



Seattle City Light December 14, 2006 Wind Storm Restoration Analysis

Seattle City Council Briefing Summary of Recommendations June 14, 2007

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Presentation Overview

- Executive Summary
- Introduction
 - Methodology
 - Supporting Principles
- Storm Response Summary Findings
- Recommendations Summary and Detail
 - Prioritization Methodology
 - Summary
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Process Steps

- City Light experienced a devastating wind storm December 14, 2006 that took 9 days to restore
- CH2M Hill conducted a series of high level interviews immediately following the storm
- Davies Consulting, Inc. (DCI) used the CH2M Hill analysis as a starting point to conduct a more in-depth analysis of the City Light restoration effort
- DCI conducted interviews, facilitated an expert review panel, and looked at benchmarks and industry best practices
- Using the gathered information, DCI performed a gap analysis and prepared a final report, including recommendations for improving City Light's storm restoration process and response-related IT infrastructure

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Storm Response Evaluation Methodology

- DCI used the following approach to evaluate the City Light restoration response to the December 2006 wind storm
 - Mobilize Project and Identify Areas of Investigation
 - Review Existing Response Data and Preliminary Findings from Interviews
 - Investigate Internal and External Communication Processes
 - Evaluate SCL Performance against DCI Benchmark Database
 - Compare City Light Response to Plan and Industry Best Practice to identify Gaps
 - Organize and Facilitate Expert Panel Review
 - Prepare Assessment of City Light's Performance
 - Prepare the Final Report

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Supporting Principles

- Performing the restoration safely is paramount
- Thorough damage assessment is the backbone of the restoration effort
- A central goal of the restoration plan and process is the ability to restore service as quickly as possible, and to give accurate estimated times of restoration with progressive granularity
- Preparation is a core principle of the plan, in the form of training, process structure, guidelines, agreements with outside agencies, and infrastructure
- One must remove bottlenecks from the process and ensure each participant is free to perform his or her function without distraction or interference

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Summary Findings as of Date of Storm

Area	Performance	Summary
Overall Restoration		<ul style="list-style-type: none"> Overall, City Light's performance was in-line with utilities suffering comparable system damage with adequate customer satisfaction and length of restoration
Restoration and Response Plans		<ul style="list-style-type: none"> Response Plan is incomplete and Restoration Plan is generally absent
Damage assessment and prioritization processes		<ul style="list-style-type: none"> There was no pre-established process or training Assessment not completed thoroughly or in a timely manner
Mutual assistance and support agreements		<ul style="list-style-type: none"> Mutual assistance agreements thought to be in place had expired Contracts with hotels and food providers did not guarantee rooms
Logistics		<ul style="list-style-type: none"> Transformers, poles, wire and other material in sufficient supply Procurement of small material items and meals was hampered by requiring senior-level management approval Fueling and fleet services well organized and executed
Availability and utilization of field resources		<ul style="list-style-type: none"> A high number of craft positions are vacant Did not optimize crew assignments making maximum use of journey-workers, apprentices, and underground personnel in all cases
Communications		<ul style="list-style-type: none"> City Light's radio system was significantly underutilized Call-backs are not part of City Light's standard storm procedure and were only partially implemented Inconsistent messages to customers and employees Regular updates scheduled and use of radio and TV was good
Coordination with city agencies		<ul style="list-style-type: none"> EOC is critical to inter departmental coordination
Infrastructure and Technology		<ul style="list-style-type: none"> City Light is unable to provide ETR's using their current process Paper trouble ticket system overwhelmed System Control Center



Key



Well below expectations



Below expectations



At expectations



Above expectations



Well above expectations

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Recommendation Prioritization Methodology - Process

- Categorized recommendations
 - Subdivided Process Recommendations by Theme
- Evaluated how each recommendation supports the restoration goals
- Examined feasibility within target timeframe
- Assigned each recommendation to one of three tiers:
 - Tier 1 ■ : Restoration goals cannot be achieved without these items, which should be fully implemented by October 31, 2007
 - Tier 2 ■ : Restoration would be significantly enhanced by these items, which should have a target completion between October 31, 2007 – February 29, 2008 (storm season)
 - Tier 3 ■ : Execute as time and resources permit



Recommendation Prioritization Methodology – Infrastructure and Technology

- Categorized recommendations
 - Subdivided Infrastructure Recommendations by Timeframe (Short vs. Long)
- Evaluated how each recommendation supports the restoration goals

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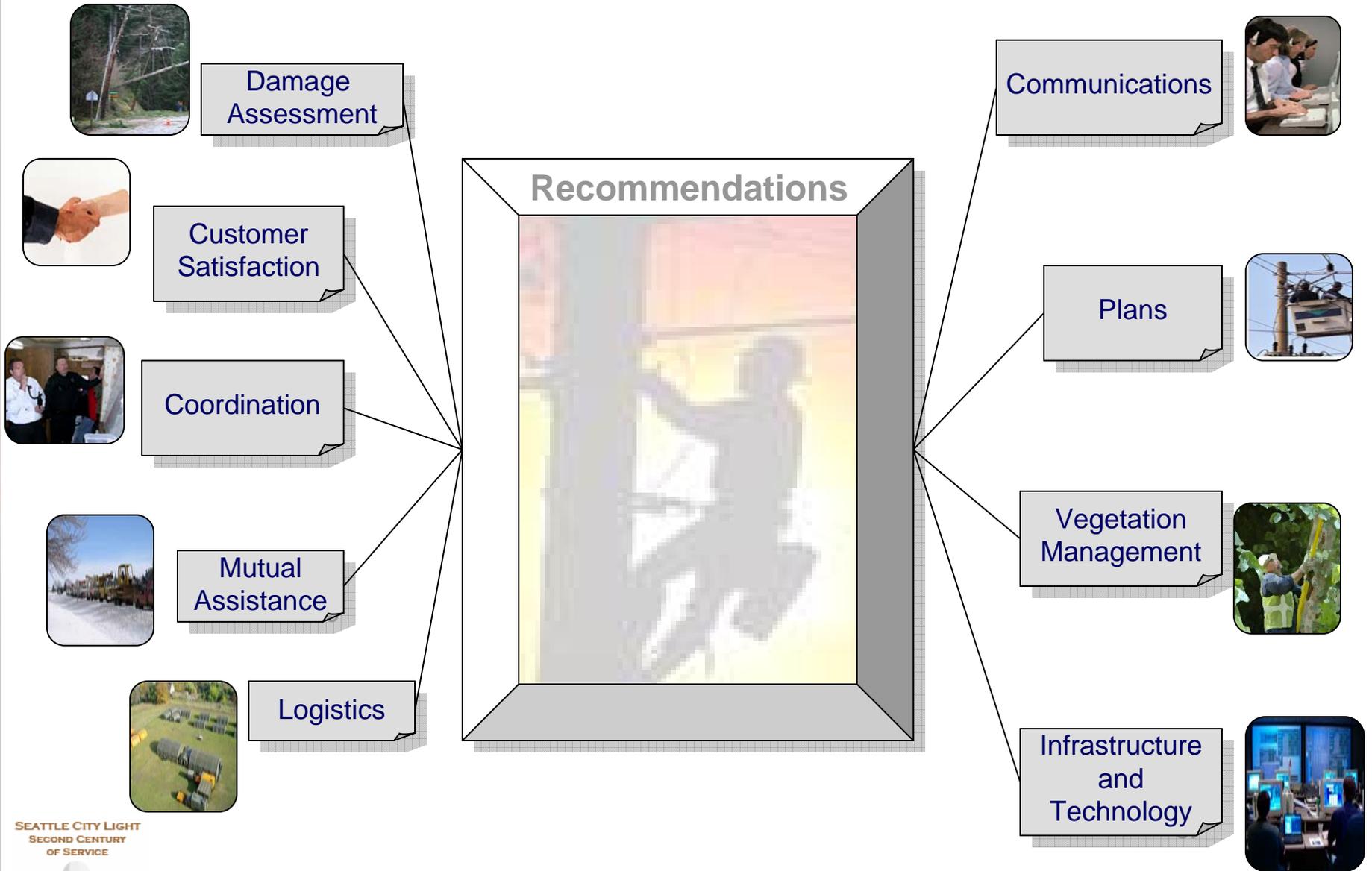


Recommendation Prioritization Methodology – Infrastructure

- Assigned each recommendation to one of three tiers:
 - Short Term Infrastructure and Technology:
 - Tier 1  : Restoration goals cannot be achieved without these items, which should be fully implemented by October 31, 2007
 - Tier 2  : Restoration would be significantly enhanced by these items, which should have a target completion between October 31, 2007 – February 29, 2008 (storm season)
 - Tier 3  : Execute as time and resources permit
 - Long Term Infrastructure and Technology:
 - Tier 1  : Initiate by July 1, 2007
 - Tier 2  : Initiate by July 1, 2008
 - Tier 3  : Execute as time and resources permit



Recommendations Focus



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Top Recommendations

■ Process

- Planning
 - Complete and practice the Response and Restoration plans
- Damage Assessment
 - Establish Sub Station/ Feeder owner process
- Mutual Assistance
 - Enter into mutual assistance agreements
- Logistics
 - Establish firm contracts for hotels, etc.
- Vegetation Management
 - Ensure vegetation crew assignments support critical restoration
- Communications
 - Establish better internal line of communications to all stakeholders
- Coordination with City
 - Establish direct lines of communications with other emergency service organizations to report trouble & coordinate response



Process Recommendation Summary

- Complete the ICS/NIMS compliant Emergency Response Plan and develop the corresponding Restoration Plans
- Redistribute operational responsibilities during the restoration in the form of second jobs to support ICS/NIMS, improve restoration time and alleviate bottlenecks
- Establish a process to provide accurate and timely Estimated Times of Restoration to customers
- Institute a 'Substation or Feeder Owner' Process for Damage Assessment
- Formalize interdepartmental emergency response coordination procedures with EOC

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Process Recommendation Summary

- Secure contracts for mutual aid assistance resources, outside contractor resources and logistical support (hotel, meals, etc.)
- Use mutual assistance and contractors to supplement the City Light line crews in major event
- Use the Company radio for all dispatching to ensure safety and improve the flow of information
- Design and implement restoration processes that will free line crews to perform line restoration activities

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Recommendations: Emergency Response Plan

Tier	Response Plan
1.1	Complete the ICS/NIMS-compliant emergency plan. Fill all positions, train and practice the plan
1.2	On an interim basis assign the Incident Commander, ICS staff, and Trouble Center to the System Control Center until the permanent Trouble Center facility is complete
1.3	Develop process for assigning City Light personnel to 'Second Jobs' and provide Second Job training
1.4	Incorporate employee contact information for all roles within the plan. Plan should consider travel time from home location when making second job assignments
1.5	Incorporate activation instructions for EOC, DOC, mutual assistance, Call Center, etc. in the plan
1.6	Structure plan to scale with magnitude of event damage
1.7	Perform at least one drill of the emergency plan per year

Tier 1 – by 10/31/07
 Tier 2 – by 3/1/08
 Tier 3 - TBD



Recommendations: Restoration Plan

Tier	Restoration Plan
1.1	Develop a comprehensive response and restoration plan that includes best practices outline in the report
1.2	After identification of damage level and initial push, institute a 16/8 work hour policy. The objective is to make maximum use of daylight hours after the initial push for events that require longer restoration
1.3	Develop an estimated times of restoration process suited to the available technology. The ETOR process should be modified as technology changes
1.4	Assign responsibility for interpreting trouble tickets, damage assessment, prioritizing work and providing estimated times of restoration to the Trouble Center
1.5	Set goals for delivering estimated times of restoration for the System (24-36 hours), Substation / Neighborhood (3-4 days), Individual customers (5-6 days). Hours/days to deliver ETOR information should be scaled for event
1.6	Include documentation of procedures in the restoration plan
1.7	Perform at least one drill of the restoration plan per year



Recommendations: Damage Assessment

Tier	Damage Assessment
1.1	Institute Feeder Owner process for damage assessment
1.2	Develop damage assessment workforce using second job resources
1.3	Provide comprehensive training and testing for damage assessment resources
1.4	Create standard damage assessment forms to be used by damage assessors to communicate location and extent of damage to the trouble center
1.5	Perform damage assessment on a feeder by feeder basis
1.6	Channel all damage assessment data through the Trouble Center

■ Tier 1 – by 10/31/07 ■ Tier 2 – by 3/1/08 ■ Tier 3 - TBD

Recommendations: Mutual Assistance

Tier	Mutual Assistance
1.1	Integrate a mutual assistance position into the City Light ICS organization. Position should be on the Incident Commander staff
1.2	Form additional bilateral mutual assistance agreements with local and long-distance partner utilities
1.3	Consider pre-positioning mutual assistance, vegetation management, and contractor resources prior to storm based on anticipated damage
1.4	Actively participate in regional mutual assistance associations
2.1	Use contractors on a routine basis and secure commitments for emergency assistance
2.2	Develop working relationships with mutual assistance partners
2.3	Identify and train 'Second Job' mutual assistance scouts on duties, the service area, and radio protocols
3.1	Execute the Edison Electric Institute's mutual assistance Short Form Agreement
3.2	Develop process for capturing mutual assistance costs

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■ Tier 1 – by 10/31/07
 ■ Tier 2 – by 3/1/08
 ■ Tier 3 - TBD

Recommendations: Logistics

Tier	Logistics
1.1	Establish contracts containing service level agreements with providers of logistical support (e.g., lodging, meals, etc.)
2.1	Streamline process to allow first line supervisors to purchase miscellaneous materials and meals without Director level approval
2.2	Create a process to take advantage of overnight crew rest periods to restock make minor repairs & refuel trucks
2.3	As required, identify and train non-line resources to perform overnight stocking of trucks and job site material delivery, allowing line resources to focus on the restoration

■ Tier 1 – by 10/31/07
 ■ Tier 2 – by 3/1/08
 ■ Tier 3 - TBD



Recommendations: Vegetation Management

Tier	Vegetation Management
1.1	Form agreements containing service level commitments for storm assistance with vegetation management vendors
1.2	Coordinate vegetation management crew movements with the needs of line crews
2.1	Estimate the number of vegetation crew requirements in advance of storm
3.1	Consider certifying a number of SDOT crews for work around electric lines as an additional potential source of VM crews during restorations

■ Tier 1 – by 10/31/07 ■ Tier 2 – by 3/1/08 ■ Tier 3 - TBD

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Recommendations: Internal Communications

Tier	Internal Communications
1.1	Commit to conducting internal communications via the Incident Command System
1.2	Ensure all dispatch and switching clearance communications are conducted via recorded radio communication
1.3	Establish schedule for internal updates to get key information to internal stakeholders
1.4	Use different radio channels for North and South to reduce congestion
1.5	Refresh training on radio use & protocol, and practice throughout year
2.1	Provide a means of communication for Incident Command Staff that will eliminate customer calls

■ Tier 1 – by 10/31/07
 ■ Tier 2 – by 3/1/08
 ■ Tier 3 - TBD



Recommendations: External Communications

Tier	External Communications
1.1	Create an outbound callback process, suited to the currently available technology, for verifying power restoration
1.2	Position the individual responsible for media communications in the Trouble Center
2.1	Use a single voice to release data to the media
2.2	Improve the Call Center scripts to collect better trouble data from customers
3.1	Make fuller use of web technology to communicate updates to the general public

■ Tier 1 – by 10/31/07 ■ Tier 2 – by 3/1/08 ■ Tier 3 - TBD



Recommendations: Coordination with City Agencies

Tier	Integration with other City Departments
1.1	Integrate plans and co-ordinate responsibilities with other City Departments
1.2	Develop list of critical customers connected to City Light lines. Integrate critical customer restoration plans with other City Departments
1.3	Designate a primary and backup liaison to the City EOC around the clock to coordinate all restoration activities
1.4	Provide a dedicated phone number and phone lines to communicate with other City first responders
2.1	Develop table top exercises that will include other city first responders and participate in City exercises.

■ Tier 1 – by 10/31/07
 ■ Tier 2 – by 3/1/08
 ■ Tier 3 - TBD



Top Recommendations

■ Infrastructure and Technology

– Short Term

- Upgrade existing systems to the extent possible to eliminate paper tickets

– Long Term

- Purchase and install an OMS
 - Update or purchase other technologies to interface with OMS



Technology and Facilities Recommendation Summary

- Acquire technologies to improve the information flow and to improve decision making in City Light's response
 - Purchase OMS and evaluate AMI
 - Replace the IVR
 - Obtain GIS upgrade
- Optimize existing information systems until such time as they can be supplanted by comprehensive enterprise systems
- Increase the ability to monitor the system electronically
- Ensure key systems and facilities have available power and backup generation
- Secure an overflow call system to ensure that customers do not encounter busy signals when they contact City Light in an emergency situation
- Construct a permanent trouble center to coordinate the restoration from an appropriate facility

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Recommendations: Short-Term Technology and Facilities

Tier	Short-term Infrastructure Changes	Estimated Capital Costs
1	Extend the S.O.A.R.S. application to permit 'Virtual Trouble Ticket Sorting'	\$40,000 +/-
1	Install & maintain permanent backup generation at the service centers and communications infrastructure facilities	\$75,000 +/- Installation Cost
1	Continue with updates to the Electrical System Status (ESS) application to bridge the gap until an enterprise OMS comes online	\$250,000 +/-
2	Evaluate & select an alternative for increasing call center capacity ensuring customers do not get busy signals when trying to call	NA

■ Tier 1 – by 10/31/07
 ■ Tier 2 – by 3/1/08
 ■ Tier 3 - TBD



Recommendations: Long-Term Technology and Facilities

Tier	Long-term Infrastructure Changes	Estimated Capital Costs
1	Acquire & implement Outage Management System (OMS)	4 Million +/-
1	Upgrade Geographic Information System (GIS) to ARC-FM	2 Million +/-
1	Reprogram the existing or replacement Interactive Voice Response (IVR) system to improve the ease with which customers can auto-register lights out reports	\$300,000 +/-
1	Expand SCADA coverage to enable remote control of all substation breakers	\$400,000 +/-
1	Expedite construction of the Trouble Center	7 Million +/-
2	Enable outbound calls and automated call-back through integration of OMS and Customer Notification System (CNS) or similar outbound calling mechanism (e.g. replace IVR)	\$550,000 +/-
2	Evaluate the need for additional SCADA monitoring on feeder devices	NA
3	Acquire & Implement Automated Meter Infrastructure (AMI)	\$60 Million +/-

■ Tier 1 – by 7/1/07
 ■ Tier 2 – by 7/1/08
 ■ Tier 3 - TBD



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Conclusion

- In terms of restoration capability, City Light technology and processes are years behind best in class utilities. To meet customer expectations and be a high performance utility, we recommend the following for City Light:
 - Complete response and restoration plans
 - Move away from a paper ticket system to an electronic process
 - Develop an effective damage assessment process
 - Implement mutual aid agreements
 - Purchase and install OMS and AMI systems
 - Upgrade other technologies
 - IVR replace
 - GIS upgrade
 - Renovate and complete the new combined DOC and Trouble Center as soon as possible

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Conclusion

- Lack of maintenance could play a major role in the next event. Attention must be given to:
 - Vegetation management
 - Aging asset evaluation and replacement strategy
 - Pole inspection and replacement
 - System hardening evaluation
 - Asset evaluation
- City Light has a dedicated staff
 - Demonstrated concern for customer
 - Response capability limited by lack of appropriate processes and technologies

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