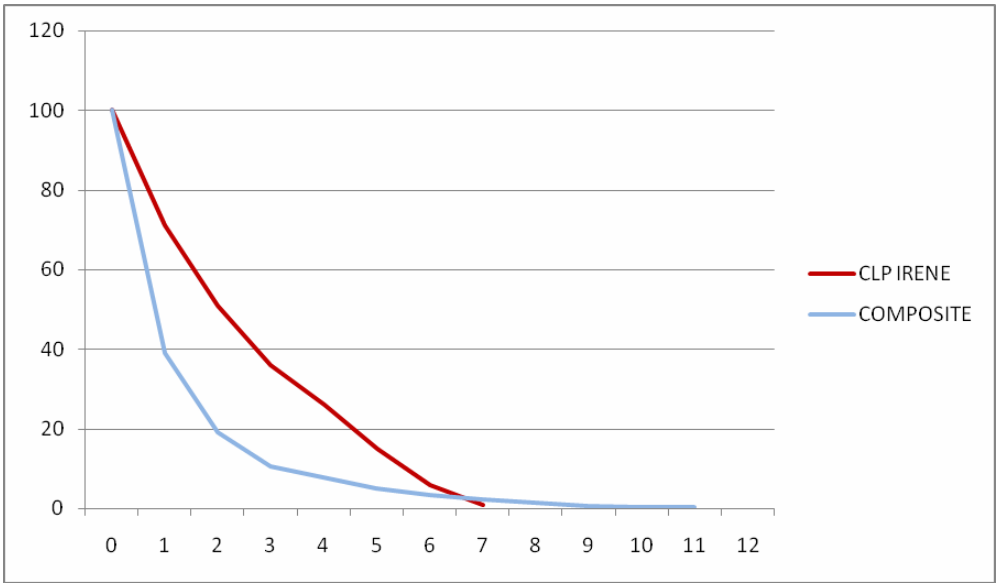
A significant factor in the CL&P performance was the amount of crew time spent in working with the towns in the "Cut/Clear, Make Safe" process. CL&P's commitment to public safety is commendable, but in the response to these two storms, management did not have proper control over this work. A number of CL&P managers reported that they assigned at least one, and sometimes more, crews to work with the towns, and this lasted for a number of days. The primary focus was to clear roadways where CL&P facilities were involved. Due to the lack of control by a number of managers, the crews worked with the towns for a longer period than they should. During this time, the crews were not doing restoration work. It is the widely accepted practice in the electric utility industry to coordinate with governmental entities to put top priority on clearing downed wires and poles so that public workers may clear the roadways. The assignment of crews to work with towns is unusual, and in these two storm responses, was a problem.

3. Restoration Performance

Liberty analyzed the restoration rate for CL&P and drew some comparisons. In Irene, Liberty compared the CL&P restoration rate to that of a composite rate for nine utilities responding to

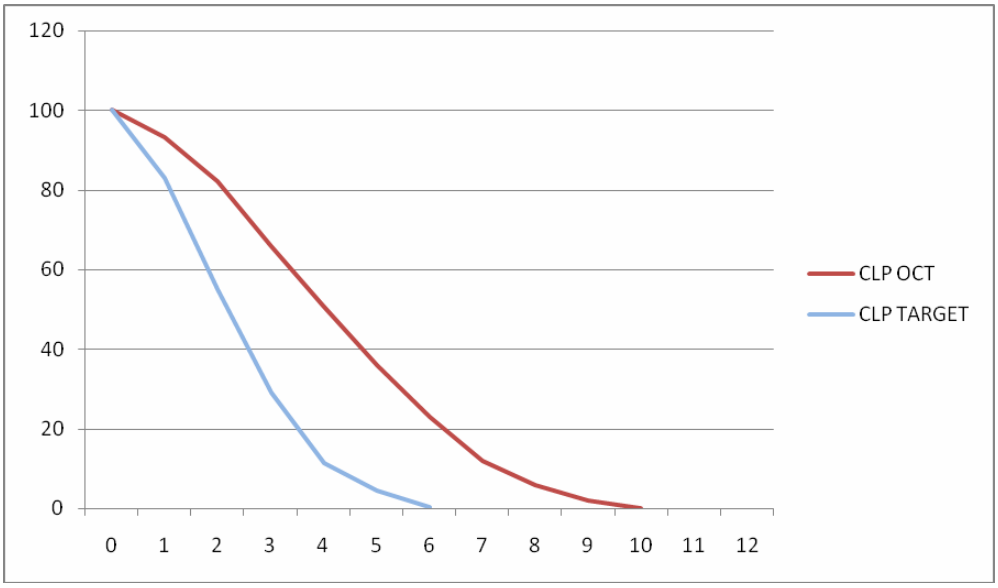
hurricanes in recent years. Liberty compared the CL&P actual restoration rate during the October storm to the "target" rate it set for itself.

Percentage of Customers to be Restored - Irene



The CL&P rate of restoration in Irene was significantly slower than the composite rate.

Percentage of Customers to be Restored - October



The CL&P restoration rate in the October snowstorm was significantly slower than the target rate they established at the outset of the storm.

The major reason for this difference was the difficulty and delay in securing outside assistance.

4. Conclusions – CL&P Field Restoration

1. CL&P was hindered in its restoration efforts by the fact that outside resources did not arrive in a timely manner. (See the recommendations in Chapter VIII)

The CL&P workforces for the two events compare favorably to those of other utilities responding to major outage events. The time required to get this amount of help on site is the major factor. Chapter VIII covered the CL&P efforts involved in recruiting outside help. It was several days into the restoration before significant outside help arrived.

2. The staffing level of CL&P line workers is reasonable and compares well to other utilities.

The CL&P line-worker staffing compares well to that of other utilities. While CL&P is slightly higher on numbers of customers per worker, it is significantly lower on miles of distribution line per worker. The main reason for the large disparity is the high customer density of the CL&P service area. It takes fewer miles of line to serve a large number of customers. Utilities do not determine line worker staffing based on the numbers needed for a response to a major outage

event. Rather, they base it on normal revenue and maintenance workload, routine storm response requirements, and other factors such as productivity and process improvements.

3. CL&P followed a safe and efficient work schedule for the field crews.

CL&P followed the widely accepted practice of scheduling the main workforce during daylight hours, and maintaining a skeleton crew organization to handle emergencies during the night. It scheduled the crews for sixteen hours at work and eight hours off for rest, which is the safest and most efficient practice.

4. CL&P did a good job in field restoration, but there are a number of improvement opportunities. (See Recommendations 1 - 4)

CL&P broke down local crews to provide supervision for incoming crews. It made good use of staging areas and "satellite" command centers. CL&P disbursed operators from the System Operating Center to the field commands to assist management there. CL&P used daily reports that crews turned in at the end of the workday, but had difficulty in getting status updates during the day. This impacted the situational awareness of the response leadership on an ongoing basis during the day. The majority of districts moved crews around, assigning orders based upon number of customers affected. In major events such as Irene and the October snowstorm, assigning work in this method can cause inefficiencies and delay the restoration. CL&P management did not have proper control over the "Cut/Clear, Make Safe" work done with the towns. A number of CL&P managers reported that they assigned at least one, and sometimes more, crews to work with the towns, and this lasted for a number of days. The assignment of crews to work with towns is unusual, and in these two storm responses, was a problem.

5. Recommendations

XII-CL&P-1 Strengthen procedures for getting regular, timely restoration status updates from crews in the field.

CL&P should remind all crews at regular intervals to send in status reports. CL&P may need crew aides to handle the reporting duties, and have mobile data terminals in a vehicle assigned to work with each crew.

XII-CL&P-2 Change the restoration practice in major events such as Irene and the October storm to limit the amount of time crews are moved from one circuit to another until work on the first circuit is completed.

XII-CL&P-3 Assign crews to specific circuits in a major outage event.

CL&P had no choice but to move crews around until additional help arrived, but assigning crews to a specific circuit in major outage events is a utility best practice.

XII-CL&P-4 Work with the towns, other utilities, and emergency agencies to establish specific guidelines as to the work to be done in the "Cut/Clear, Make Safe" effort with the towns.

CL&P should work with the towns, other utilities, and emergency agencies to establish specific guidelines as to the work to be done in the "Cut/Clear, Make Safe" effort with the towns.

There must be a clear understanding and agreement as to what the utility will do in this area. CL&P must train district managers in this procedure, and division and area management must follow this during major outage restorations to ensure that all command centers are following the guidelines and controlling the work.

B. UI

1. UI Field Workforce

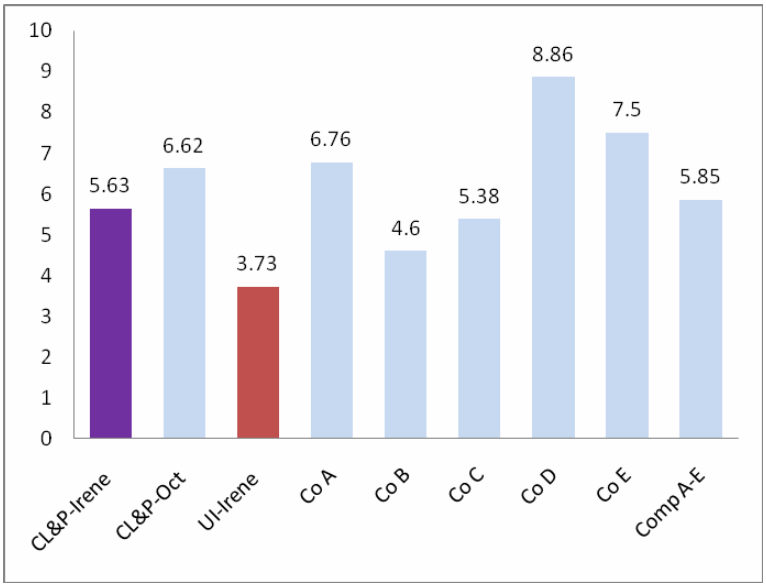
Liberty only analyzed the UI response to Irene. The October storm affected significantly less UI customers.

a. Line and tree workers in the response to Irene

UI expanded its crew base from 100 to over 300 by calling in available utility crews from many different states including Florida, North and South Carolina, Wisconsin, Missouri, Indiana, and New Hampshire.[254] The bar graph below shows the number of "tool workers" – line and tree personnel – per 1,000 customers out of service at the peak. Liberty compared the UI figure to that of CL&P and five other utilities that responded to hurricane outages in recent years.

[254] UI response to audit request AG – 168

Toolworkers per 1,000 Customers Out At Peak



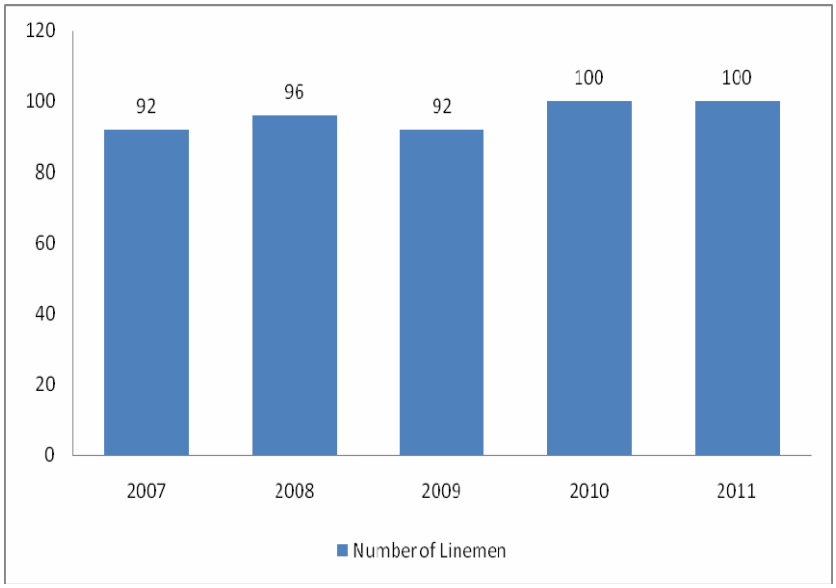
The number of linemen working on UI property in response to Irene was significantly lower than the others measured. UI experienced the same problem that CL&P did in getting outside help in the early stages of the storm, but the low lineman staffing was a hindrance to a timely restoration.

2. UI Lineman staffing

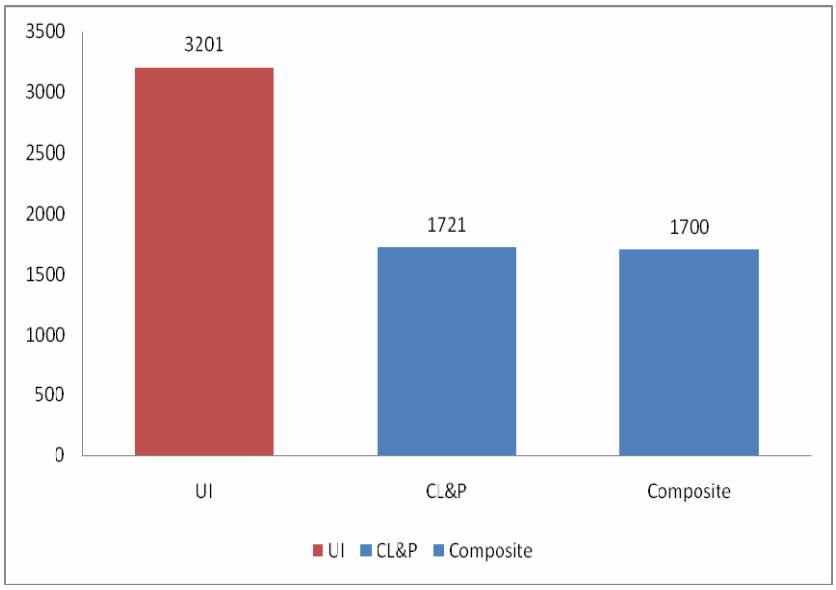
The chart below[255] depicts the UI lineman staffing over the past five years. The number of linemen has increased by 9 percent in this time period.

[255] UI response to audit request OCC – 163

UI Lineman Staffing 2007 – 2011



Liberty analyzed the UI lineman staffing on the basis of total customers served, comparing UI to both CL&P and a composite of others.



UI has a very compact service area with high customer density, which explains the disparity.

Utilities determine line worker staffing based on normal revenue and maintenance workload, routine storm response requirements, and other factors such as productivity and process improvements. In a major outage event, a successful response depends on a number of factors such as a good plan, the recruitment and early deployment of adequate numbers of outside workers, and good processes to manage this workforce. The UI lineman staffing level was not a factor in their response to Irene and the October storm.

2. Restoration Practices

The UI service area had three geographic areas – West, Central, East – for the Irene response. Each area contained five to six towns. The purpose in doing this was for control – UI kept its crews separate from other types of crews. UI does not mix its crews with contractors. UI crews were in one area, "internal contractors" (those who work on UI property on a full-time basis) were in another area, and Mutual Assistance crews from other utilities and "external contractors" worked in the third area. Crews worked directly out of EOC. Crew leaders would work with crews and report in at the EOC.[256]

UI assigned dispatchers at the SOC to work with certain groups of crews that had been assigned specific towns or circuits. Dispatchers had separate work areas so that they would not conflict with each other. UI operators handled switching at the System Operating Center (SOC), and did this when repair crews were on site and could take clearance. It did not do switching during the night in preparation for the crews the next day.

UI restoration priorities were: 1) municipal priorities – downed wires, road clearing; 2) backbone feeders, and 3) side taps, based on largest number of customers. In those cases where it assigned a circuit, they picked up everything but services, and then moved to work orders with the most customers. UI followed the philosophy of assigning orders based on numbers of customers as opposed to assigning crews to circuits. On a few occasions, it assigned a crew to a circuit, but that was the exception.[257]

UI used local electricians to pick up services or coil them and tack them to the pole. This is a best practice that more utilities should follow. UI also engaged contractors to go into the flooded area.

The UI process for restoration status updates was manual. A crew called in when it completed orders and UI updated the outage management system (OMS) at the work center. UI expedited this call-in process by assigning dispatchers to work with a specific work area.

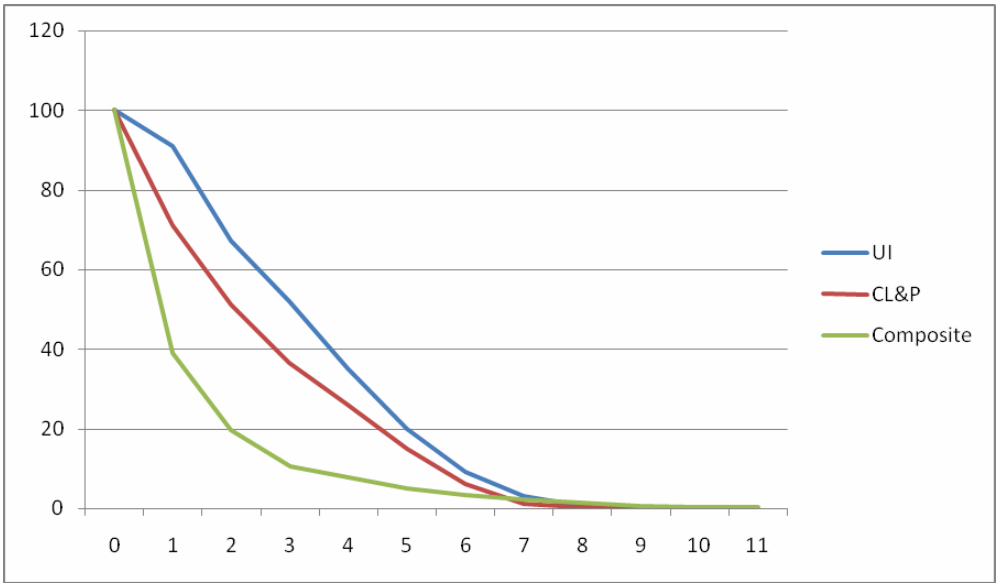
UI served meals at local restaurants at pre-determined times. If a crew was still out working, UI made accommodations on a case- by-case basis. There were three staging sites, and trucks were tied up there and refueled at night. UI transported workers to their lodging. The longest trip was eight to eleven miles. Breakfast was served at one staging site; other workers got breakfast at the restaurants at their lodging.[258]

[256] UI Interview #11, February 8, 2012, and UI Interview #15, January 10, 2012
[257] UI Interview #13, February 9, 2012
[258] UI Interview #7, January 20, 2012

UI's practice and experience in the "Cut/Clear, Make Safe" process was the same as at CL&P. They furnished a tree crew and a line crew to a town upon request. UI told crews to go and work with towns and do what they could. UI says wires were down all over, and created an issue of public safety. UI assigned two crews to each town (1 line, 1 tree crew). New Haven had three crews. UI has not analyzed the effect on restoration time.[259]

3. Restoration Performance

The line graph below compares the restoration rate during Irene for UI, CL&P, and a composite of nine utilities that responded to recent hurricanes.



The UI restoration rate was slower than the other two. The issues covered above are the primary reason for this slower rate.

4. Conclusions

1. UI did not bring in enough line workers in its Irene response, and this extended the restoration time, but the UI normal line worker staffing is not a concern. (See recommendations in Chapter VIII)

The number of linemen working on UI property in response to Irene was significantly lower than the others measured. UI experienced the same problem that CL&P did in getting outside help in the early stages of the storm, but the low lineman staffing was not a hindrance to a timely

[259] UI Interview #6, January 9, 2012

restoration. UI's service area is compact and has high customer density, thus requiring fewer linemen on a per customer basis.

2. UI did a good job in field restoration, but there are a number of improvement opportunities. (See Recommendations 1 - 3)

UI assigned dispatchers at the SOC to work with certain groups of crews that had responsibility for specific towns or circuits. Dispatchers had separate work areas so that they would not conflict with each other. UI used local electricians to pick up services or coil them and tack them to the pole. UI also engaged contractors to go into the flooded area. There were three staging sites, and trucks were tied up there and refueled at night.

UI used daily reports that crews turned in at the end of the workday, but had difficulty in getting status updates during the day. This affected the situational awareness of the response leadership on an ongoing basis during the day. The majority of districts moved crews around, assigning orders based upon number of customers affected. In major events such as Irene and the October snowstorm, assigning work in this method can cause inefficiencies and delay the restoration. UI management did not have proper control over the "Cut/Clear, Make Safe" work done with the towns. UI followed the philosophy of assigning orders based on numbers of customers as opposed to assigning crews to circuits. On a few occasions, UI assigned a crew to a circuit, but that was the exception. UI's practice and experience in the "Cut/Clear, Make Safe" process was the same as at CL&P. They furnished a tree crew and a line crew to a town upon request, but there was little management control over what the crews did and how long they stayed on that assignment.

3. The UI restoration rate during Irene was slower than it should have been. (See recommendations in Chapter VIII and Recommendations 1-3 below.)

The UI rate was slower than that of CL&P, and considerably slower than other utilities that have responded to recent hurricanes. The primary reason is failure to bring in enough outside workers and to appropriately manage the "Cut/Clear, Make Safe" process.

4. Recommendations

XII-UI-1 Strengthen the procedures for getting regular, timely restoration status updates from crews in the field.

UI should remind all crews at regular intervals to send in status reports. UI may need crew aides to handle the reporting duties, and mobile data terminals should be in vehicles assigned to work with each crew.

XII-UI-2 Change the restoration practice in major events such as Irene to limit the amount of time crews are moved from one circuit to another until work on the first circuit is completed.

UI had no choice but to move crews around until additional help arrived, but assigning crews to a specific circuit in major outage events is a utility best practice.

XII-UI-3 Work with the towns, other utilities, and emergency agencies to establish specific guidelines as to the work to be done in the "Cut/Clear, Make Safe" effort with the towns.

There must be a clear understanding and agreement as to what the utility will do in this area. UI must train managers in this procedure, and top management must follow this during major outage restorations to ensure that all are following the guidelines and controlling the work.

XIII. Post-storm Activities

There are three primary three post-event activities, ramp-down, clean-up, and post-event critiques. Ramp-down includes releasing outside crews, de-activating storm command centers, and moving back into the normal routine. Clean-up is performing patrols, tree trimming, and line repairs as required to restore facilities to a reliable state. Post-event critiques include the lessons-learned process, and follow-up on the issues identified in this process.

A. CL&P

1. Ramp-down

CL&P's ERP contains a good ramp-down procedure;[260] CL&P followed it in both storms. As CL&P accomplished restoration in one area, it assigned resources to areas that still required additional assistance. Continued recovery and restoration activities result in a gradual demobilization of personnel and equipment. When recovery efforts reduced power outages across the CL&P system to manageable levels, the following actions occurred:

- The NU System Commander and the Area Commander determined that a System/Area Emergency no longer exists.
- Released Mutual Aid crews
- Released contract crews
- Released NU affiliated crews
- Released support personnel
- Dissolved System/Area/Division/District Command

When recovery efforts are complete, the following actions occurred:

- The District/Division/Area Commanders determine that a District, Divisional, or Area Emergency no longer exists.
- Re-centralized dispatch functions to the SOC
- Released line crews to their normal work locations
- Dissolved Incident Command

2. Clean-up

CL&P performed a thorough post-storm analysis for Irene and the October storm. This included contracting the assessment of approximately 17,000 miles of its overhead electric distribution system. This assessment involved a visual inspection from ground level of wires and poles, and the identification of vegetation management issues such as hazard trees. About 30 survey teams performed this work. Work continued to correct all items on a priority basis.[261]

[260] CL&P ERP, Section 1, 5.6, pages 25 and 26
[261] CL&P response to EL-12

3. Post-event critiques

The CL&P ERP states that the company will conduct post-storm critiques at the district, division, and company levels and include a cross section of all departments involved in the restoration. After Irene, CL&P embarked on an enthusiastic effort to conduct thorough critiques and to meet with all of the 149 towns it serves through regional meetings. The CL&P Vice-President, Customer Operations, conducted in-person critiques in 21 different locations. As a result, CL&P did not complete the critiques within the thirty-day target set in the plan, and were just wrapping up the Irene critiques when the October snowstorm hit. The division managers conducted the critiques in 28 locations following the October storm.

The critiques identified organizational strengths, opportunities for improvement, and captured lessons learned. Following the completion of the critiques, CL&P developed a list of action items to strengthen the CL&P Emergency Plan.[262]

Liberty heard some criticism of the critique process. One comment in particular seemed to sum up the concerns that were expressed: *"Need to provide an open, honest forum on post-event critique "all the way to the ground floor."*[263]

4. Conclusions – CL&P Post-storm Activities

1. CL&P has a good plan for the post-storm activities, and performed well in all three of these areas. There is an opportunity for improvement in the post-event critiques. (See Recommendation 1)

CL&P's ERP contains a good ramp-down procedure; CL&P followed it in both storms. CL&P performed a thorough post-storm analysis for Irene and the October storm. After Irene, CL&P embarked on an enthusiastic effort to conduct thorough critiques and to meet with all of the 149 towns it serves through regional meetings. The CL&P Vice-President, Customer Operations, conducted in-person critiques in 21 different locations. The division managers conducted the critiques in 28 locations following the October storm. While the involvement of a senior officer in all post-Irene critiques is commendable, CL&P should review this decision and revise the procedure in future events to avoid the lengthy delay in completing the critiques. In addition, CL&P should aggressively seek input from response team leaders to improve the critique process.

5. Recommendations – CL&P Post-storm Activities

XIII-CL&P-1 Revise post-event process to accomplish the mutual goals of senior management involvement and timely completion, and to make the critiques of more value to the response team.

[262] CL&P interview #1, December 15, 2011, and response to Liberty audit request # 032
[263] CL&P interview #37, January 6, 2012

B. UI

1. Ramp-down

In Irene and the October snowstorm, UI followed the new post-event process contained in the December 1, 2011, EPP. Even though the plan was not completed or filed with PURA at the time of these two storms, it had reviewed and approved a number of the processes that it put into effect. This covered the process to transition from the Incident Management structure to normal operations, and the criteria for resuming normal operations. UI followed the EPP guidelines on releasing outside resources.

2. Clean-up

After UI restored all of the areas affected by the storms to pre-storm operating conditions, it embarked on the clean-up phase. This included system wide inspection and remediation of the overhead distribution system. As storm restoration efforts were winding down, UI assigned resources to patrolling circuits in areas where no outages occurred to assess tree conditions that could lead to an outage and to identify damages to the overhead electric distribution system. UI has addressed this work on a priority basis.[264]

3. Post-event critiques

UI also followed the 2011 EPP in performing post-event critiques. Each of the Incident Management organizations was responsible for conducting a post-incident performance review of its area of responsibility. UI made assignments to ensure follow-up. The Restoration Manager was responsible for ensuring that personnel completed these post-event critiques and that UI updated the EPP as appropriate. UI held post-storm critique meetings with representatives from all departments involved in the restoration process after both storms. All electric system operations managers along with supporting functional managers involved in the storm restoration participated in the critiques. UI held additional meetings with union participants representing each function involved with the restoration. UI prioritized the issues identified and are following up to complete them.[265]

4. Conclusions – UI Post-storm Activities

1. UI had a good plan for post-storm activities, and performed well in all three areas.

In Irene and the October snowstorm, UI followed the new post-event process as contained in the December 1, 2011 EPP. This included the transition from the Incident Management structure to normal operations, and the criteria for resuming normal operations. UI followed the EPP guidelines on releasing outside resources. After restoring all of the areas affected in the storms to pre-storm operating conditions, UI embarked on the clean-up phase. This included system-wide

[264] UI response to audit request EL-012
[265] UI response to EL-10

inspection and remediation of the overhead distribution system. UI held post-storm critique meetings with representatives from all departments involved in the restoration process after both storms. UI prioritized the issues identified and are following up to complete them.

5. Recommendations – UI Post-storm Activities

None