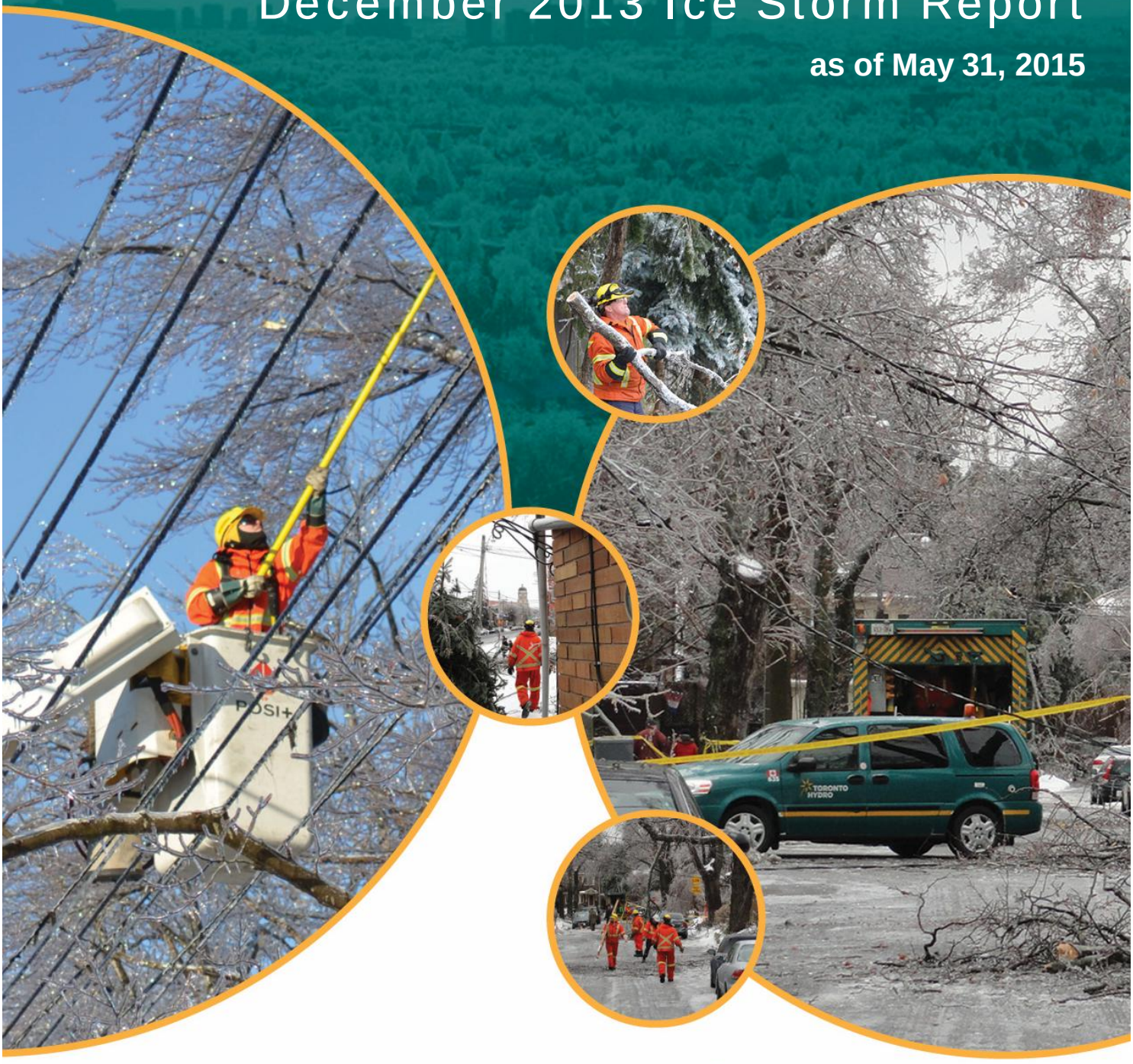
Re: EX7.5a

Status of Recommendations from December 2013 Ice Storm Report

as of May 31, 2015



Report from Toronto Hydro to Manager of the City of Toronto

June 16, 2015

TORONTO HYDRO®

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1. Purpose

This report provides a detailed update on Toronto Hydro's progress in implementing the recommendations from the Independent Review Panel (IRP)[1] *Report on the Response of Toronto Hydro-Electric System Limited to the December 2013 Ice Storm* and other third party reports. (See Appendices D, E and F for examples). Toronto Hydro is providing this status report at the request of the Manager of the City of Toronto in response to Council's directions from the July 2014 Council meeting. The information provided in this report reflects our commitment to the principles of transparency, accountability and continuous improvement.

[1] IRP members are: David J. McFadden, Panel Chair and Partner, Gowling Lafleur Henderson LLP; Joseph Pennachetti, City Manager, City of Toronto; Sean Conway, Visiting Fellow, Centre for Urban Energy – Ryerson University; and Carlos D. Torres, Vice President of Emergency Management, Consolidated Edison of New York, Inc.

2. Executive Summary

Toronto Hydro executives and management team took prompt and responsive action to address the recommendations in the 2013 Ice Storm Report. They implemented immediate improvements to:

1. Address limitations in the customer outage call intake process;
2. Enhance consumer emergency preparedness through education and outreach;
3. Engage with the City to address joint ways to address the management of trees in close proximity to hydro lines; and
4. Consider other system hardening opportunities (e.g., undergrounding, expanded use of tree-proof conductor).

Many of the remaining recommendations, such as those related to damage assessment, Estimated Time of Restoration (ETR) and external communications are being addressed by a Grid Emergency Management Project (GEM) team. The Director of Grid Emergency Management leads this project, which was initiated in September 2014. The project is occurring in three (3) phases:

- *Phase I (September 2014 – July 2015)*: a team of internal functional experts drawn from grid operations, logistics, information technology, communications, call centre, and organizational training and development, are updating, creating (as needed), and documenting the processes, roles and analytical tools needed to improve grid emergency preparedness, response and customer communications.
- *Phase II (August 2015 – December 2015):* updating of the Grid Emergency Response Plan to include the documentation developed in Phase I, and the delivery of additional training programs and tabletop exercises.
- *Phase III (2016 and beyond):* focus will be to:

    1. Build upon the development and delivery of the training and tabletop exercises;
    2. Comprise technical enhancements to the current operating systems (NMS)
    3. Further automate the damage assessment information collection and global ETR generation.

    The scope and timing of technology enhancements is subject to a favourable Ontario Energy Board (OEB) funding ruling.

Executive Summary

This report provides an update of the status of implementation of each of the 26 recommendations from the 2013 Ice Storm Report and other third-party reports. These recommendations fall within nine (9) areas. Table 1 summarizes the actions Toronto Hydro has taken to date.

Table 1: Summary of Recommendations Status

Area Evaluated in 2013 Ice Storm Report	Summary of Actions Taken by Toronto Hydro to Address Recommendations
Emergency Planning and Preparedness	• Created Grid Emergency Management Department • Instituted emergency response roles for all employees • Expanded Incident Levels scale and updated activation criteria • Expanded Incident Command System (ICS) organization
Resource Acquisition and Allocation	• Joined North Atlantic Mutual Assistance Group (NAMAG) and Canadian Electricity Association (CEA) mutual assistance groups • Added more on-system contractors • Formalized mutual assistance on-boarding processes • Updated and documented Logistics processes to ensure scalability
Damage Assessment and Restoration Planning	• Created new damage assessment process • Trained damage assessors • Improved ETR estimation process
Restoration Execution	• Pre-established restoration strategies and priorities • Streamlined dispatch of off-system resources • Trained additional dispatchers
Communications – Customer Contact	• Increased capacity to handle large call volumes • Enhanced outage map • Established Memorandum of Understanding (MOU) with City for 311 service
Communications – Other Stakeholders	• Updated processes to ensure “one voice” messaging • Enhanced Customer Action Form • Provided additional emergency preparedness tips and information
Information Systems and Technologies	• Enhanced Outage Management System (OMS) to support damage assessment • Increased Integrated Voice Response (IVR) capability
Vegetation Management and System Hardening/Resiliency	• Gained City support for planned system durability and resiliency programs
Toronto Hydro – City Coordination	• Active participant on various City emergency management groups • Collaborated on preparation and delivery of numerous customer education programs
Undergrounding Considerations	• Planning to invest $70 - $75 million in conversions pending OEB approval

3. Background

The Ice Storm

On December 21 and 22, 2013, the Greater Toronto Area (GTA) was at the epicenter of a freezing rain event that brought between 20 and 30 millimetres of precipitation – more than two-year's worth – in two days. This severe ice storm resulted in 313,000 service interruptions (at peak) to Toronto Hydro customers. Approximately 57%, or 416,000 customers served by Toronto Hydro lost power at one point during the event, affecting more than one million City residents. Most of the damage was caused by tree limbs falling on power lines. In addition to widespread power outages, the event caused extensive property damage and economic losses.

The Ice Storm was an unprecedented event that disrupted the lives of most Toronto residents and tested the mettle of the first responders, and City and Toronto Hydro personnel involved in the recovery effort. Through a dedicated, coordinated and intensive response, the community was safely restored to normalcy.

Background

The Independent Review Panel (IRP)

In January of 2014, Toronto Hydro's Board of Directors announced the establishment of an Independent Review Panel (IRP) to oversee an assessment of its response to the Ice Storm. The intention of the review was to confirm practices that worked well and areas in need of improvement. The role of the IRP was to ensure the objectivity of the review and provide guidance and subject matter expertise. The scope of the assessment included all aspects of the widely-used emergency management (EM) life cycle practices, as adapted to the utility environment.

They received input from nearly 80 stakeholders that included residents of Toronto, members of the business community, Toronto Hydro employees, CUPE executive, City of Toronto employees, and City Councilors, and reviewed relevant internal plans, reports and documentations, and considered pertinent City and Provincial regulations, policies and emergency management practices.

Synopsis of Toronto Hydro's Performance

In general, when compared to the performance of other utilities conducting ice and snow storm restorations Toronto Hydro's overall performance is well within the industry norm. In fact, there are a number of areas where Toronto Hydro either performed better than the norm or where their approach was considered to be a best practice.

Toronto Hydro deployed approximately 1,250 field resources, including 98% of Toronto Hydro's core trade workers, and more than 400 from other utilities and contractors. Crews completed restoration of all customers who could accept power by January 2, 2014. Notably there was only one (1) recordable safety incident at Toronto Hydro over course of the restoration and no deaths attributed to the storm.

Figure 1 shows the progress of Toronto Hydro's restoration performance, noting that 75% of customers were restored within 48 hours from the time the restoration began. Milestones 1-7 denote:

1. Initial weather statement warning of a potential ice event;
2. Initial request for mutual assistance issued by Toronto Hydro;
3. All City OEM directed priority load restored;
4. ~ 86% of all customers affected restored (within 72 hours);
5. ~ 90% of customers out at peak restored (within 96 hours);
6. ~ 99% of customer out at peak restored;
7. All customers who can accept service restored.

Figure 1: 2013 Ice Storm Restoration Timeline with Key Milestones

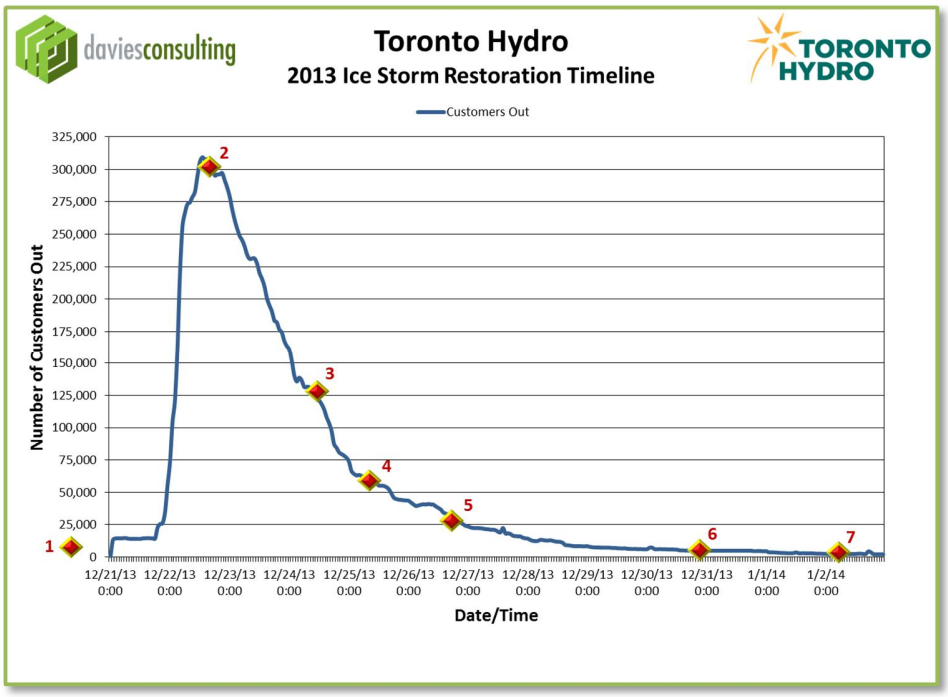
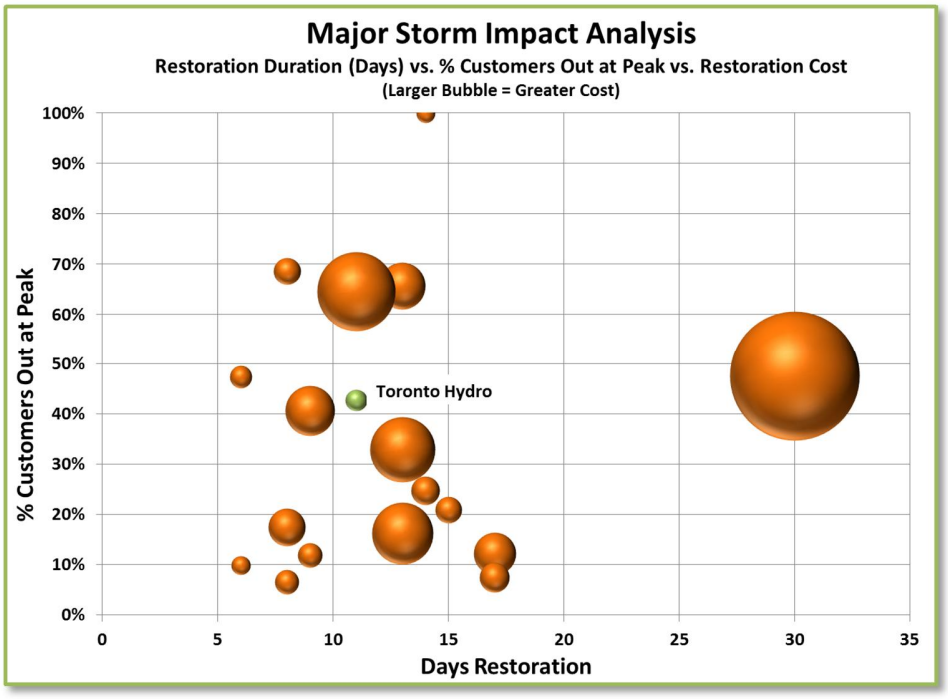


Figure 2 shows a comparison of Toronto Hydro's storm restoration in terms of restoration duration (days) vs % of customer base out at peak vs restoration cost. When compared to the performance of other utilities conducting ice and snow storm restorations Toronto Hydro's overall performance is well within the industry norm in terms of days to restore, and considerably better than the norm in terms of cost to restore.

Figure 2: Event Benchmark Comparison



Source: Davies Consulting Storm Response Benchmark Database, 2014

Summary of Findings and Recommendations

The review of Toronto Hydro's response to the Ice Storm, revealed both well-executed emergency management practices and areas in need of improvement to bring Toronto Hydro's performance in line with industry norms and leading practices.

The *summary findings* for each area evaluated, were:

1. Toronto Hydro generally followed an Incident Command System-based approach at the management level, but had not fully developed, trained and exercised the approach across the Company;
2. Customers could not obtain timely and accurate information about their outage status (including estimated time of restoration, or ETR) during the event;
3. The incident communication process, with a defined media strategy and unity of message was in line with industry leading practices; however, ETR information was not readily available;
4. The Company secured and deployed mutual assistance resources early in the restoration and executed the overall mutual assistance process generally well;
5. Restoration priorities were in line with industry practices; however, the damage assessment process was not fully executed;

6. While the restoration approach varied among the Local Command Centres, the overall restoration duration was in line with similar events in the industry;
7. Toronto Hydro has implemented some advanced operational and information technology systems, but has not fully integrated them to provide adequate restoration support and situational awareness; and
8. The circuit-based vegetation management preventive program is on a 3-year cycle which is in line with industry practices and follows industry pruning standards and City of Toronto by-laws.

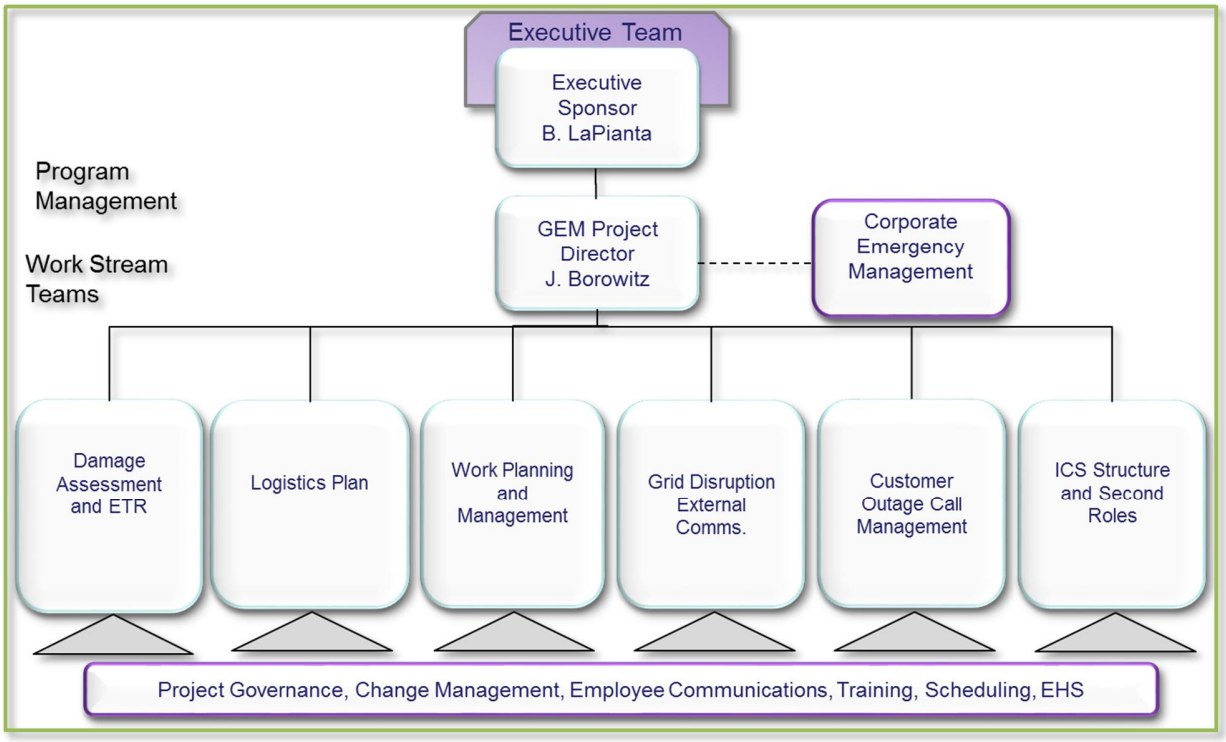
The *summary recommendations* by area of evaluation and in no particular priority order, were:

1. Update emergency response plans to align with vision and strategy, incorporate the documentation of key processes and procedures, and train response roles and structure;
2. Improve situational awareness capabilities to enable development of accurate ETRs and facilitate focus on critical priorities;
3. Develop capacity to provide customers timely access to report and obtain critical information related to their outage using the media they require during any outage, including blue-sky and full-scale major events;
4. Work with key stakeholders to identify, agree upon, and fund cost-beneficial system hardening and resilience initiatives, including vegetation management and targeted conversion of line segments to underground construction;
5. Educate stakeholders to ensure that they understand their responsibilities and are better prepared and more fully informed when incident occurs (e.g., repairing the damage of equipment on customer property);
6. Codify the process for rapid access to and deployment of trained, certified, and equipped resources;
7. Pre-define restoration approaches that are scaled to outage levels and can be executed efficiently and safely;
8. Update and further integrate key Information and operational systems to provide real or near-real time intelligence during major events; and
9. Enhance collaboration between Toronto Hydro and the City to Integrate outreach, messaging, and education to improve citizen preparedness and awareness of major events.

Toronto Hydro's Emergency Management Project

In response to the Ice Storm Report, in the fall of 2014, Toronto Hydro established the Grid Emergency Management Project (GEM). Figure 3 shows the project organization.

Figure 3: Grid Emergency Management Project Organization



Designated a corporate strategic project, the objective of this effort is to address the recommendations of the Independent Review Panel. Moreover, the project team also is implementing recommendations arising from a number of industry/association post-ice storm reports including, but not limited to, the City Of Toronto After Action Report, the Electric Distributors Association Post Ice Storm Report (EDA), the Toronto Hydro-Electric System Limited Climate Change Vulnerability Assessment, the Edison Electric Institute After The Storm Report, and CUPE Local One's Post Ice Storm Report.

The sections that follow provide a detailed update on the status of the implementation of the recommendations arising primarily from the Independent Review Panel and to the other referenced reports.

4. Introduction

The Independent Review Panel (IRP) addressed nine (9) areas of Toronto Hydro's emergency response as shown in Table 2. Toronto Hydro retained Davies Consulting LLC, a leading management consulting firm with extensive experience in utility emergency response throughout North America, to conduct the assessment under the direction of the IRP.

Table 2: Focal Areas of 2013 Ice Storm Assessment

Areas Addressed in 2013 Ice Storm Assessment
1. Emergency Planning and Preparedness
2. Resource Acquisition and Allocation
3. Damage Assessment and Restoration Planning
4. Restoration Execution
5. Communications – Customer Contact
6. Communications – Other Stakeholders
7. Information Systems and Technologies
8. Vegetation Management and System Hardening/Resiliency
9. Toronto Hydro – City Coordination

In the report of the assessment, submitted to the City Council in June 2014 the IRP noted that the 2013 Ice Storm "was an unprecedented event that disrupted the lives of most Toronto residents and tested the mettle of the first responders, as well as the City and Toronto Hydro personnel involved in the recovery effort." It found that Toronto Hydro demonstrated a prudent, diligent and safe approach to the restoration and the Company performed in a manner consistent with industry norms. As expected with any incident of this magnitude, the recovery effort from the ice storm also exposed several aspects of the Company's emergency response that could be improved. The IRP presented 26 recommendations, 23 of which addressed enhancements Toronto Hydro can make. The others called for closer cooperation among Toronto Hydro, the City of Toronto and the Province of Ontario to prepare the community for future major outage events.

Toronto Hydro executives and management team took prompt and responsive action to address the recommendations in the Ice Storm Report. They implemented immediate improvements to:

1. Address limitations in the customer outage call intake process;
2. Enhance consumer emergency preparedness through education and outreach;
3. Engage with the City to address joint ways to address the management of trees in close proximity to hydro lines; and
4. Consider other system hardening opportunities (e.g., undergrounding, expanded use of tree-proof conductor).

Many of the remaining recommendations, such as those related to damage assessment, Estimated Time of Restoration (ETR) and external communications are being addressed within GEM. The

Director of Grid Emergency Management leads this project, which was initiated in September 2014. The project is occurring in three (3) phases:

- *Phase I (September 2014 – July 2015)*: a team of internal functional experts drawn from grid operations, logistics, information technology, communications, call centre, and organizational training and development, are updating, creating (as needed), and documenting the processes, roles and analytical tools needed to improve grid emergency preparedness, response and customer communications.
- *Phase II (August 2015 – December 2015):* updating of the Grid Emergency Response Plan to include the documentation developed in Phase I, and the delivery of additional training programs and tabletop exercises.
- *Phase III (2016 and beyond):* focus will be to:

    1. Build upon the development and delivery of the training and tabletop exercises;
    2. Comprise technical enhancements to the current operating systems (NMS)
    3. Further automate the damage assessment information collection and global ETR generation.

    The scope and timing of technology enhancements is subject to a favourable Ontario Energy Board (OEB) funding ruling.

Throughout the course of the program, the core team members are engaging with internal and external stakeholders, vendors, peer utilities and experts in the field. This inclusive, collaborative approach is ensuring that the practices adopted:

- Are an optimal mix of innovative and proven methods;
- Adaptable to Toronto Hydro's operating environment;
- Provide customers with actionable information; and
- Scale to address incidents of any size.

Involving the eventual users in designing the emergency management organization, processes and procedures also is essential to creating a sustainable emergency preparedness and response capability throughout the Company. Outreach to leading-practice utilities through site visits, industry meetings and conferences has both deepened overall knowledge of leading emergency management practices and yielded readily usable methods, analytical tools and planning templates.

This report provides an update of the status of implementation of each of the 26 recommendations from the 2013 Ice Storm Report. Mirroring the structure of the 2013 Ice Storm assessment, the recommendations are grouped within the nine (9) areas of emergency response assessed. For easy reference, each recommendation has an alpha-numeric key associating it to the evaluation areas (e.g., EPP-1, EPP-2). Table 3 shows the reference key for each evaluation area.

Table 3: Recommendations Reference Key

Reference Key	Area Evaluated in Ice Storm Report
EPP	Emergency Planning and Preparedness
RA	Resource Acquisition and Allocation
DAP	Damage Assessment and Restoration Planning
RE	Restoration Execution
CCC	Communications – Customer Contact
COS	Communications – Other Stakeholders
IT	Information Systems and Technologies
VMSH	Vegetation Management and System Hardening/Resiliency
TH – C	Toronto Hydro – City Coordination

5. Implementation of Recommendations

5.1. Emergency Planning and Preparedness (EPP)

Over the past decade, Toronto Hydro had been advancing its emergency planning and preparedness capabilities, resulting in the following strengths noted in the 2013 Ice Storm Report:

- Emergency response structure largely aligns with the Incident Command System, which is considered to be the industry leading practice in emergency response.

Toronto Hydro uses ICS[2] to manage all types of emergencies. This approach is consistent with comparably-mature ICS programs at other utilities.

- Corporate Emergency Management organization is centralized and addresses all hazards.

Toronto Hydro has a corporate emergency management group that addresses all-hazards. The move to establish a discrete emergency management function (managed outside of Grid Operations) is in line with practices of leading utilities.

- Trained and exercised System Operations Centre (Command Centre) roles and responsibilities prior to an event.

Toronto Hydro has a training and exercise program for Senior Management Stand-by (SMS) – a group of on-call leaders, SOC staff and the Crisis Management Team (CMT).

This program includes annual internal training and exercises, along with participation in exercises with the Independent Electricity Systems Operator (IESO), North American Electric Reliability Council (NERC), and the City of Toronto.

- Pre-event weather monitoring process in place and used to support activation decisions.

In preparation for the December 2013, Toronto Hydro monitored weather information provided by Environment Canada, the government source of weather and meteorological information. This approach to weather monitoring is in line with standard practices of utilities that do not have an in-house meteorologist.

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[2] Incident Command System (ICS) is a standardized on-site management system designed to enable effective, efficient incident management by integrating a combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure.

The ICS is used to manage an incident or a non-emergency event, and can be used equally well for both small and large situations (Source: ICS Canada).

The Province of Ontario has developed the Incident Management System (IMS) that provides standardized organizational structures, functions, processes, and terminology for use at all levels of emergency response in Ontario. IMS addresses the need for coordinated responses to all types of incidents and is closely related to the Incident Command System (ICS). ICS is used by some first responders in Ontario and many first responders (wild land fire, search and rescue, etc.) across Canada.

Implementation of Recommendations

Toronto Hydro has responded to the recommendations made by the IRP to improve emergency planning and preparedness as follows. These actions enable Toronto Hydro's to more:

1. Effectively prepare the Company, customers and the public for impending incidents;
2. Quickly mobilize all available resources to expedite restoration of power to customers; and
3. Clearly communicate restoration priorities and process to customers.

EPP-1 Reaffirm and communicate emergency management vision and strategy throughout all of Toronto Hydro.

The Toronto Hydro executive and management team has established an emergency management vision and set of guiding principles (See Appendix A). Together, these affirm its belief that emergency management is a core competency of the Company and of critical value to its customers. All emergency response plans will incorporate and align with the corporate emergency management vision and guiding principles.

There is a comprehensive communications plan in place to inform and educate all Toronto Hydro staff. The leadership team is using a variety of methods to reach employees, including in person briefings, articles in internal publications, and the corporate intranet. The roll out of the emergency management vision and guiding principles will be completed by September 2015.

EPP-2 Continue to inculcate the ICS-based approach to emergency response.

Under the leadership of the Director of Grid Emergency Management, Toronto Hydro has completed or is in the process of implementing the following:

- Formalizing and expanding the use of emergency response roles. The objective is for every employee of Toronto Hydro to have an emergency response role. Industry benchmarks

indicate that the full implementation of a comprehensive emergency roles initiative can take up to five years. This implementation includes:

- Defining the array of emergency roles (also known as second roles) needed for all levels of response;
- Identifying competencies needed to execute each role;
- Matching individuals or job groups with Toronto Hydro to these roles;
- Incorporating emergency role into "blue sky" job descriptions;
- Training and exercising emergency response roles; and
- Assigning roles at the point of hire.

By July 31, 2015, Toronto Hydro will identify and roster (i.e., assign specific people or groups to roles) roles most essential to restoration during an incident. These include:

- ICS Command and General staff;
- Damage assessors;
- Wires down guards;
- Dispatchers;
- Mutual assistance crew supervisors;
- Materials procurers and handlers;
- Situational awareness unit staff;
- Outage call handlers; and
- External communications staff.

Through May 31, 2015, nearly one-third (563 out of 1,459) of Toronto Hydro employees have been assigned a role during an emergency; either their existing role or an emergency role. To date, the GEM team has identified 44 emergency response roles to which over 500 people have been assigned. When fully implemented, there may be up to 100 unique emergency roles identified.

Training for essential emergency roles has begun in Phase I. For example, 69 employees have been trained as damage assessors and eight (8) have been trained as Dispatchers. Recently, Toronto Hydro's executive team participated in an emergency response tabletop exercise that was peer reviewed by a member of Florida Power & Light's emergency preparedness group. In Phase II, additional emergency roles will be defined and assigned and the requisite training developed and delivered.

- Formalizing the pre-event activation and communication process. The documentation of resource activation, notification and demobilization processes and procedures has been completed. This documentation will be incorporated into the Grid Emergency Response Plan. Training of Toronto Hydro employees conducting these processes has begun in Phase I and will continue in Phase II.
- Update the emergency levels to include worst-case planning assumptions. Toronto Hydro has expanded the scale it uses to determine the magnitude of an incident from three (3) levels to five (5) levels. This five-level scale is in line with industry leading practice. The Director of Grid

Emergency Management, in consultation with the grid operations and enterprise risk management groups, has evaluated and updated the criteria Toronto Hydro uses to characterize grid-related threats and hazards and to declare an incident level. The expansion of the grid emergency scale and refinement of activation criteria equips Toronto Hydro to address incidents of all levels more effectively. (See Appendix C)

- Expand the training and exercise program to the Local Incident Command Centres (LICC).[3] All Toronto Hydro personnel performing an emergency response role, particularly Command staff will be trained by December 31, 2015. Required training will include:
    - IMS 100, IMS 200 and supplemental courses (classroom and tabletop exercises) on ICS within Toronto Hydro for all staff filling ICS Command and General staff roles (including ICS staff in the LICCs); and
    - IMS 100 for all employees who could be engaged in emergency response.

Three Toronto Hydro employees can "train-the-trainers," certified by the provincial emergency management office to deliver IMS training to support these additional requirements.

In addition to the actions noted above, the Director of Grid Emergency Management led a review of Toronto Hydro's ICS organization currently in use. The number of roles within the ICS organization have been expanded, as needed, to address larger-scale incidents (e.g., addition of technical specialist to address other hazards, such as a cyber-breach) and roles names and descriptions have been revised to conform to ICS/IMS standards and conventions. Also, utility-specific roles have been added for:

1. Logistics;
2. Situational awareness;
3. Resource planning;
4. Damage assessment;
5. Mutual assistance; and
6. Wires down.

See Appendix B for the Toronto Hydro ICS organization chart.

EPP-3 Enhance centralized emergency management group resources to support full implementation and sustainment of ICS and ongoing relationships with key stakeholders.

EPP-4 Add dedicated grid operations emergency management resources.

Toronto Hydro has established a Grid Emergency Management Department that consists of a full-time Director of Grid Emergency Management, a Mutual Assistance/Logistics Supervisor. This Director current leads a Grid Emergency Management Program team that is supplemented by several temporary secondments. Toronto Hydro's current rate case includes funding proposal for

[3] These are called Service Centres in the 2013 IRP Ice Storm Report. These are located in the North East, North West and South and are activated when an incident is declared. They are the locations from which line crews are dispatched.

the implementation of a permanent Grid Emergency Management department of up to six, full-time staff.

The staff will be responsible for:

- Grid emergency response preparedness;
- Grid emergency plan maintenance;
- ICS implementation and sustainment;
- Communications and stakeholder management; and
- Emergency management coordination with the City and regulators.

This group will work in concert with the corporate emergency preparedness group (that reports to the Executive Vice President and Chief Information and Risk Officer), supplementing enterprise-level all-hazards planning and response, including communications and stakeholder management. Subject to OEB funding approval, Toronto Hydro will continue to add permanent staff to this department in Q3 2015.

EPP-5 Update the Emergency Response Plan to improve comprehensiveness and usability.

The current Grid Emergency Response Plan will be updated in Phase II. It will include documentation such as:

- Emergency Management Vision and Guiding Principles;
- Updated ICS organization;
- Descriptions of emergency response roles and responsibilities;
- Incident Levels activation guidelines;
- Processes for activation, notification and mobilization/demobilization of resources;

- Restoration strategy;
- Processes and procedures for logistics, damage assessment, restoration, and associated support functions (e.g., human resources, finance and administrative, information technology); and
- Role-specific checklists, job aids, schematics and other documentation as required to support the emergency response.

There will be associated plans for Logistics and Customer Support that will comprise the processes, procedures, policies, roles, checklists and associated job aids for these functions. This set of similar documentation for External Communications will be in the Incident Communications Plan.

The Grid Emergency Response Plan content is geared to respond to an overhead distribution system event; however much of this content (e.g., ICS organization, activation, notification and demobilization processes) can be used to support a response to any hazard. All of the practices, processes, procedures and related documentation will scale to address incidents of any magnitude. This Plan will be readily available to all emergency response staff in formats that are accessible and easy used during a response. Also, the Plan will be used to support internal emergency preparedness training and exercises. It will be updated annually, and, more frequently if needed, to reflect lessons learned from incident responses.

5.2. Resource Acquisition and Allocation

The response to the 2013 Ice Storm entailed the deployment of nearly all of Toronto Hydro's core trade workers (98%), many management and professional staff, and 450 mutual assistance field resources. The Company sourced off-system crews through sustained contractors (who have agreements in place to provide support), other contractors, the City of Toronto, and from other utilities. Toronto Hydro executed the following aspects of resource acquisition and allocation well during the Ice Storm:

- Safely deployed the largest number of resources for any response in Toronto Hydro history.

Implementation of Recommendations

The total number of resources supporting restoration following the 2013 Ice Storm, including internal staff and field personnel, contractors, and mutual assistance, was nearly 1,400 – the largest number of any response conducted by Toronto Hydro. During the course of the restoration, only one recordable safety incident occurred. This statistic is noteworthy as the persistent ice and freezing temperatures following the storm made work locations (uneven surfaces, back yards, heavily canopied areas, locations requiring ladders to access) hazardous.

- Developed and applied mutual assistance processes in real time that generally worked.

Notably, the first time that Toronto Hydro had used mutual assistance was in the response to the 2013 Ice Storm. Toronto Hydro executives and the Logistics Resource lead, who was responsible for mutual assistance intake and support processes, relied upon established relationships with other utility executives and agreements, practices, and processes in place to support daily operations to bring on and support mutual assistance providers. They were able to call upon current vendors to expedite materials and equipment deliveries, expand food services, and provide fuel. The logistics group also was able to quickly procure other services, such as lodging, when pre-existing agreements or processes did not exist.

Toronto Hydro staff from the Human Resources and Safety, Power Systems, and Operation Support Services Divisions drew upon experiences from responding to other Level 3 incidents (e.g., Hurricane Sandy) to quickly develop the content for onboarding briefings to off-system mutual assistance and forestry crews. Also, Toronto Hydro provided “bird-dog” supervisory support to all but a few (later arriving) mutual assistance crews.

Implementation of Recommendations

- Flew in, equipped, and deployed mutual assistance resources from Manitoba within 48 hours.

The 42-member crew contingent provided by Manitoba Hydro was the second largest sent by a responding utility. Toronto Hydro transported, outfitted, and deployed all Manitoba crews and supervisors within 48-hours of placing the call for assistance. Crew members arrived with their own personal protective equipment and tailboards. Toronto Hydro supplied everything else they needed to support the restoration. This was a unique feat. By contrast, a number of utilities attempted to fly in crews from the West Coast during the Hurricane Sandy restoration, but ran into significant barriers and delays.

- Conducted thorough mutual assistance on-boarding process and safety briefings.

Upon arrival, mutual assistance crews were transported and checked-in to their respective hotels, conveyed to the LICC from which they would be dispatched, and given an extensive orientation briefing that addressed local safety rules and conditions, high-level work protection code information, and what to expect on the streets. In addition, each day, mutual assistance crews would receive safety briefings prior to being dispatched to work locations.

- Strong collaboration between City and Toronto Hydro tree crews on restoration activities.

The City of Toronto Urban Forestry's top priority during the aftermath of the 2013 Ice Storm was to provide resources (crews) to Toronto Hydro to restore power. The City Director of Forestry participated in daily planning conference calls that included Toronto Hydro executives, to review progress and identify needs.

Toronto Hydro has responded to the recommendations made by the IRP to improve resource acquisition and allocation as follows. These actions enable Toronto Hydro's to:

1. Rapidly mobilize resources for restoration, customer communications and other essential emergency response roles;
2. Procure the equipment, materials, lodging, food and personal care to enable crews to focus on restoration; and
3. Provide a safe working environment for crews.

Implementation of Recommendations

RA-1 Adopt a resource management strategy that provides for deployment of all available resources, seamless integration and coordination of crews, and optimal supervisory span of control.

Toronto Hydro has made significant progress in building the capability to mobilize, manage, and de-mobilize off-system resources. The Company has: become an active participant in U.S. and Canadian mutual assistance (MA) alliances; codified processes and procedures for the on-boarding, support and demobilization of mutual assistance crews; established activation triggers that better inform mutual assistance requests; and identified additional roles within the ICS organization to support the influx of MA crews.

The focus of the Phase I work has been on the sourcing of line crews from utilities within North America and investigating third-party applications for rostering and calling out internal crews and off-system resources. Also, Toronto Hydro recently reviewed its Unit Price contract provisions. In 2014, Toronto Hydro completed a request for proposal (RFP) to secure Design, Build Construction services for both civil and electrical infrastructure. These contractors enable Toronto Hydro to supplement its existing workforce to complete capital programs. The RFP resulted in the addition of two (2) other on-system contracting companies to assist in any reactive, grid response or customer connection work as required. Similarly, Toronto Hydro has revised its third-party call centre contract to include outage call management, thereby increasing the number of resources available for outage call support.

- Establish mutual assistance process and agreements that encompass all potential sources of crews: regional, national, cross-border utilities, contractors, and City.

Toronto Hydro has taken action to access mutual assistance from both neighbouring utilities in the United States (U.S.) and from utilities across Canada. In October 2014 the Company became a member of the NAMAG, one of seven Regional Mutual Assistance Groups (RMAGs), across the U.S.

As the Edison Electric Institute, the trade organization for investor-owned utilities in the U.S., explains:

> *"RMAGs are organized geographically to meet the needs of electric utilities during emergency situations. Although participation is voluntary, each utility in an RMAG has committed, when possible, to send its restoration workers, contractors, and specialized equipment to help other utilities in the network when called upon to do so. If needed, utilities in one RMAG will assist those in another region. By sharing resources among utilities, the RMAGs help to mitigate the risks, costs and duration of the event related to restoring power following major outages. Together, the RMAGs enable a consistent, unified response to emergency events that result in a significant loss of power."*

Since joining NAMAG, Toronto Hydro has participated in several meetings where members share best practices for deploying and managing mutual assistance workers and documentation standards (e.g., cost capture templates, job aids). The GEM team is incorporating these leading

practices and forms into the design of Toronto Hydro's grid emergency response processes and procedures.

Within the existing RMAG framework, discussions are underway to allow utilities that have similar distribution systems or staff with similar, specialized skills (e.g., lead work, network) to engage mutual assistance from each other (outside the full, RMAG protocol). These discussions are in the early stages.

An area requiring further investigation and improvement is the border-crossing process for foreign crews. Toronto Hydro is engaging in discussions with the appropriate agencies (including Canada Border Services) and industry contacts to identify ways to reduce the time for processing in-bound crews.

Within Canada, Toronto Hydro has been co-chairing a CEA mutual assistance working group whose goal is the establishment of a Canadian national/regional mutual assistance group. Building on the work of this group, the CEA recently announced the signing of a National Mutual Assistance Agreement by Canadian electric utilities. As stated by the CEA,

> *"[t]he Agreement provides a ready mechanism for Canadian electricity industry companies to assist each other during emergencies. It covers assistance in all types of emergencies including, but not limited to, those caused by storms, natural disasters, equipment failures, or willful damage. This assistance could include personnel support, equipment and consumable supplies, or other services."*

With regard to accessing additional contractor resources, existing Unit Price Agreements include provisions that allow for the use of on-system contractors to assist with grid emergency response efforts. Further discussions are needed with the City to develop a more formalized approach to the securing and sharing of City crews. These will occur in a subsequent phase of the GEM project.

- Document the process, with pre-defined decision criteria, to mobilize and demobilize mutual assistance.

In tandem with the efforts to establish mutual assistance agreements and improve shared mutual assistance practices, Toronto Hydro is formalizing and documenting Company processes, procedures, roles and checklists for activating, on-boarding, deploying and demobilizing in-bound mutual assistance resources. The criteria used to support incident level declaration (described above) along with the data resulting from the redesigned damage assessment process will result in a more accurate estimate of mutual assistance requirements.

These criteria include:

1. Number of trouble spots;
2. Number of customers affected at peak;
3. Restoration duration;
4. Resources required; and
5. Restoration strategy.

Data from the initial damage assessment (described below) will include:

- Type of damage (e.g., pole event, primarily wires, underground or overhead or both);
- Extent of damage (e.g., concentrated within a few city wards, or across the territory); and
- Location of damage (e.g., back yard, ravine, commercial or residential).

The ICS organization includes roles that are responsible for mutual assistance mobilization and demobilization. Toronto Hydro will use the processes and forms defined in the mutual assistance agreements, adapting them as needed to meet requirements specific to Toronto Hydro. This documentation will be included in the Grid Emergency Response Plan slated for update in Q3/4 2015.

- Source and prepare supplemental supervisors to accommodate maximum crew scale-up.

In Phase I of the emergency response roles initiative, Toronto Hydro is in the process of identifying internal staff who are qualified to serve as supervisors and/or "bird-dogs" for mutual assistance crews. Supervisors may be needed if utilities providing mutual assistance are unable to send a suitable number. The size of the internal pool will support an adequate span of control (1-2 crews for bird-dogs; 5-7 bird dogs per supervisor).

RA-2 Create a comprehensive, scalable logistics plan as part of the Emergency Response Plan.

The effort to develop a Logistics Plan that supports a rapid, consistent, scalable response has included:

- A thorough review of the current facilities, processes, resources and contracts to determine capability to support larger-scale incidents;
- Site visits with other utilities to learn about leading practices; and
- Discussions with current and potential vendors to ensure scalability of services.

The GEM team addressed ten (10) areas of logistical support:

1. Staging sites;
2. Food, lodging and personal care;
3. Security;
4. Equipment and materials procurement;
5. Transportation;
6. Fuel;
7. Materials management;
8. Forensics/environmental support;
9. In-bound mutual assistance; and
10. Information technology/communications support to facilities activated (e.g., LICCs).

Specific changes to current policies, processes and procedures to support scalability of logistics support are:

- Identification of three (3) additional sites, near Toronto Hydro service centres/facilities to stage equipment and materials;

- Update to processes and procedures that support 24/7 readiness of facilities activated when an incident is declared;
- Pre-established agreements with catering vendor to provide high quality, nutritious meals to crews and other emergency response staff;
- Pre-established agreements with hotels to acquire rooms at pre-negotiated rates;
- Pre-established agreements with vehicle rental agencies to augment Toronto Hydro fleet;
- Agreement with facilities vendor to provide additional or special services needed during an incident (e.g., security fencing, emergency lighting, generators, site security);
- Agreement with warehouse vendor to have emergency plan in place to ensure availability of facilities, equipment and materials should an outage occur;
- Back up facilities identified should catering vendors require additional or alternate space to prepare meals;
- Back up generation for key facilities; and
- Fuel contracts address back up supply to maintain operations.

In addition to these enhancements to current logistics practices, the GEM team is putting in place two new practices that will improve crew productivity:

1. Fast track process for alternative product review and approval – eliminates (where possible) single source support of materials and provides for pre-approval of alternate materials for high-priority items; and
2. Waste disposal services to support timely clean-up of field waste – provides for the deployment of waste removal trucks and crews to work sites so that line crews do not have to haul field-generated waste to service centres.

The documentation of most of the processes and procedures within the ten logistical support areas has been drafted and is undergoing final review by internal management, logistics staff and vendors. This documentation will be included in the Logistics Emergency Response Plan. The staging site agreements are under review by site owners and are expected to be in place by July 31, 2015.

In Phase II, the Logistics team will consider the use of turnkey providers of staging site facilities and/or basecamps. This type of service may be needed to support a Level 5 incident response.

5.3. Damage Assessment and Restoration Planning

Damage assessment and effective restoration planning are essential for a rapid and effective restoration. Following the industry leading practice, Toronto Hydro established priorities early in the restoration and restored customer service in accordance with those priorities. The Company maintained focus through frequent Command Centre conference calls and communicating the specific priorities for the subsequent planning period.

Toronto Hydro used its "triage" process to gather damage information. This process served other needs, apart from damage assessment, including evaluating the wire down locations being reported by the customers, crews and first responders, and making them safe for public and utility

employees participating in the response. The strengths of Toronto Hydro's damage assessment and restoration planning processes during the Ice Storm noted by the IRP were:

- Overall restoration priorities were in line with industry practices.

Toronto Hydro established and followed restoration priorities during the 2013 Ice Storm response that followed typical industry practices. These priorities were:

- Public safety (911 calls and live down wires);
- Critical customers (e.g., hospitals, water pumping stations, 911 call centres);
- Substation and feeder backbone restoration (i.e., portions of the system that provide service to large blocks of customers);
- Lateral sections of the circuits (i.e., branches of the circuit that are typically single phase lines that serve several streets in a neighbourhood); and
- Customer service drops (i.e., lines that connect the house to the overhead transformer and typically service one or two customers).

By following these priorities, which addressed larger blocks of customers first, Toronto Hydro was able to restore power to 86% of the customers who were out at peak within the 72 hours from the start of the field restoration (See Figure 1).

- The Command Centre coordination calls (every three hours) provided useful information and maintained alignment of Local Incident Command Centres to restoration priorities.

Once the Command Centre was activated on Sunday morning, December 22, 2013, the Incident Commander held coordination calls every three hours. The standard industry practice is to conduct these calls twice a day. Toronto Hydro chose to hold them more often given the degree of damage caused by the ice storm. These calls were essential to maintaining response organization alignment to restoration priorities.

- Some Local Incident Command Centres (LICC) conducted planning activities overnight to facilitate work assignments and crew deployments for the subsequent shift.

A utility industry leading practice is to use the overnight shift to plan and organize assignments for the subsequent day shift. Conducting work planning at night affords the day shift managers and supervisors more time for crew support and for the extensive coordination with external stakeholders that typically occurs during the day. Some of the LICCs at Toronto Hydro conducted overnight planning for work for the next day, making crew assignments and creating job packets. This practice aided the deployment of the day crews.

Toronto Hydro has responded to the recommendations made by the IRP to improve damage assessment and restoration planning as follows. These actions enable Toronto Hydro to:

1. Provide initial coping information that customers and citizens need during an extended incident;
2. Communicate progressively more accurate information to customers about estimated time to restore (ETR) and outage status; and
3. More quickly mobilize the numbers and types of resources (people, equipment, materials) needed for restoration.

DAP-1 Institute a damage assessment process that defines the required approach, procedures, and competencies to establish situational awareness and planning inputs within the specified timeframe (e.g., within 48 hours).

The guiding principles for emergency management at Toronto Hydro establish that for any incident, the Company will provide a global estimated time of restoration (ETR) within a *maximum* time of 24 hours from the time the hazard has ceased to persist on Toronto Hydro territory (See Appendix A). This timeframe is in line with industry leading practice.

The GEM team, in collaboration with grid distribution operations staff, created a multi-phase damage assessment process to support ETR development throughout the course of an incident. This approach is designed to enable the provision of higher quality, actionable customer and stakeholder information earlier in the event (e.g., successively more accurate and geographically-specific ETRs). The phases can be scaled down, in terms of geographic scope and comprehensiveness, to produce ETRs for lower level incidents in less time.

Phase I: S*tatistical damage assessment* - conducted over the first six-to-nine hours after conditions are safe for personnel to travel across the service territory that was impacted. Trained crews of damage assessors will conduct a visual appraisal of a predetermined statistical sample (~10%) of affected territory by All Electric Distribution (AED) map. Assessors will use pre-printed maps and pre-defined checklists to support consistent, rapid data collection and reporting. Nearly 80 Engineering Techs are trained as damage assessors, one of the priority emergency roles addressed in Phase I.

The data provided by the assessors feeds into an Excel-based analytical tool that generates:

1. A projection of the damage which will be identified through the end of the comprehensive damage assessment; and
2. A global labour and bulk material estimate for restoration. The accuracy of the tool's damage projection has been validated, using 2013 Ice Storm damage assessment data.

   At this time this process is predominantly manual, designed to interface with current systems.

Phase II: C*omprehensive damage assessment* - in which the remainder (~90%) of AED maps in the affected territory are assessed. This duration of this assessment will depend upon the magnitude of the incident, taking up to several days for a Level 4 or 5 incident. Along with the Phase I damage, trouble spots identified in this phase are translated into OMS tickets and detailed material

estimates. Those tickets form the work queue for the main portion of the restoration, which can be prioritized, dispatched, and closed out via the central OMS with visibility to all in the organization.

Beyond a true-up of the statistically-determined global labour and material estimates, this phase of the assessment enables:

- Ongoing monitoring of progress against the global ETR;
- Development of regional ETRs;
- Greater degree of quality and accuracy of OMS tickets and associated customer outage counts, material planning, and progress tracking; and
- Communication of more detailed ETR information to customers, Councillors and other stakeholders.

Load testing of the OMS system to support the increased volume of users and inputs is underway; additional capacity or licenses may be required to support the process during a higher level incident.

Phase III: S*weep damage assessment* - where crews re-assess repaired locations to check for limbs on line, temporary repairs not made permanent, and any other remaining damage. The outputs are supplemental trouble tickets for previously unidentified work. Information from this process enables the completion of restoration, deactivation of the ICS organization and demobilization of resources.

The redesign of the wires down process to minimize delays to the damage assessment process will occur in Phase II of GEM. There will be specific roles, separate from damage assessment, within the ICS organizational structure to manage the dispatch and close out of wires down calls. The recommended wires down process is undergoing an internal review to ensure compliance with regulatory requirements and safety standards.

- Build a stronger damage data reporting interface with OMS and alternate data capture processes and tools.

The damage assessment processes described above are designed to work with current systems and tools (e.g., Excel spreadsheets) that do not require specialized expertise or investment to maintain. The GEM team is evaluating several alternatives for automating and simplifying the capture of field damage data. Examples are upgrades to the NMS (OMS, DMS) system and third-party applications for the electronic gathering of damage assessment data. The extent of technology investments will depend upon OEB funding decisions.

DAP-2 Develop a process to establish (calculate) timely and accurate ETRs.

Toronto Hydro has established a Situational Awareness Unit (SAU) within the ICS organization that includes several roles dedicated to developing and monitoring ETRs. The ETR developer will use the following process to establish the global and regional ETRs:

1. Gather damage summaries from the statistical damage assessment process.
2. Apply standard labour estimates based on the types of damage identified.

3. Apply an efficiency factor to account for the overall severity of the incident and anticipated complications due to the volume of damage and safety of personnel working the restoration.
4. Confirm the number of line resources working on the system and those scheduled to arrive later.
5. Distribute the adjusted labour estimate among the resources to establish a baseline amount of time required to complete the restoration.
6. Test alternative scenarios involving greater amounts of mutual assistance in order to come up with a recommended MA workforce.
7. Confirm how many resources can be added to the effort and on what schedule, repeat the ETR calculation and advise Incident Commander of the result via the Planning Section Chief.

The Incident Commander, in consultation with the Planning and Operations Section Chiefs and the Public Information Officer (PIO), will approve the global ETR and subsequent, regional ETRs. This information will be communicated to customers and other stakeholders through the use of multiple channels (e.g., web, social media, print, TV) to increase reach and effectiveness.

DAP-3 Establish standard work planning processes and procedures; train and exercise response personnel to drive consistency across central and local commands.

The Control Centre and LICCs will follow a two-phase, coordinated approach to restoration. The ICS organization now in place provides a clear chain of command and an objectives-based plan (Incident Action Plan) to drive consistent execution across the LICCs and by the Control Centre.

- Phase I, called P.A.I.R.D. (Patrol, Assess, Isolate, Restore, Document), addresses restoration activities up to the first 48 hours of an incident.
- Phase II, called Main Restoration, addresses the remaining work of restoring all customers who can receive service.

Phase I: *P.A.I.R.D. (Patrol, Assess, Isolate, Restore, Document)* - the Control Centre conducts a rapid restoration by isolating damaged locations in order to energize: as much of the backbone as possible in the shortest amount of time, while the LICCs:

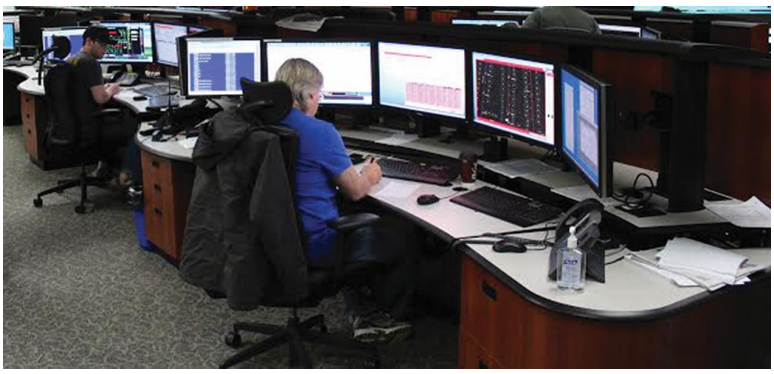
- Support the grid response crews in addressing Police, Fire and ambulance (PFA) calls;
- Manage wires down hazards; and
- Gather the damage assessment information required to organize Phase II of the restoration.

The Control Centre will prioritize and isolate trouble, close in breakers and restore critical facilities (as pre-determined, with input from external stakeholders), as well as document open devices requiring later restoration. The outputs will be rapid "Quick Win" restorations that aim to restore the bulk of customers, address restoration not repair, and document devices out to support the

restoration planning process. This work will occur in parallel with, and independent of the damage assessment process.

The LICCs will attend wire down hazards to enhance public safety and remove electrical hazards where possible. The outputs will be hazard mitigation and support to the registration of damage into the OMS from the damage assessment process.

Phase 2: *Main Restoration* - the prioritization and dispatch activities move out to the LICCs so that Control Centre can focus on issuing the many switching orders required to operate the system safely.



The Control Centre will issue switching orders and hold-offs for pre-prioritized restoration work. The outputs will be support to the LICC restoration strategy and execution and switching orders available on demand. The latter will eliminate long queues and wait times for crews ready to switch in and move on.

The LICCs will continue to:

- Address wires down and other electrical hazards;
- Dispatch vegetation crews to clear trees ahead of restoration; and
- Dispatch line crews (including on and off-system resources) per the Incident Action Plan.

The outputs will be fewer delays due to better crew sequencing and a restoration executed in accordance with the pre-determined strategy.

5.4. Restoration Execution

When compared with similar events, the overall customer restoration curve during the 2013 Ice Storm was in line with industry experience. The restoration curve shows the number of customers out over time throughout the restoration period and depicts the rate of restoration (See Figure 1). The restoration was conducted safely, with only one recordable incident during the event.

Toronto Hydro worked with the Electrical Safety Authority (ESA) to streamline the process for reconnecting services where possible (and where safe) to reduce hardship to customers. It also managed the work protection and special requests well to ensure that there were no unusual delays in restoring customers. As noted by the IRP, Toronto Hydro executed the following aspects of restoration well during the Ice Storm:

- Safety performance was excellent.

Among the approximately 1,250 field resources involved in the restoration over an 11-day period, there was only one recordable incident. When compared to the performance of other utilities

during similar events, Toronto Hydro's results rank among the best. In addition to the exceptional worker safety record during the restoration, there were no deaths in the greater Toronto area that were directly attributed to the 2013 Ice Storm. This is a notable outcome for all the City staff and first responders who came together to restore normalcy to the residents.

- Dispatch functions were decentralized to Local Incident Command Centres early in the restoration process.

In line with leading industry practices, during major events. Toronto Hydro separates its service territory into local areas that are managed through LICCs). This provides the Company with the ability to decentralize the dispatch function, thereby reducing the potential for bottlenecks at the central dispatch location. Through decentralization, Toronto Hydro doubled the number of dispatchers during the 2013 Ice Storm.

- Coordination with the Electrical Safety Authority (ESA) to reconnect customer premises was adjusted during the event to reduce hardship.

Standard ESA guidelines for restoring service connections require the equipment on the customer premise to be safe in order to reconnect power. For equipment that the customer is responsible to maintain, any needed repair work to ensure safety compliance is typically performed by a qualified electrician hired directly by the customer. In the initial days of the 2013 Ice Storm response, Toronto Hydro crews found some instances where the customers had power, but their equipment was not in proper condition, so they were forced to disconnect customer services. The Company quickly realized that this would create an unnecessary burden on customers who didn't lose power. Toronto Hydro worked with the ESA to amend the process, creating a form for customers to sign acknowledging that they would repair their equipment within a certain period of time, so their service would not be disconnected.

- Special requests were handled within the pre-defined priority order.

During major restorations, utilities often receive requests from elected officials and other influential stakeholders to restore a specific customer or commercial premise sooner than the restoration strategy would dictate. As a result, responding to a special request could cause a utility to deviate from focusing on the planned restoration priorities. On the few occasions during the 2013 Ice Storm when a special request was made that did not seem to be warranted, Toronto Hydro executives did not deviate from the plan.

- The work protection process did not cause unusually long delays in restoration.

The practice of work protection (i.e., "switching and tagging") provides clear guidelines under which a line crew can operate different devices that allow it to reconfigure the circuit and restore power to portions of customers more quickly as they repair the damage. This is an area of restoration where utilities typically encounter delays because a substantially larger number of switching requests from the field arrive at the central location (i.e., system control centre) at the same time. Sometimes, these delays can exceed one hour. Toronto Hydro operators were able to issue switching orders within a reasonable amount of time without causing any delays beyond

those that are typical for a restoration effort of this magnitude. Interviews with the field crews confirmed that, given the scale of the ice storm, delays were within the norm.

- "Bird-dogging" of mutual assistance crews worked well.

Off-system crews that are brought in through mutual assistance often are not familiar with the local electric distribution system. A leading practice is for the host utility to provide them with a local resource, called a "bird dog," to help with daily work needs (e.g., navigating the territory, coordinating work with other crews, ensuring the safety of the work site, accessing food). Toronto Hydro provided bird dogs to many of the mutual assistance crews, particularly those arriving during the first few days of the restoration.

Toronto Hydro has responded to the recommendations made by the IRP to improve restoration execution as follows. These actions enable Toronto Hydro's to:

1. Address pre-determined critical and priority loads to ensure that that essential community services are available (e.g., water, medical, telecommunications);
2. Clearly articulate restoration priorities and progress to crews, customers, and the public; and
3. Conduct a safe restoration.

RE-1 Pre-determine best restoration approach for each emergency Level (e.g., 1-4).

Toronto Hydro has adopted a 5- level scale to determine the magnitude of an incident and associated emergency response activation (See Appendix C). There is a preferred restoration strategy for each incident level, as shown in Table 4:

Table 4: Restoration Approach by Incident Level

Incident Level	Restoration Approach
Level 1	Event based
Level 2	Event based
Level 3	Hybrid (Event/Area by District)
Level 4	Area/Circuit based
Level 5	Circuit based

These pre-determined strategies will drive consistency in restoration execution, and provide enough flexibility to accommodate meaningful differences in field conditions among the Local Incident Command Centres.

- Amend work protection and restoration guidelines to enable off-system crews to "take over" and restore portions of the system in a catastrophic outage.

Toronto Hydro is exploring the use of alternate operating procedures in the field, in line with existing rules, codes and regulations, to improve the efficiency of crews.

- For each restoration approach, provide standard processes and procedures, and secure adequate resources to expedite dispatch work.

The standard processes and procedures described under recommendation DAP-3 above, support any restoration approach. As of May 31, 2015, eight (8) additional people have been identified and trained to perform the role of dispatcher during an incident response.

RE-2 Eliminate centralized mutual assistance and contractor Local Incident Command Centres and encompass those resources within the three geographic LICCs.

Toronto Hydro will deploy and manage off-system crews (i.e., mutual assistance, contractor, forestry) in the same manner as on-system crews. All line resources will be dispatched through one of the three geographically-dispersed LICCs. These are located at Commissioners, Monogram, and Milner. When declaring an incident the Incident Commander will indicate which LICCs to activate.

Once the restoration process is decentralized to the LICCs, the off-system resources will be assigned to one of the three LICCs based on the needs indicated by the initial damage assessment. At that point, staff within the LICCs will:

- Take control of the off-system resources and use them as required to restore outages within their portion of the system; and
- Release crews no longer needed to other LICCs, or demobilize them according to the pre-established process.

The processes, procedures, decision-making criteria and checklists for assigning off-system resources are under development. They will be completed by July 31, 2015, and will be documented in the Grid Emergency Response Plan.

5.5. Communications – Customer Contact

The ability of a utility to handle a significantly larger volume of customer calls during a major outage is essential to a successful restoration. During the first few days of a major storm, or other event causing widespread outages, incoming calls increase dramatically as compared to the expected daily volume.

Toronto Hydro experienced an unprecedented call volume during the 2013 Ice Storm. A total of 397,500 calls entered the IVR from the main customer phone number from December 21, 2013, through January 2, 2014. Of those, it is estimated that 374,200 were storm calls and 23,300 were non-storm calls. Just over one-third of the total storm calls (127,800) were received the first full day of the storm on Sunday, December 22, 2013. This number was nearly 1,000 times greater than the average number of calls received per day during normal operations.

As noted by the IRP, Toronto Hydro handled the following aspects of customer contact communications restoration well during the Ice Storm:

- The ability to use an external contract call centre as a back-up call centre site.

Since 2007, the Toronto Hydro Customer Care organization has contracted with a local call centre outsourcer, to provide call handling and clerical services. The outsourcer agents answer calls to the residential queues weekdays between 8:00 a.m. and 4:30 p.m. Equipment is in place to route calls easily from the Company to outsourced call centre and some call centre staff are familiar with Toronto Hydro procedures. From the perspective of emergency management, there is another major advantage: geographic diversity. If an incident renders the Toronto Hydro call centre inaccessible, calls can be readily directed to a contractor site at another location.

- The Key Accounts organization within Customer Care implemented an effective process to inform key and commercial accounts of outage status.

There is a group within Toronto Hydro responsible for managing the relationships with its "key" accounts. Key accounts are customers with consumption of 1 megawatt hours or higher annually (at one site or in aggregate). There are approximately 550 such accounts.

During the 2013 Ice Storm, key account representatives worked 12-hour shifts to keep their customers advised of restoration efforts. This continued until January 2, 2014, when power was restored to all key accounts. In addition to providing extended call coverage, key accounts sent daily group emails to customers with general information about Toronto Hydro's plans and progress. Key customers gave positive feedback about receiving this additional information.

In addition, for commercial customers, Customer Care was able to fast track a proactive customer outage communications program, scheduled to launch in Spring 2014. General restoration information was communicated to the enrollees via group emails. Also, Customer Care set up an email inbox to allow two-way communication with these customers.

- The control room, dispatch, call centre, and key accounts staff are co-located, enabling more effective information exchange.

At the time of the 2013 Ice Storm, the control room, dispatch, call centre, and key accounts functions were all located at the same facility. The proximity of controllers, dispatchers, customer service, and key accounts personnel provided for easier, quicker face-to-face communication. In-person communication is especially important during an emergency response, when key staff is focused on completing assigned tasks and may not have as much time to monitor the channels of communication they use during non-emergency times. The nearness to control and dispatch allowed key account managers more timely access to updates on restoration status, improving their responsiveness to customers. Likewise, Customer Care supervisors had access to dispatch to discuss individual customer situations.

Toronto Hydro has responded to the recommendations made by the IRP to improve Customer Contact Communications as detailed below. The improvements completed or underway help fulfill the following objectives:

- Customers will not receive a busy tone when calling to report an outage;
- All customers can report an outage; and

- An ETR will be provided, globally, regionally, and locally as the event progresses, enabling customers and key stakeholders to make informed decisions and more effectively manage through the event.

CCC-1 Secure capacity (people and technology) to support timely customer contact during an incident:

- Enhance the customer self-service Integrated Voice Response (IVR) outage application to handle significantly more calls.

Toronto Hydro is in the final stages of replacing the call handling infrastructure, with a modern and more advanced IVR system. Designed to handle 500 concurrent calls, (approximately four times the volume of the current system) it essentially will eliminate the likelihood of customers experiencing busy signals in all but exceptional circumstances. Capacity limitations in the current IVR limit Toronto Hydro's ability to analyze high volume event call patterns and customer behaviour. Incoming calls exceeding IVR capacity (i.e., busy signals) cannot be tracked or analyzed for repeat call patterns. The new system will give Toronto Hydro greater insight into call patterns and customer behavior for continual improvement opportunities. Toronto Hydro is in the final stages of performance testing the new system and expects it to be in place by July 2015.

- Secure sufficient capacity and surge capability during periods of extremely high call volume to eliminate busy signals.

In December 2014, Toronto Hydro established a contract with a third-party service, called Twenty-First Century Communications (TFCC), that provides additional IVR capability to support high call volumes. TFCC provides back-up call handling support to many utilities across North America as well as 911 calls in the United States. TFCC handles approximately 300 million calls per year. This scale is far beyond what Toronto Hydro can achieve independently to the point where TFCC has IVR capacity to handle all outage calls should every customer Toronto Hydro services lose power at the same time.

The updated, internal IVR infrastructure described above is expected to handle the volume of calls resulting from higher-level incidents. However, to manage exceptional circumstances and ensure that customers do not receive busy signals, Toronto Hydro will continue to maintain TFCC's capacity. The process in place to activate TFCC can be initiated in two (2) minutes. The transfer of calls is seamless to customers.

IVR activity will be monitored to ensure the TFCC activation is completed before the call capacity of the internal IVR has reached maximum levels. Toronto Hydro also monitors weather patterns, progressive impacts of the event, automated monitoring and feedback from the field to ensure TFCC is activated at the correct time. When a more severe incident is expected, Toronto Hydro may activate TFCC prior to the event to ensure customers have uninterrupted access to report an outage and get up-to-date information

- Identify and train customer representatives within Toronto Hydro and at outsourcer to service outage calls and website contacts during major incidents.

Toronto Hydro has identified and trained suitable candidates to increase its capacity to respond to customer phone calls and email or website contacts during a major incident. Now, Toronto Hydro can sustain a contact team of approximately 80 staff allowing for emergency shift coverage while meeting requirements stipulated by the related labour laws. Toronto Hydro also manages key account outage issues through a group of dedicated resources, available 24/7. Additional options to increase Toronto Hydro's customer contact capabilities are:

- 24/7 Councillor hotline – including Mayor and city manager;
- Leveraging of associations (e.g., Building Owners and Managers Association);
- Use of back up locations;
- Use of remote locations (e.g., home agents);
- System changes to reduce the level of expert knowledge required to answer outage calls;
- Integration with 311 Toronto for outage call support and on-line outage reporting; and
- The assignment of outage call handling emergency response roles to non-customer care staff.

Toronto Hydro has finalized a contract with its day-to-day outsourced call provider, Optima, to deliver additional capacity during a major event. These agents have been trained and successfully activated during an incident earlier this year.

CCC-2 Improve the process for ensuring accurate and uniform outage status messages across every mode of communication to customers (e.g., IVR, web, mobile application, low tech channels).

Roles and processes are in place to ensure the dissemination of the most current and accurate ETRs and restoration progress. The damage assessment process described in Section 5.3 will result in a more accurate global ETR within 24 hours (or sooner if possible) and additional, regionally-specific ETRs during subsequent planning periods. The Situational Awareness Unit within the Planning section will be the primary conduit of ETR and other outage information to the Public Information Officer and associated Incident Communications Team (ICT).

The Customer Contact and Communications groups have enhanced the ways customers will experience receiving information through each channel:

- Processes have been developed to improve internal communication so that all channels are reporting a consistent message that is more relevant and timely for customers.
- The outage message on the IVR will be updated more frequently, as dictated by the nature of the event and the restoration stage. The TFCC IVR also is able to play regional messages once more granular information is available.
- 311 Toronto also is provided the same information as internal staff, through regular updates throughout the incident.
- Toronto Hydro has implemented a mobile-friendly website that is utilized during major incidents (https://outages.torontohydro.com) and includes the same consistent messaging

as well as links to Toronto Hydro's Twitter feed and mobile "report an outage" functionality. Customers are able to set up an icon on their smart phones which links them directly to this site.

- By the end of July 2015, Toronto Hydro will have deployed a full-scale storm mode for its outage map further ensuring customers will hear a consistent message regardless of how they get the information from Toronto Hydro (e.g., traditional media, Twitter, call centre). In addition, the methods used to present information on the outage map are being updated, making it much more useful for customers during a day-to-day event.

CCC-3 Employ outbound calling/texting to inform customers of outage status and other pertinent information.

Toronto Hydro has contracted with TFCC to provide high volume outbound alerting through email, SMS and phone. Customers are able to register their interest in this service via the Toronto Hydro website, where the majority of customers have selected email as their preferred notification channel. Initially, this capability will be used to send general outage information messages via the communications processes described elsewhere in this document. As the new internal processes mature, the option is available to establish a more proactive and customer specific messaging approach.

CCC-4 Work with City of Toronto to evaluate options for using 311 capabilities.

The City of Toronto's customer call centre (311 Toronto) and Toronto Hydro Customer Care staff have put in place a MOU to:

1. Increase and enhance the communication processes and coordination between Toronto Hydro and 311 Toronto during power outage events. Toronto Hydro will send timely updates to 311 Toronto about events that may result in increased call volumes. 311 Toronto will add to its IVR menu an option to connect to Toronto Hydro's call centre and outage management system.
2. 311 Toronto will provide Toronto Hydro customers with outage information and updates provided to them by Toronto Hydro. When applicable, 311 Toronto will refer Toronto Hydro customers to the on-line reporting tool or assist them directly by reporting outages on their behalf using the online tool.

5.6. Communications – Other Stakeholders

Throughout the event, Toronto Hydro was able to maintain unity of message, demonstrate an understanding and level of control over the incident, and provide stakeholders with a clear understanding of the restoration priorities and progress. Toronto Hydro worked closely with City and Provincial officials to coordinate the messaging to the public and used social media to distribute the message.

In the Ice Storm Report, the IRP, noted several leading external communications practices used by Toronto throughout the response:

- As the face of the Company and the executive spokesperson, the CEO performed his role well.

When used, the executive spokesperson is the most visible and important role in incident and crisis communication. During the 2013 Ice Storm, the President and Chief Executive Officer (CEO) served as the primary spokesperson for the Company. As the face of the Company, he was present, on-message, empathetic, transparent, and consistent in his external communication. Conducting upwards of 25 interviews between, December 19, 2013, and January 2, 2014, his messages were aligned with press release content, maintaining a sense of consistency that was received well by the stakeholders. The frequency and quality of communication provided by the executive spokesperson, given the information available about restoration status, was comparable to leading practice within the industry.

- Proactive media campaign and consistent messaging (use of "one voice"), including coordination with the Systems Operations Centre, worked well.

Toronto Hydro presented a consistent message across all of its communication channels, aligning with the "one voice" concept, which is considered a leading practice. The Company also used a sound communication methodology, delivering messages crafted by the media and communications lead and approved by the incident commander. Toronto Hydro's communication department ensured that all communications channels disseminated consistent message content.

All internal and external communication stemmed from approved press releases that were distributed to the media. The Company spokesperson was consistent in conveying the messages of the day throughout the event.

- Toronto Hydro was viewed as an effective partner in City and Provincial communications.

Toronto Hydro continuously communicated with the City of Toronto and made the Company spokesperson available for City press conferences. The level of effort to communicate jointly is a leading practice for a utility during major events and enabled Toronto Hydro to be seen as an effective partner with the City and Provincial governments. There were at least 15 press conferences between City Hall and Queen's Park that the CEO attended with City leaders. While the City and Toronto Hydro spoke about different aspects of the emergency, their messages were consistent and complementary.

Moreover, when the City Councillors became overwhelmed with constituent inquiries, they turned to a few Toronto Hydro staff members for support. They were prolific communicators with the City Council, answering questions for the Councillors about the restoration. Throughout the assessment, representatives from City government repeatedly noted that Toronto Hydro was a strong and committed partner in communication to the public throughout the event.

Implementation of Recommendations

- Toronto Hydro used a variety of methods to reach the public, including social media.

Toronto Hydro used various communication channels to reach external stakeholder groups. These channels include broadcast media, print media, radio, social media, and the corporate website, as well as phone and email for some stakeholder groups. Social media proved to be the channel with the biggest growth and stakeholder engagement. Toronto Hydro's Facebook fan page garnered 3,000 new fans and over 6,000 unique comments while the Company's Twitter account accumulated approximately 24,000 new followers and 20,633 retweets during the 2013 Ice Storm.

Toronto Hydro has responded to the recommendations made by the IRP to improve external communications as follows. These actions enable Toronto Hydro to:

1. Provide customers and external stakeholders (e.g., City, Councillors, Provincial entities) with current, accurate, consistent and clearly understandable information about incident conditions and the status of restoration efforts.
2. Progressively provide more detail about ETRs and other key coping information.
3. Deliver information to customers through the methods they prefer (e.g., mobile, web, text).
4. Assist public officials to better respond to their constituencies.

COS-1 Develop a process to communicate timely and accurate ETRs at different levels of specificity.

Section 5.3 of this report details the process used to formulate global and regional ETRs. When the global and regional ETRs are approved, the PIO and the ICT disseminates this information through all communications channels using a combination of:

1. Pre-approved messages; and
2. Messages that are developed specifically for the incident that are approved by the Incident Commander.

The processes for communicating ETRs quickly, accurately and consistently have been documented. Planned upgrades to the OMS system will provide the ability to support more granular ETR estimates (e.g., customer level).

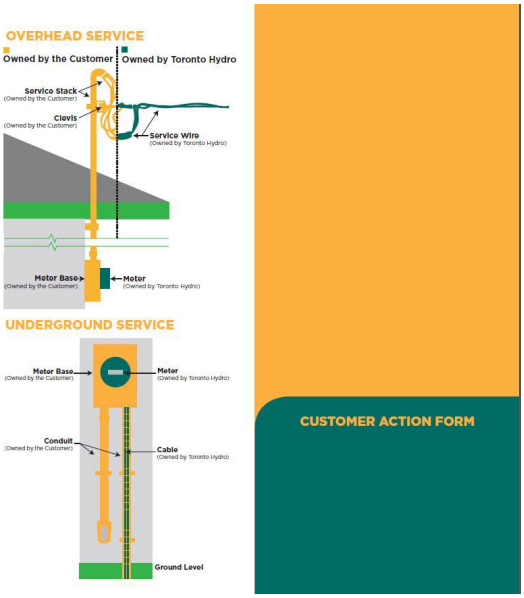
COS-2 In collaboration with the City of Toronto, develop an education program to improve stakeholder literacy of: restoration process, customer responsibility, and preparedness.

Toronto Hydro continues or has completed several customer education efforts:

1. Outreach to communities including vulnerable neighborhoods to raise awareness and educate customers about emergency preparedness. Emergency preparedness guides and kits are distributed. The kit includes a small LED flashlight, battery-powered radio, emergency kit brochure and checklist, and a conservation tips brochure.

2. A restoration process video, posted to the Toronto Hydro YouTube channel (https://www.youtube.com/watch?v=wOUTa4Zlqks).
3. A generator safety tips video, posted to the Toronto Hydro YouTube channel (https://www.youtube.com/watch?v=PHyH0BaY6FM).

4. A redesign to enhance the service repair notice (Customer Action Form) to support reconnection of individual service. The form now includes a visual and simple way of explaining next steps for customers who have damaged equipment, showing the equipment customers are responsible for, links to licensed electrical contractors and safety tips for customers. (http://www.torontohydro.com/sites/electricsystem/business/connections/Documents/Service%20Repair%20Notice_CAF.PDF)



5. New Outage Centre microsite to communicate important information during major outages and emergencies. The site is mobile-friendly and is available in eight different languages.
6. Provision of information and resources on the power outages webpage (http://www.torontohydro.com/sites/electricsystem/PowerOutages/Pages/OutageMap.aspx) to help customers and the public understand the restoration process and how to prepare for emergencies.

COS-3 Expand liaison role to address education, communication, and coordination with key community stakeholders (e.g., elected leaders, public safety) during major incidents.

Toronto Hydro's Emergency Management Guiding Principles (See Appendix A) affirm its commitment to working in concert with the community during a response, stating that the Company will:

> *"[c]oordinate its grid emergency response processes with those of other key stakeholders and applicable agencies."*

Stakeholders include the Province, the City of Toronto, Toronto Emergency Management Program Committee (TEMPC), Toronto Community Housing Corporation (TCHC), Red Cross, associations, key accounts, customers, Councillors, hospitals and those on life support who are registered with Toronto Hydro.

The ICS organization includes an Emergency Management Office Representative, reporting to the PIO, who, when activated:

- May sit in the City Emergency Operations Centre (EOC);
- Brings specific issues or information requests from the EOC to the attention of the Toronto Hydro Incident Commander; and
- Acts as a conduit to ensure that issues raised in the EOC are communicated to Toronto Hydro and vice versa.

In blue sky conditions, Toronto Hydro:

- Is a member of the City's Emergency Risk Communications Group and regularly participates in meetings on emergency preparedness communications; and
- Participates in the City of Toronto's emergency preparedness week.

The PIO organization also includes Government Relations Representatives who, in blue sky conditions, engage on a daily basis with elected officials and their staffs. In an incident, they will continue to liaise with these stakeholders to update them about the incident status and address their concerns and requests.

In the future there may be a Liaison Officer role, reporting to the Incident Commander (see Appendix B), that would be activated to support larger scale incidents.

COS-4 Formalize process for developing, approving, and disseminating key messages.

Toronto Hydro has documented and streamlined, where possible, the communications process for developing, approving and disseminating key messages during in incident. The process clarifies roles, decisions to be made and timeframes so messages are timely, accurate and delivered through the communications methods that customers prefer (e.g., web, social media, broadcast, print). This process supports the Company's commitment to deliver communications (content, frequency, channels) that will assist all customers and stakeholders in managing their lives and businesses effectively throughout an incident.

An essential part of this process is the link between the members of the ICT and the Situational Awareness Unit (SAU). Designated roles within the SAU have pre-defined responsibilities to support the priorities of the Communications Team during an event. There are pre-established meetings where Communications can receive up-to-date information, forms to provide typically needed statistics, and protocols to support response to more urgent needs.

The process, roles, forms and checklist documentation is available in the Incident Communications Plan.

5.7. Information Systems and Technologies

The role of the information and operational technologies in major events is two-fold:

1. They provide incident managers with the ability to identify, process, and comprehend critical restoration information (e.g., customers out, location of outages, devices that have operated, location of crews) in order to establish "situational awareness;" and
2. They provide data and intelligence to inform restoration decision making.

The operational and information technology systems commonly used by utilities during major events are:

- Outage Management System (OMS);
- Distribution Management System (DMS);
- Geographic Information System (GIS);

- Customer Information System (CIS);
- Supervisory Control and Data Acquisition system (SCADA);
- Integrated Voice Response System (IVR);
- Mobile Data System (MDS);
- Automated Metering Infrastructure (AMI, smart meters); and
- Radio communications, web sites and web-enabled applications.

The integration of the different systems provides the utility with an end-to-end ability to manage outages.

- The OMS plays a critical role in the end-to-end process. It captures, evaluates, and tracks the status of outages across the service territory. It integrates with the IVR system and CIS to generate outage records for individual customers tracks group calls related to outages, and generates outage tickets for repair. It links to the GIS system provides information about electric distribution system connectivity, and generates reports on the status of outages across the system for further analysis.
- GIS is used to enhance a utility's ability to track assets, develop circuit maps, and, in some cases, view tree canopy in relation to the system's equipment and assets.
- MDS aids the development of situational awareness and operational decision making. MDS terminals installed in line trucks provide GPS and trouble spot information and enable restoration crews to interface directly with work management systems, OMS, and dispatchers to streamline execution of operational decisions
- SCADA systems provide an understanding of the scope of the outages and allow operators to remotely open and close devices in the field. This improves reliability on a day-to-day basis and can be used early in a large event response to re-energize those circuits that have ties to other feeders that have not been affected by the outage.
- Since the early 21st century, utilities have been adopting and implementing advanced metering infrastructure (AMI), also known as smart meters. These systems provide utilities with the ability to carry out two-way communication with meters, and can be used to "ping" a meter (i.e., send a signal) to determine whether there is power at the premise.

Like most other utilities, Toronto Hydro has implemented and integrated each of the systems described above, to support day-to-day operations. Generally, they support blue sky day operations and smaller outage events (i.e., Level 1 or 2) with great proficiency. The volume of transactions and interfaces generated by an incident the size of the 2013 Ice Storm, stresses the capacity of the system, pushing some portions of the technology infrastructure to their limits.

The IRP noted the following strengths of Toronto Hydro's information systems and technologies:

- One of the early adopters of smart meter technology.

In 2006, Toronto Hydro was one of the first utilities in North America to deploy smart meter technology, called Automated Metering Infrastructure (AMI). As a part of an OEB initiative to improve energy efficiency, regulators provided funding for the Company to install AMI. Today, there are 648,000 retail customer and 85,800 industrial/commercial smart meters on Toronto Hydro's system. This extensive smart meter network provides Toronto Hydro with the ability to

remotely monitor the status of an outage. Since energy efficiency was the primary objective for AMI, the system is not set up to support a large-scale restoration.

- An extensive Supervisory Control and Data Acquisition (SCADA) system with 85,000 control points on more than 4,000 devices.

Over the years, Toronto Hydro has implemented an extensive SCADA system with connectivity to more than 90% of its distribution circuit breakers. Approximately 140 circuit breakers on the 4kV system do not have SCADA controls. As a result, Toronto Hydro's SCADA system provides relatively strong penetration of the devices for an overhead system of its size and construction.

This allows Toronto Hydro to perform remote sensing and control of devices on the electrical distribution system. During an event like the 2013 Ice Storm, the SCADA system was used to initially determine the number of feeder lock outs (i.e., circuits that were completely out of power) and perform remote switching and restoration operations. These resulted in some portion of customers being restored within the first 24 hours from when the event started.

- Mobile Data Terminals available in a portion of Toronto Hydro vehicles.

Approximately 20% of Toronto Hydro trucks used during the 2013 Ice Storm restoration and were equipped with full MDS terminals and another 30% had mobile connectivity. These mobile units, typically laptops located in each vehicle with cellular technology and automatic vehicle locating technology (AVL) or Global Positioning Satellite (GPS) Technology, allow the crews to receive, accept, update, and close outage tickets from their truck and provide a more timely status of each outage in the OMS.

Toronto Hydro has responded to the following group of IRP recommendations about information and operational technologies as follows. These actions enable Toronto Hydro to:

1. Have better information to pinpoint and diagnose trouble spots.
2. Develop more accurate ETRs earlier in the restoration cycle.

IT-1 Include IT/OT technologies that provide real or near real-time intelligence in the technology strategic roadmap.

- Expand mobile platforms for operational communication (e.g., mobile data terminals, mobile platforms for damage assessment).
- Evaluate enhancements to smart meter technologies to improve situational awareness during large-scale outage.
- Upgrade the outage management system (OMS) and create an OMS-lite (thin client or web-based) version to support decentralized command and control.
- Ensure that primary data systems (i.e., GIS, OMS, CIS, outage map) integrate to provide key data for customers and decision makers

Several improvements to the systems and applications that support incident response are underway or planned. These include:

1. Updated or new Network Management System (i.e., OMS, DMS). An investigation of the functionality provided by the latest version of Toronto Hydro's OMS system is underway. The NMS upgrade or replacement is budgeted for 2016-17. Anticipated enhancements include the ability to use historical data to predict system and customer-level ETRs.
2. Outage map upgrade. This will be available by the end of September 2015.
3. Expansion of capacity to handle large volumes of customer calls (detailed in Section 5.5).
4. Development of damage assessment work agenda tracking system in OMS.

5.8. Vegetation Management and System Hardening/Resilience

The increased frequency of severity of weather events, along with changing expectations and lower tolerance for long duration outages by customers, have spurred utilities to explore ways to improve storm performance of their distribution systems (durability and resilience).

- *Durability*[4] refers to the ability of the system to withstand the impacts of storms without damage and includes materials or equipment that resist damage, the arrangement of existing equipment to resist or avoid damage, and technologies that help protect the system from damage.
- *Resilience*[5] is defined as the ability to continue to operate despite damage to some parts of the distribution system. It encompasses the configuration of system components to reduce the numbers of outages, reconfiguration of the system to maintain service, and application of system resources to continue service to customers while the electric system is restored.

Some commonly used durability and resilience enhancement techniques include:

1. Improving the strength of poles and structures;
2. Burying overhead lines;
3. Enhancing flexibility of the electric system through circuit ties and system automation; and
4. Increasing vegetation clearances around power lines.

Most system hardening initiatives span multiple years, involving sequential cycles of investment to yield improvement. Leading utilities have worked with their key stakeholders (in particular, regulators) to identify the best options, evaluate the costs and benefits for each option, determine the optimal portfolio of projects to enhance the durability and resilience of their distribution systems, and ultimately secure funding for this work.

[4] Edison Electric Institute (EEI) defines hardening as those activities that: "improve the durability and stability of infrastructure to withstand the impacts of severe weather events with minimal damage," *Before and After the Storm*, March 2013.

[5] The Edison Electric Institute also defines resilience as those "measures (that) do not prevent damage; rather they enable facilities to continue operating despite damage and/or promote a rapid return to normal operations," *Before and After the Storm*, March 2013.

Converting Overhead Lines to Underground

Over the past decade and immediately after a major event that causes extensive power outages, customers, regulators, legislators, and other external stakeholders tend to express interest in the conversion of overhead distribution facilities to underground construction. Underground facilities reduce, if not eliminate, the risk of failure due to high wind, falling trees, and ice accumulation. On the other hand, they are more exposed than overhead lines to other hazards such as heat and flooding. Damage related to heat and flooding often requires more time and higher cost to restore.

In addition to the potentially higher cost of underground restorations, all of the studies that have been commissioned by different regulators and state legislators across the U.S. have deemed widespread "undergrounding" to be cost prohibitive. As an alternative to implementing large conversions, some utilities have converted selected overhead circuits or sections of circuits to improve the reliability of service to critical infrastructure facilities. These include hospitals, water filtration plants, and 911 call centres.

Vegetation Management

Vegetation is typically the single largest culprit of outages during major events. Trees and limbs tend to fall into distribution lines and take down wire and equipment, including poles, creating interruptions to customer service. Most utilities clear vegetation around lines, typically using a pre-defined cycle.

Also, VM programs often must comply with external regulations, particularly when utilities serve urban areas with denser tree canopy. The arboriculture industry pruning standard defines proper pruning techniques to ensure that any pruning does not negatively affect the health of the tree. Workers must follow these standards when maintaining vegetation around distribution lines. In addition, many municipalities, and some neighbourhoods, have specific requirements to protect their tree canopy.

Pole Maintenance

In addition to investing in vegetation management, most utilities conduct periodic wood pole inspection and replacement programs. The inspection cycles typically range from 8-to-15 years and include a combination of visual, sounding, ground line, and boring methods for assessing the integrity of wood poles. The poles which do not pass the test are stratified by priority (i.e., When do they need to be replaced based on their condition?) and replaced within a pre-defined target period.

The damage that Toronto Hydro experienced during the 2013 Ice Storm was mostly caused by tree limbs falling on distribution lines and breaking the conductors. During the entire storm, the Company had to replace only 17 out of approximately 101,000 wood poles on its distribution system. Given the small fraction of poles that were broken during the ice storm and the well-defined wood pole inspection and replacement program in place, it can be concluded that the strength and integrity of the Company's wood pole plant did not contribute to the number of

outages experienced during this storm and may have actually prevented a larger amount of damage.

Throughout the Company's history, Toronto Hydro has maintained clearances around its power lines using different methods and programs. In 2008, Toronto Hydro renegotiated its vegetation management contract and established a three-year, circuit-based cycle for maintaining clearances across its system, which is an industry leading practice. The current VM program follows the CSA and ANSI standards as well as City of Toronto Line Clearance Guidelines[6].

In 2008, Toronto Hydro conducted a study to explore different system hardening options. As a result of that study, the Company began to implement several hardening efforts including, but not limited to better pole guying, stronger insulators, and fiberglass brackets for pole line equipment support. It is important to note that over the past 30 years, Toronto Hydro has been installing underground systems in all new developments. This has been a standard industry practice, with developers bearing a portion of the cost.

In the Ice Storm report, the IRP noted the following positive attributes of Toronto Hydro's longstanding vegetation management and system hardening initiatives:

- Toronto Hydro has been following a circuit-based trimming program since 2008 and adheres to accepted industry and City of Toronto pruning standards.

In 2008 the Company re-negotiated its VM program and implemented a circuit-based approach. The circuit-based approach focuses the yearly VM spending on circuits where it will provide the best reliability improvement while ensuring that the system is still maintained in adherence with the accepted industry and City of Toronto pruning standards. Similar to most utilities, the Company does not trim around service drops.

- Vegetation management preventive maintenance program is in line with industry practices (i.e., three-year cycle).

The duration of the vegetation trim cycle for an electric distribution utility depends on a number of factors, such as tree species, local by-laws, customer priorities, and the electric system configuration. The cycle for line clearances typically ranges between three and seven years on the distribution system. Toronto Hydro maintains its circuit clearances on a three-year average cycle, meaning that circuits are pruned every two to five years, depending on their reliability performance. This VM preventive cycle often is considered a leading industry practice.

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[6] Canadian Standard Association (CSA) C22.3 No. 1-10

1. Flashover distance for AC System Conductors to trees

ANSI A300 – Standard Practices for Tree Care Operations

2. Recommended standard by the International Society of Arboriculture (ISA) and the Tree Care Industry Association (TCIA)

City By-Laws – City of Toronto Forestry Cycle Pruning Guidelines

3. 15 cm (0.5 ft.) clearance from house service
4. 30 cm (1 ft.) clearance from secondary conductors
5. 90 cm (3 ft.) clearance from primary conductors

Implementation of Recommendations

- Over the past six years, Toronto Hydro has maintained a consistent scope of the vegetation management program (e.g., clearances, miles completed) while reducing the cost of the program.

As mentioned earlier, most utility vegetation management work is conducted by outside contractors that specialize in electric line clearance. Toronto Hydro uses an outside contractor for all preventive trimming. It has retained one vegetation management crew in-house that focuses on customer requests and corrective maintenance work. There is a certified arborist in-house.

When Toronto Hydro transitioned from the area-based to circuit-based approach in 2008, the Company was able to reduce the overall cost of the program while continuing to maintain the same clearances (in line with industry and City of Toronto standards) on a three-year average cycle. This strategy reduced the costs of the overall program while providing the same (or better) day-to-day reliability.

- Toronto Hydro's wood pole program is in line with industry leading practice.

For more than 15 years, Toronto Hydro has been conducting a PWPI program on a 10-year cycle. The work is performed by contractors specializing in this field. The program includes a two-step assessment (visual and sounding assessment and a bore test) with standard remediation alternatives for wood poles that do not pass the inspection. The Company has established timeframes within which the rejected poles have to be addressed. The cycle and scope of the Company's PWPI program are in line with industry leading practices.

Toronto Hydro has responded to the following IRP recommendations about vegetation management and system hardening as follows. These actions enable Toronto Hydro to:

1. Reduce the type and extent of damage that occurs.
2. Reduce momentary and sustained outages.

VMSH-1 Evaluate all viable options to improve distribution system resilience during major weather events, including converting lines to underground for sections of circuits where it will enhance the reliability of services to critical infrastructure and facilities.

VMSH-2 Gain support from key stakeholders on the level of resilience required and related funding.

Toronto Hydro's Engineering & Investment Planning Division considered alternatives for improving system durability and resiliency and included capital investments within its 2015-2019 capital plan for this purpose. The alternatives were discussed with a joint working group that included representatives from Toronto Hydro, the City of Toronto's Urban Forestry Division and the Major Capital Construction Coordination Office. The working group supported Toronto Hydro's 2015-2019 plan, which is pending OEB approval. The plan includes the following initiatives that will improve system durability and resiliency:

1. Installation of additional tree-proof conductor: The installation of approximately 150 kilometres of tree-proof conductor to help reduce the risk of tree-caused power interruptions in some of the highest risk areas on the distribution system.
2. Conversion of overhead lines to underground: The funding of $70-to-$75 million in projects to convert overhead power lines to underground, with an emphasis on conversions in vulnerable and high risk areas.
3. Reduction in the amount of horizontal line construction: The conversion of approximately 120 kilometres of horizontally-constructed overhead lines (e.g., box construction) to halo or vertical construction to reduce the exposure that specific distribution lines have to trees and the tree canopy.

In addition to these planned initiatives, Toronto Hydro is working with utility vendors on new technologies and innovative products (e.g., breakaway connectors, advanced equipment guarding, meters for generator attachments) that may further improve the distribution system's durability and resiliency.

5.9. Toronto Hydro – City Coordination

City of Toronto staff and public officials interviewed for the Ice Storm assessment, uniformly noted how well Toronto Hydro responded to the 2013 Ice Storm given the extreme cold, hazardous working conditions, and extensive, tree-related damage. Both Toronto Hydro and the City of Toronto recognized that this was a community recovery, as well as customer restoration effort. They were able to accomplish both through an effective collaboration over the course of the event to coordinate restoration priorities, public communication, forestry, and outreach.

The IRP noted the following areas of particularly effective collaboration between Toronto Hydro and the City:

1. Identification of critical load priorities – The City and Toronto Hydro had in place a pre-determined list of critical facilities to be restored first and Toronto Hydro's restoration plans aligned with these priorities.
2. Sharing of vegetation management resources – Toronto Hydro needed a number of additional forestry resources to address the tree-related damage to the system. The City of Toronto provided many City forestry crews to support the effort.

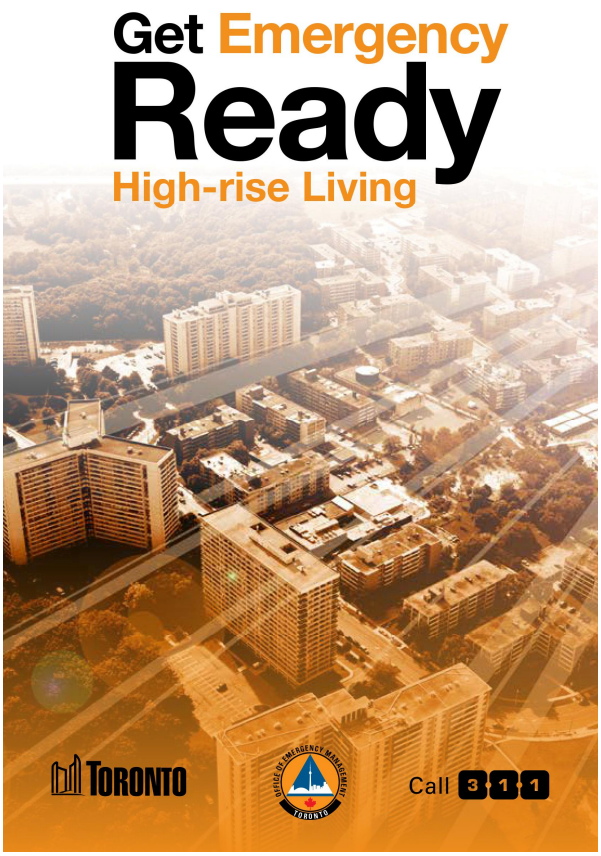
3. Public communication – Toronto Hydro executives and staff supported the communication efforts of the City of Toronto through participation in daily press conferences, attendance at Provincial meetings, and responding to the thousands of emails received by Councillors.

Toronto Hydro has responded to the following IRP recommendations to further improve collaboration between the Company and the City of Toronto. These actions enable Toronto Hydro to:

1. Equip customers and the public to be better prepared to cope with an incident that may result in extended outages;
2. Extend its outreach to more vulnerable populations; and
3. Contribute to the advancement of the City and community's emergency preparedness and planning.

THC-1 Strengthen emergency management coordination between City of Toronto and Toronto Hydro.

- Identify and monitor vulnerable and special medical needs populations.
- Educate customers/citizens about emergency preparedness.



Toronto Hydro has completed or is continuing numerous education programs to improve customer and citizen literacy of: restoration process, customer responsibility, and preparedness. These are described in Section 2.6, COS-2. In addition to these programs, Toronto Hydro:

1. Provides emergency preparedness tips in our CITYWISE newsletter (sent to City Councillors) for inclusion in their communications materials.
2. Uses all available channels of communication to reinforce the importance of emergency preparedness and safety (e.g., customer bill insert, online newsletter, web site, social media).
3. Worked with the City's Office of Emergency Management (OEM) and as part of the City's Emergency Risk Communicator Network, on a guide "Get Emergency Ready for High-rise Living," that is distributed at community outreach events.

- Conduct joint planning, training, and exercises.

Toronto Hydro is a member of several City of Toronto Emergency Management groups. Along with Strategic Communications, other city agencies/partners and the Office of Emergency Management, Toronto Hydro is an active participant on the TEMPC and the Emergency Management Working Group (EMWG). In this capacity, we review and provide input on the development and implementation of the various Emergency Support Functions and jointly develop and participate on emergency response exercises. This includes the preparations for the Pan Am and Para-Pan Am games that the City is hosting in July and August 2015.

THC-2 In collaboration with the City of Toronto (Urban Forestry), update related urban forestry plans to ensure adequate line clearances to withstand major events.

Toronto Hydro, through the joint working group with the City of Toronto's Urban Forestry Division (noted in Section 5.8 above), has pursued a number of actions and initiatives for the purpose of maintaining adequate line clearance to withstand major events. One initiative is the review and updating of current line clearing standard Another is the joint development of a new tree planting guideline that will identify tree species that are appropriate to plant adjacent to power lines to minimize tree growth and overhang risks.

These initiatives will take into account both risks posed to power lines and the goals of the Urban Forestry Strategic Management Plan (e.g., with respect to canopy targets and species diversity). Both are expected to conclude in 2015 such that implementation may begin in 2016. Other initatives that have been agreed to include the sharing of tree inventory data for the City and the exchange and discussion of annual tree clearing programs and specific locations between Toronto Hydro and Urban Forestry.

In addition, Toronto Hydro is planning to increase funding for tree trimming for the 2015-2019 period. If approved by the OEB, the funding for vegetation management will increase from an average of $2.6 million annually (during 2011-2014) to $4.4 million annually. The additional line clearing will help the distribution system withstand major events.

THC-3 Request the Province to require all new and existing buildings to have adequate back-up generation within the next 10 years.

Toronto Hydro is preparing a plan to engage with Provincial and City of Toronto entities to address the provision of back-up generation in new and existing buildings to:

1. Accommodate the safe evacuation of occupants;
2. Assist firefighter operations; and
3. Provide emergency power supply to meet essential needs (e.g., refrigeration, heat, phone service) during an extended outage.

The outcomes of these discussions will be particularly relevant to vulnerable populations that live in high-rise buildings.

5.10. Undergrounding

Toronto Hydro, together with representatives from the City's Urban Forestry Division and the Major Capital Infrastructure Coordination Office, formed a Working Group to examine "undergrounding" and specifically act upon decisions 17, 18, and 19 made by City Council as part of the "Review of the City of Toronto's Emergency Response to the December 2013 Ice Storm." (See Appendix D). A summary of the Working Group's analyses, findings, and results follows.

The Working Group explored the costs and benefits of undergrounding existing overhead lines. The Group considered studies that have been commissioned by different utilities, regulators, and legislators across North America, which consistently conclude that widespread "undergrounding" is cost-prohibitive. A preliminary estimate for converting all of Toronto Hydro's existing overhead power lines to underground ranges from $11 billion to $16 billion dollars. In comparison, Toronto Hydro's current net book value is less than $3 billion. Expenditures to fund widespread undergrounding would result in significant increases in distribution rates charged to customers (i.e., more than two-times existing rates). Another concern is that widespread conversions could result in significant inconvenience to property owners (e.g. ,yard excavation, driveway removal and replacement, damage to tree root systems, and pad-mount transformers placed on customers' properties).

Consideration also was given to undergrounding of a smaller scale based on the City of Toronto's road classifications (e.g., major and minor arterial, collector, and local roads). The estimated costs to convert overhead lines to underground on major and minor arterial roads also are substantial, at $4 billion to $5 billion (of the total $11 billion to $16 billion). From a system durability and resilience standpoint, converting lines on arterial roads would not yield the benefits necessary to justify the significant expenditures.

Experience from major storms, including the 2013 Ice Storm, indicates that overhead lines along arterial roads do not incur as much damage as lines on non-arterial roads. This is a result of lower tree densities on arterial roads together with greater clearances from trees, and taller (and stronger) poles supporting more circuits. When damage does occur on arterial roads, the configuration of the distribution system is such that switching and backfeed possibilities exist to quickly isolate damaged sections for timely power restoration. Furthermore, by their very nature, arterial roads provide excellent access for Toronto Hydro crews to repair damaged overhead lines or clear trees. This was evidenced in Toronto Hydro's response to the 2013 Ice Storm when overhead lines along arterial roads were restored quickly in comparison to lines on collector and local roads.

The Group acknowledged that underground lines reduce, if not eliminate, the risk of power interruptions due to high wind, falling trees, ice accumulation, and other external factors; however, underground lines are more exposed than overhead lines to other hazards such as heat, flooding and dig-ins. Also, the Group recognized that, as compared with overhead lines, damage to underground lines, either as a result of heat, flooding, simple equipment failure, or dig-ins, often requires significantly more time (and higher cost) to repair, leading to longer power interruptions.

Implementation of Recommendations

The Working Group concluded that extensive conversions of overhead lines, either across Toronto Hydro's system or by road classification (e.g., arterial, local) is not prudent. As an alternative, the Working Group concluded that a strategy of making targeted investments is most appropriate beginning with select overhead line sections that are threatened by environmental factors (e.g., high tree densities, inaccessible locations such as ravines and back lots). These factors increase system reliability risks and supply disturbances to critical facilities (e.g., hospitals, water filtration plants). The Working Group agreed that the most prudent approach is to consider underground distribution (of existing overhead lines) when the high cost is justified by significant reductions in power interruptions (to large numbers of customers) for extended durations of time (hours). Toronto Hydro has identified two key areas in the distribution system, where it is prudent to undertake significant conversion activities:

1. Overhead power lines in the rear lot of properties; and
2. Overhead power lines in areas with limited accessibility such as ravines, river crossings, and other off-road environments posing accessibility restrictions.

During its engagement, the Working Group acknowledged that very often, risks posed by trees (and other environmental influences) to overhead power lines can be mitigated by more cost effective means than converting the lines to underground. Examples of these means include:

- Tree trimming: To ensure sufficient clearances between tree limbs and overhead lines so that contact is not made during normal weather, windy days or storms;
- Storm hardening: To remove all tree limbs above overhead power lines to eliminate the possibility of branches falling on the lines;
- Tree proof conductor: Installing conductor that is able to withstand brush contacts with tree branches without resulting in a power interruption; and
- Plant relocation: Moving overhead plant away from large trees to eliminate the possibility of any tree branches contacting the overhead lines.

The Working Group also reviewed how Toronto Hydro treats new customer connections and developments. Toronto Hydro has in place a standard design practice (SDP) that requires newly constructed developments (e.g., subdivisions) to distribute power using underground lines. Toronto Hydro provides this standard design practice to developers and strongly encourages them to utilize underground construction. The Working Group found that this results in the building of underground power lines in the majority of new developments. This furthers City Council's objective of reducing "power outages as much as possible during future storms."

In conclusion, the Working Group supports a strategy that focuses on converting overhead lines in the rear lot of properties and those running through ravines and off-road environments. Also, it supports Toronto Hydro's planning approach and plan to invest $70-75 million in conversions between 2015 and 2019 (pending OEB approval).

5.11. Conclusion

The December 2013 Ice Storm was the largest single storm that Toronto Hydro has experienced in its 100 year old history. The response to this event was unprecedented - requiring the use of all available on-system Toronto Hydro crews, contractors, and 400 mutual assistance resources from across the province and, in some cases, across Canada. Overall, the Company performed well in comparison to other electrical utilities and industry accepted best practices; however several post-Ice Storm reports, including one commissioned by Toronto Hydro's Board of Directors, identified a few areas for improvement.

As detailed in this report, Toronto Hydro has devoted significant time and resources towards addressing these recommendations, taking a multi-phased approach to fully address these opportunities for improvement. The first phase of implementation will be complete by July 31, 2015. As detailed in this report, Toronto Hydro has made substantial progress, including actions to address:

- Expanded use of ICS, including use of emergency response roles;
- Customer call management;
- Development of more timely ETRs;
- Resource acquisition;
- Restoration efficiency;
- Stakeholder communications; and
- System resiliency (including strategic undergrounding).

Toronto Hydro will continue the work to fully implement and sustain the Phase I improvements through the end of 2015 and beyond. In accordance with the Company's Emergency Management Vision and Guiding Principles, these ongoing efforts demonstrate our commitment to emergency management as a core part of Toronto Hydro's business operations.

Appendix A: Toronto Hydro Emergency Management Vision and Guiding Principles

Emergency Management Vision

We strive to exceed our customers' expectations through an effective emergency management approach that serves our world class city. This means that:

- We are ready and able to respond to incidents, never stopping until all power is restored.
- Our customers and other stakeholders can rely on our timely, accurate and relevant communications to stay informed throughout a restoration.
- Every employee has a role and takes pride in completing each response safely and efficiently.
- We plan, train and continually improve our emergency management practices.

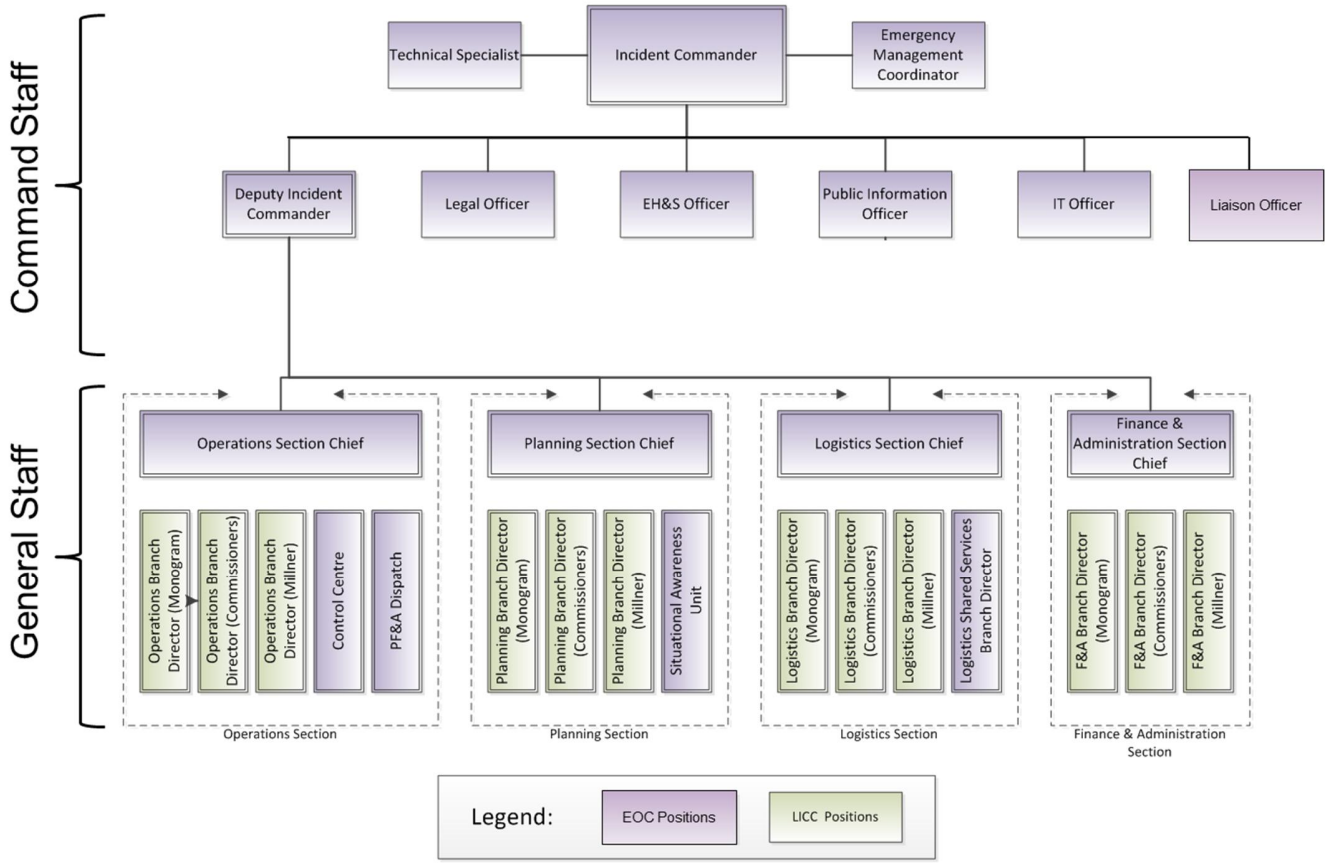
Guiding Principles

- The safety of the public and our employees is our first priority.
- Our emergency response plans are current and incorporate new information, lessons learned and emerging best practices.
- Our grid emergency plan aligns with the corporate emergency management core plan.
- We proactively educate our customers on our emergency preparedness approach and what they can do to prepare for major incidents.
- We actively evaluate, prepare for and participate in mutual assistance, providing support to other utilities when they need resources and engaging them in our restorations when needed.
- We proactively monitor and assess all credible threats and mobilize all resources in advance of an incident accordingly.
- For any incident we will provide a global ETR within a maximum of 24 hours, or less, if possible.
- We follow industry grid emergency management best practices to support efficient restoration of the most customers in the shortest amount of time.
- Mobilizing all available resources – internal, contractors and mutual assistance – we work around the clock to restore power to our customers within the established ETR.
- Every Toronto Hydro employee is assigned an emergency response ("second") role, for which they are trained, competent and ready to perform.
- We provide our customers with timely and accurate information via all available communications channels (e.g., web, social media, IVR, print, broadcast).

Guiding Principles (cont.)

- We communicate to internal and external stakeholders using "one voice" so that messages are consistent, coordinated and clear.
- Customers are able to readily report their outages, check the status of their outage, and receive the best available ETR information at that time.
- We coordinate our grid emergency response processes with those of other key stakeholders and applicable agencies.
- We apply cost-effective ways to continuously improve grid resiliency to minimize risk of failure.

Appendix B: Toronto Hydro ICS Organization



Appendix C: Toronto Hydro Incident Activation Levels

Incident Level	IC Spending Level Authority	IC Reporting	ICS Structure Activation	Global ETR Availability Timeframe	No. of Customers Affected at Peak	No. of Trouble Spots	Restoration Duration	Resource Req. (FTEs)	Restoration Strategy	Staging Strategy
I	< $1 million	EVP, Operations, EVP, Engineering	IC/Operations	< 8 hours	< 10k	< 250	1 day	Internal 25 – 75	Event	Existing Facilities
II	< $1 million	EVP, Operations, EVP, Engineering	General Staff/PIO	< 16 hours	20k –100k	200 – 750	2 – 4 days	Internal 50 –200	Event	Existing Facilities
III	$1 – $10 million	Disaster Oversight Committee	General & Command Staff + 1 or more LICCs	< 24 hours	75k – 300k	500 –6,000	3 – 7 days	Internal + Contract + limited MA 150 – 500	Hybrid (Event/Area by District)	Limited Number of Staging Sites
IV	$10– $20 million	CEO	All	< 24 hours	250k – 500k	5,000 – 15,000	5 – 10 days	Internal + Contract + MA 400 – 1,500	Area/Circuit	Multiple Staging Sites
V	$20 million +	Board of Directors	All	< 24 hours	450k – All	> 12,000	> 8 Days	Internal + Contract + MA 750+	Circuit	All Available Staging Sites

Appendix D: City of Toronto Staff Report Action Required – Further Update on the Implementation of December 2013 Ice Storm Recommendations

1. Update the City of Toronto Emergency Plan and its Operational Support Functions and Risk Specific Plans. Division/Agency Lead(s): Office of Emergency Management.
2. Enhance emergency staffing capacity and maintain, at a minimum, five-deep staffing levels. Division/Agency Lead(s): Office of Emergency Management.
3. Develop a proactive public education and awareness program. Division/Agency Lead(s): Office of Emergency Management.
4. Develop emergency response protocols to ensure Police Officers are available to direct and control the City's highest priority traffic intersections. Division/Agency Lead(s): Transportation Services (in consultation with Toronto Police Services).
5. Develop a standardized process for the post-emergency review and evaluation of emergency events. Division/Agency Lead(s): Office of Emergency Management.
6. Toronto Hydro to develop and implement emergency education awareness and preparedness communications for distribution to all Toronto Hydro customers. Division/Agency Lead(s): Toronto Hydro (in consultation with Office of Emergency Management).
7. Establish an Emergency Human Services working group and to explore the formation of an Emergency Response Agreement with the Toronto Central Local Health Integration Network, Findhelp Information Services (211), and other community-based agencies. Division/Agency Lead(s): Social Development, Finance & Administration Office of Emergency Management.
8. Pre-identify appropriate Community Recreation facilities to be used as Emergency Reception Centres and develop facility specific plans. Division/Agency Lead(s): Parks, Forestry & Recreation.
9. Identify opportunities to expand and strengthen the communications tactics and communications channels. Division/Agency Lead(s): Strategic Communications.
10. Develop a contingency plan to ensure additional call centres are available for Toronto residents when there is a power outage lasting two days or more. Division/Agency Lead(s): 311Toronto (in consultation with Toronto Hydro).

11. Develop a new Councillor Co-ordination Operational Support Function (OSF) document to support the role of Councillors during an emergency event. Division/Agency Lead(s): City Clerks.
12. Include in any enhanced emergency communications strategies the provision of American Sign Language (ASL) in televised updates and announcements. Division/Agency Lead(s): Strategic Communications.
13. City (311 Toronto) and Toronto Hydro to expedite the development and execution of a Memorandum of Understanding. Division/Agency Lead(s): 311 Toronto (in consultation with Toronto Hydro).
14. Strategy to integrate the Toronto Hydro and the City's (311 Toronto) customer service communication systems. Division/Agency Lead(s): 311 Toronto (in consultation with Toronto Hydro).
15. Review current line clearing programs and identify opportunities to enhance co-ordination of activities to more effectively manage the potential impact of trees in close proximity to hydro lines. Division/Agency Lead(s): Parks, Forestry & Recreation (in consultation with Toronto Hydro).
16. Explore the use of infrastructure that is resilient to power outages when replacing or installing new above ground infrastructure. Division/Agency Lead(s): Toronto Hydro (in consultation with Parks, Forestry & Recreation).
17. Review and identify potential future priorities, where conversion of overhead lines to underground would most significantly improve resiliency. Division/Agency Lead(s): Toronto Hydro (in consultation with Major Capital Infrastructure Coordination Office).
18. Strategy to underground key pieces of Toronto Hydro's infrastructure including major and minor arterials. Division/Agency Lead(s): Toronto Hydro (in consultation with Major Capital Infrastructure Coordination Office).
19. Consider construction of underground power lines in the new developing areas, and the vulnerable and high risk areas where tall and nearby trees may cause damages to electric lines. Division/Agency Lead(s): Toronto Hydro (in consultation with Parks, Forestry & Recreation).
20. Request the Province of Ontario to expand the existing provisions in the Ontario Building Code to require mandatory continuous power supply for back-up generators in certain building types and forward to other large Ontario municipalities and AMO to seek their endorsement. Division/Agency Lead(s): Toronto Buildings.

Appendix D: City of Toronto Staff Report Action Required – Further Update on the Implementation of December 2013 Ice Storm Recommendations

21. Report to the Budget Committee once confirmation of Ice Storm expenditure reimbursements through the Provincial Ice Storm Assistance Program are received. Division/Agency Lead(s): Accounting Services.

22. City Manager report to the Executive Committee on the status of the implementation of City Council's decision in the second quarter of 2015. Division/Agency Lead(s): Executive Management.

Appendix E: CUPE 1 Mapping The Aftermath: A Front-line Workers' Review Of The Toronto Hydro's Response To The Ice Storm Of 2013

Following is a summary of the key issues for consideration from the CUPE 1 report: *Mapping The Aftermath: A Front-line Workers' Review Of Toronto Hydro's Response To The Ice Storm Of 2013*:

There was a fair amount of consistency in workers' suggestions for improvements, which are detailed below:

- Revisit and revise the levels of emergency planning. Ensure that this information, along with the expected protocol, is known to all staff.
- Start staging crews the moment there is information about an impending emergency.
- During emergencies, appropriately assign and utilize all available staff.
- Develop a better and more consistent public communications plan, which takes into consideration that crews on the ground will need to deal with frustrated customers and may benefit from basic public relations training.
- LICCs, SOCs, and Power System Controllers need to work with each other to better direct crews. Staff the LICCs with more knowledgeable personnel or remove LICCs from the process.
- Allow Power Systems Controllers to prioritize restoration work and coordinate with ground crews to include their observations and assessments. These personnel have the expertise to understand what would be required to restore power systematically and efficiently.
- There is an urgent need for better, more open communication about the chain of command and manager's expectations during emergencies.
- The City should provide more staging areas for triage operations, such as waste and transportation yards.
- Feeder restoration needs to be better prioritized. Main feeders need to be restored first; feeders that supply electricity to a home or a few homes should not be the primary focus.

Appendix E: CUPE 1 Mapping The Aftermath: A Front-line Workers' Review Of The Toronto Hydro's Response To The Ice Storm Of 2013

- Toronto Hydro is chronically understaffed; the overall workforce of Toronto Hydro has decreased by approximately forty percent since 1998. Investing in hiring and training staff would shorten emergency response times.
- Have appropriate sleeping, eating, and/or catering establishments made part of the Emergency Preparedness Plan.

Appendix F: City of Toronto Council Motions

City Council consideration on July 8, 2014

EX43.3	ACTION	Amended		Ward: All

Review of the City of Toronto's Emergency Response to the December 2013 Ice Storm

City Council Decision
City Council on July 8, 9, 10 and 11, 2014, adopted the following:

Emergency Preparedness and Response:

1. City Council direct the City Manager, in consultation with applicable City divisions, agencies and corporations, to update the City of Toronto Emergency Plan and its Operational Support Functions and Risk Specific Plans, as per the recommendations detailed in Appendix 1 to the report (June 17, 2014) from the City Manager and Deputy City Managers.

2. City Council direct the City Manager, in consultation with applicable City divisions, agencies and corporations, and partners, the Canadian Red Cross etc., to enhance emergency staffing capacity and maintain, at a minimum, five-deep staffing levels to ensure sufficient redundancy for the Emergency Operation Centre and at Emergency Reception Centres, and to advance training of required staff throughout the balance of 2014 using existing staff training resources.

3. City Council direct the Deputy City Manager, Cluster B to develop a proactive public education and awareness program to increase the awareness of residents and businesses on emergency preparedness measures and information including through existing City of Toronto notices and methods of communications (property tax, hydro, water bills, etc.) in consultation with Toronto Hydro and other partners as appropriate.

4. City Council request the Toronto Police Service Board to direct the Chief, Toronto Police Service to work with the City Manager to develop emergency response protocols to ensure Police Officers are available to direct and control the City's highest priority traffic intersections in the event of power outages during emergency events.

5. City Council direct the Deputy City Manager, Cluster B, in consultation with all relevant City divisions, agencies and corporations, to develop a standardized process for the

post-emergency review and evaluation of the City of Toronto's response to emergency events, incorporating elements recommended through the third party peer review.

6. City Council request Toronto Hydro to develop and implement emergency education awareness and preparedness communications for distribution to all Toronto Hydro customers, such topics to include:

   a. emergency preparedness checklist;

   b. emergency contact information; and

   c. roles and responsibilities with respect to tree maintenance and standpipes.

Supports for Vulnerable Populations:

7. City Council direct the Deputy City Manager, Cluster A and the Director, Office of Emergency Management, in consultation with all relevant City divisions, agencies and corporations, to establish an Emergency Human Services working group and to explore the formation of an Emergency Response Agreement with the Toronto Central Local Health Integration Network, Findhelp Information Services (211), and other community-based agencies to improve implementation of the Vulnerable Persons Protocol and increase access to services for vulnerable residents during an emergency situation.

8. City Council direct the Deputy City Manager, Cluster A to pre-identify appropriate Community Recreation facilities to be used as Emergency Reception Centres and develop facility specific plans, including the provision of back-up power, for operational response during an emergency event.

Emergency Communications:

9. City Council direct the City Manager to continue to work in collaboration with staff from Toronto Hydro, the Red Cross and other members of the City's Emergency Risk communicators' network to identify opportunities to expand and strengthen the communications tactics and communications channels that can be utilized to more effectively communicate with the public, particularly vulnerable populations, during an extended power disruption.

10. City Council request the City Manager to work in collaboration with staff from Toronto Hydro to include in the establishment of enhanced emergency communications strategies, a contingency plan to ensure additional call centres are available for Toronto residents when there is a power outage lasting two days or more.

11. City Council direct the City Manager and the City Clerk, in consultation with City of Toronto Councillors, the Office of Emergency Management and Strategic Communications, to develop a new Councillor Co-ordination Operational Support Function (OSF) document to support the role of Councillors during an emergency event, including protocols for the co-ordination and dissemination of information and the development of appropriate processes for training.

12. City Council request the City Manager to include in any enhanced emergency communications strategies, such as those suggested in Parts 9 and 11 above, the provision of American Sign Language (ASL) in televised updates and announcements.

311 Toronto and Toronto Hydro Contact Centre Co-ordination:

13. City Council request City (311 Toronto) and Toronto Hydro to expedite the development and execution of a Memorandum of Understanding that formally documents the expectations and actions of both organizations to ensure co-ordination of communications in the short term, information and requests for service related to power outages for localized and widespread events.

14. City Council request the City Manager to work in collaboration with the staff from Toronto Hydro and to report as part of the first quarter report to City Council on a strategy to integrate the Toronto Hydro and the City's (311 Toronto) customer service communication systems.

Urban Forestry and Infrastructure Resiliency:

15. City Council direct the Deputy City Manager, Cluster A, in consultation with Urban Forestry, to work with Toronto Hydro to review current line clearing programs with respect to best practices and report back to City Council in the first quarter of 2015 on identified opportunities to enhance co-ordination of activities to more effectively manage the potential impact of trees in close proximity to hydro lines.

16. City Council request Toronto Hydro, in consultation with the City (Urban Forestry) to explore the use of infrastructure that is resilient to power outages associated with tree contact, which reduces line clearing requirements and the associated adverse impact on trees, when replacing or installing new above ground infrastructure.

17. City Council support Toronto Hydro's inclusion of $70 to $75 million over five years for the conversion of overhead hydro lines to underground as part of its 2015-2019 rate application to the Ontario Energy Board, and request that Toronto Hydro work with the City (Urban Forestry) to review and identify potential future priorities, where

conversion of overhead lines to underground would most significantly improve the resiliency of the electrical-supply in Toronto.

18. City Council request the City Manager to work in collaboration with the staff from Toronto Hydro and to report as part of the first quarter report to City Council on a strategy to underground key pieces of Toronto Hydro's infrastructure including major and minor arterials.

19. City Council request Toronto Hydro to consider construction of underground power lines in the new developing areas, and the vulnerable and high risk areas where tall and nearby trees may cause damages to electric lines, so that Toronto Hydro could reduce power outage as much as possible during future storms.

Provincial Requests:

20. City Council request the Province of Ontario to expand the existing provisions in the Ontario Building Code to require mandatory continuous power supply for back-up generators in certain building types (i.e., buildings more than six stories, care occupancies and hospitals) and forward this request to other large Ontario municipalities and to the Association of Municipalities of Ontario to seek their endorsement.

21. City Council direct the Deputy City Manager and Chief Financial Officer to report to the Budget Committee once confirmation of Ice Storm expenditure reimbursements through the Provincial Ice Storm Assistance Program are received, including a funding plan for any submitted expenditures that are deemed ineligible for reimbursement under the Program.

Other:

22. City Council request the City Manager to report to the Executive Committee on the status of the implementation of City Council's decision in the second quarter of 2015.

23. City Council request Toronto Hydro to report to Council in the second quarter of 2015 on the implementation plans for the Independent Review Panel recommendations.

24. City Council request Toronto Hydro to include the City Manager in all aspects of its review of the current outage Management System.

25. City Council receive the report (June 24, 2014) from the City Manager [Item EX43.3a] for information.

Appendix F: City of Toronto Council Motions

Background Information (Committee)

(June 17, 2014) Report and Appendices 1, 2 and 3 from the City Manager and the Deputy City Managers (http://www.toronto.ca/legdocs/mmis/2014/ex/bgrd/backgroundfile-70933.pdf)
(June 18, 2014) Appendix 4 - PricewaterhouseCoopers LLP Peer Review of the City's Emergency Management Program Review (http://www.toronto.ca/legdocs/mmis/2014/ex/bgrd/backgroundfile-70908.pdf)
(May 1, 2014) Appendix 5 - Province of Ontario May 2014 Program Update (http://www.toronto.ca/legdocs/mmis/2014/ex/bgrd/backgroundfile-70934.pdf)
(July 2, 2014) Presentation from the City Manager on December 2013 Ice Storm - City of Toronto's Emergency Response Review (http://www.toronto.ca/legdocs/mmis/2014/ex/bgrd/backgroundfile-71052.pdf)
(July 2, 2014) Presentation from Anthony Haines, President and Chief Executive Officer, Toronto Hydro on Ice Storm Independent Panel Review Report Briefing (http://www.toronto.ca/legdocs/mmis/2014/ex/bgrd/backgroundfile-71053.pdf)
(July 2, 2014) Presentation from the Independent Review Panel on Toronto Hydro Response to December 2013 Ice Storm Independent Review Panel Report (http://www.toronto.ca/legdocs/mmis/2014/ex/bgrd/backgroundfile-71054.pdf)

Communications (Committee)

(July 2, 2014) Letter from John Camilleri, Cupe Local 1 (EX.New.EX43.3.1) (http://www.toronto.ca/legdocs/mmis/2014/ex/comm/communicationfile-48448.pdf)

Motions (City Council)

1a - Motion to Amend Item (Additional) moved by Councillor Raymond Cho (Carried)
That City Council request Toronto Hydro to consider construction of underground power lines in the new developing areas, and the vulnerable and high risk areas where tall and nearby trees may cause damages to electric lines, so that Toronto Hydro could reduce power outage as much as possible during future storms.

Vote (Amend Item (Additional)) Jul-08-2014 5:05 PM

Result: Carried	Majority Required - EX43.3 - Cho - motion 1a
Yes: 39	Paul Ainslie, Maria Augimeri, Ana Bailão, Michelle Berardinetti, Shelley Carroll, Raymond Cho, Gary Crawford, Vincent Crisanti, Janet Davis, Glenn De Baeremaeker, Mike Del Grande, Sarah Doucette, John Filion, Paula Fletcher, Rob Ford, Mary Fragedakis, Mark Grimes, Norman Kelly, Mike Layton, Chin Lee, Peter Leon, Gloria Lindsay Luby, James Maloney, Josh Matlow, Pam McConnell, Mary-Margaret McMahon, Joe Mihevc, Denzil Minnan-Wong, Frances Nunziata (Chair), Cesar Palacio, John Parker, James Pasternak, Gord Perks, Anthony Perruzza, Ceta Ramkhalawansingh, Jaye Robinson, David Shiner, Karen Stintz, Michael Thompson
No: 3	Josh Colle, Frank Di Giorgio, Ron Moeser
Absent: 3	Doug Ford, Giorgio Mammoliti, Kristyn Wong-Tam

1b - Motion to Amend Item (Additional) moved by Councillor Raymond Cho (Carried)

That City Council request the City Manager to work in collaboration with staff from Toronto Hydro to include in the establishment of enhanced emergency communications strategies, a contingency plan to ensure additional call centres are available for Toronto residents when there is a power outage lasting two days or more.

Vote (Amend Item (Additional)) Jul-08-2014 5:05 PM

Result: Carried	Majority Required - EX43.3 - Cho - motion 1b
Yes: 40	Paul Ainslie, Maria Augimeri, Ana Bailão, Michelle Berardinetti, Shelley Carroll, Raymond Cho, Josh Colle, Gary Crawford, Vincent Crisanti, Janet Davis, Glenn De Baeremaeker, Mike Del Grande, Sarah Doucette, John Filion, Paula Fletcher, Rob Ford, Mary Fragedakis, Norman Kelly, Mike Layton, Chin Lee, Peter Leon, Gloria Lindsay Luby, James Maloney, Josh Matlow, Pam McConnell, Mary-Margaret McMahon, Joe Mihevc, Denzil Minnan-Wong, Ron Moeser, Frances Nunziata (Chair), Cesar Palacio, John Parker, James Pasternak, Gord Perks, Anthony Perruzza, Ceta Ramkhalawansingh, Jaye Robinson, David Shiner, Karen Stintz, Michael Thompson
No: 2	Frank Di Giorgio, Mark Grimes
Absent: 3	Doug Ford, Giorgio Mammoliti, Kristyn Wong-Tam

2 - Motion to Amend Item moved by Councillor Joe Mihevc (Carried)
That:

1. City Council amend Executive Committee Recommendation 11 by adding the words "in the short term" so that the Recommendation now reads:

    11. City Council request City (311 Toronto) and Toronto Hydro to expedite the development and execution of a Memorandum of Understanding that formally documents the expectations and actions of both organizations to ensure co-ordination of communications in the short term, information and requests for service related to power outages for localized and widespread events.

2. City Council request the City Manager to work in collaboration with the staff from Toronto Hydro and to report as part of the first quarter report to City Council on a strategy to integrate the Toronto Hydro and the City's (311 Toronto) customer service communication systems.

3. City Council request the City Manager to work in collaboration with the staff from Toronto Hydro and to report as part of the first quarter report to City Council on a strategy to underground key pieces of Toronto Hydro's infrastructure including major and minor arterials.

Vote (Amend Item) Jul-08-2014 5:00 PM

Result: Carried	Majority Required - EX43.3 - Mihevc - motion 2, Part 1
Yes: 29	Paul Ainslie, Maria Augimeri, Ana Bailão, Shelley Carroll, Raymond Cho, Josh Colle, Vincent Crisanti, Janet Davis, Glenn De Baeremaeker, Sarah Doucette, John Filion, Paula Fletcher, Rob Ford, Mary Fragedakis, Mark Grimes, Mike Layton, Chin Lee, Gloria Lindsay Luby, James Maloney, Josh Matlow, Pam McConnell, Joe Mihevc, Denzil Minnan-Wong, Cesar Palacio, James Pasternak, Gord Perks, Ceta Ramkhalawansingh, Jaye Robinson, Karen Stintz
No: 12	Michelle Berardinetti, Gary Crawford, Mike Del Grande, Frank Di Giorgio, Norman Kelly, Peter Leon, Mary-Margaret McMahon, Ron Moeser, Frances Nunziata (Chair), John Parker, Anthony Perruzza, Michael Thompson
Absent: 4	Doug Ford, Giorgio Mammoliti, David Shiner, Kristyn Wong-Tam

Vote (Amend Item) Jul-08-2014 5:01 PM

Result: Carried	Majority Required - EX43.3 - Mihevc - motion 2, Part 2
Yes: 37	Paul Ainslie, Maria Augimeri, Shelley Carroll, Raymond Cho, Josh Colle, Gary Crawford, Vincent Crisanti, Glenn De Baeremaeker, Mike Del Grande, Frank Di Giorgio, Sarah Doucette, John Filion, Paula Fletcher, Rob Ford, Mary Fragedakis, Mark Grimes, Norman Kelly, Mike Layton, Peter Leon, Gloria Lindsay Luby, James Maloney, Josh Matlow, Pam McConnell, Mary-Margaret McMahon, Joe Mihevc, Ron Moeser, Frances Nunziata (Chair), Cesar Palacio, John Parker, James Pasternak, Gord Perks, Anthony Perruzza, Ceta Ramkhalawansingh, Jaye Robinson, David Shiner, Karen Stintz, Michael Thompson
No: 5	Ana Bailão, Michelle Berardinetti, Janet Davis, Chin Lee, Denzil Minnan-Wong
Absent: 3	Doug Ford, Giorgio Mammoliti, Kristyn Wong-Tam

Vote (Amend Item) Jul-08-2014 5:02 PM

Result: Carried	Majority Required - EX43.3 - Mihevc - motion 2, Part 3
Yes: 38	Paul Ainslie, Maria Augimeri, Ana Bailão, Michelle Berardinetti, Raymond Cho, Josh Colle, Gary Crawford, Vincent Crisanti, Janet Davis, Glenn De Baeremaeker, Mike Del Grande, Sarah Doucette, John Filion, Paula Fletcher, Rob Ford, Mary Fragedakis, Mark Grimes, Norman Kelly, Mike Layton, Chin Lee, Peter Leon, Gloria Lindsay Luby, James Maloney, Josh Matlow, Pam McConnell, Mary-Margaret McMahon, Joe Mihevc, Denzil Minnan-Wong, Frances Nunziata (Chair), Cesar Palacio, John Parker, James Pasternak, Gord Perks, Anthony Perruzza, Ceta Ramkhalawansingh, Jaye Robinson, David Shiner, Michael Thompson
No: 4	Shelley Carroll, Frank Di Giorgio, Ron Moeser, Karen Stintz
Absent: 3	Doug Ford, Giorgio Mammoliti, Kristyn Wong-Tam

3 - Motion to Amend Item (Additional) moved by Councillor Vincent Crisanti (Carried)

That City Council request Toronto Hydro to develop and implement emergency education awareness and preparedness communications for distribution to all Toronto Hydro customers, such topics to include:

a. Emergency preparedness checklist;
b. Emergency contact information; and
c. Roles and responsibilities with respect to tree maintenance and standpipes.

Vote (Amend Item (Additional)) Jul-08-2014 5:06 PM

Result: Carried	Majority Required - EX43.3 - Crisanti - motion 3
Yes: 42	Paul Ainslie, Maria Augimeri, Ana Bailão, Michelle Berardinetti, Shelley Carroll, Raymond Cho, Josh Colle, Gary Crawford, Vincent Crisanti, Janet Davis, Glenn De Baeremaeker, Mike Del Grande, Frank Di Giorgio, Sarah Doucette, John Filion, Paula Fletcher, Rob Ford, Mary Fragedakis, Mark Grimes, Norman Kelly, Mike Layton, Chin Lee, Peter Leon, Gloria Lindsay Luby, James Maloney, Josh Matlow, Pam McConnell, Mary-Margaret McMahon, Joe Mihevc, Denzil Minnan-Wong, Ron Moeser, Frances Nunziata (Chair), Cesar Palacio, John Parker, James Pasternak, Gord Perks, Anthony Perruzza, Ceta Ramkhalawansingh, Jaye Robinson, David Shiner, Karen Stintz, Michael Thompson
No: 0	
Absent: 3	Doug Ford, Giorgio Mammoliti, Kristyn Wong-Tam

4a - Motion to Amend Item moved by Councillor Frances Nunziata (Carried)
That City Council amend Executive Committee Recommendation 15 by adding the word "mandatory" after the word "require" so that it now reads as follows:

15. City Council request that the Province of Ontario expand the existing provisions in the Ontario Building Code to require mandatory continuous power supply for back-up generators in certain building types (i.e., buildings more than six stories, care occupancies and hospitals).

Vote (Amend Item) Jul-08-2014 5:02 PM

Result: Carried	Majority Required - EX43.3 - Nunziata - motion 4a
Yes: 39	Paul Ainslie, Maria Augimeri, Ana Bailão, Michelle Berardinetti, Shelley Carroll, Raymond Cho, Josh Colle, Vincent Crisanti, Janet Davis, Glenn De Baeremaeker, Mike Del Grande, Frank Di Giorgio, Sarah Doucette, John Filion, Paula Fletcher, Rob Ford, Mary Fragedakis, Mark Grimes, Norman Kelly, Mike Layton, Chin Lee, Peter Leon, Gloria Lindsay Luby, James Maloney, Pam McConnell, Mary-Margaret McMahon, Joe Mihevc, Denzil Minnan-Wong, Ron Moeser, Frances Nunziata (Chair), Cesar Palacio, James Pasternak, Gord Perks, Anthony Perruzza, Ceta Ramkhalawansingh, Jaye Robinson, David Shiner, Karen Stintz, Michael Thompson
No: 3	Gary Crawford, Josh Matlow, John Parker

Absent: 3	Doug Ford, Giorgio Mammoliti, Kristyn Wong-Tam

4b - Motion to Amend Item moved by Councillor Frances Nunziata (Carried)
That City Council amend Executive Committee Recommendation 3 by adding the words "including through existing City of Toronto notices and methods of communications (property tax, hydro, water bills, etc.)" after word "consultation" so that it now reads as follows:

3. City Council direct the Deputy City Manager, Cluster B to develop a proactive public education and awareness program to increase the awareness of residents and businesses on emergency preparedness measures and information including through existing City of Toronto notices and methods of communications (property tax, hydro, water bills, etc.) in consultation with Toronto Hydro and other partners as appropriate.

Vote (Amend Item) Jul-08-2014 5:04 PM

Result: Carried	Majority Required - EX43.3 - Nunziata - motion 4b
Yes: 42	Paul Ainslie, Maria Augimeri, Ana Bailão, Michelle Berardinetti, Shelley Carroll, Raymond Cho, Josh Colle, Gary Crawford, Vincent Crisanti, Janet Davis, Glenn De Baeremaeker, Mike Del Grande, Frank Di Giorgio, Sarah Doucette, John Filion, Paula Fletcher, Rob Ford, Mary Fragedakis, Mark Grimes, Norman Kelly, Mike Layton, Chin Lee, Peter Leon, Gloria Lindsay Luby, James Maloney, Josh Matlow, Pam McConnell, Mary-Margaret McMahon, Joe Mihevc, Denzil Minnan-Wong, Ron Moeser, Frances Nunziata (Chair), Cesar Palacio, John Parker, James Pasternak, Gord Perks, Anthony Perruzza, Ceta Ramkhalawansingh, Jaye Robinson, David Shiner, Karen Stintz, Michael Thompson
No: 0	
Absent: 3	Doug Ford, Giorgio Mammoliti, Kristyn Wong-Tam

5 - Motion to Amend Item (Additional) moved by Councillor Paula Fletcher (Carried)
That City Council request Toronto Hydro to include the City Manager in all aspects of their review of the current outage Management System.

Vote (Amend Item (Additional)) Jul-08-2014 5:07 PM

Result: Carried	Majority Required - EX43.3 - Fletcher - motion 5
Yes: 41	Paul Ainslie, Maria Augimeri, Ana Bailão, Michelle Berardinetti, Shelley Carroll, Raymond Cho, Josh Colle, Gary Crawford, Vincent Crisanti, Janet Davis, Glenn De Baeremaeker, Mike Del Grande, Frank Di Giorgio, Sarah Doucette, John Filion, Paula Fletcher, Rob Ford, Mary Fragedakis, Mark Grimes, Norman Kelly, Mike Layton, Chin Lee, Peter Leon, Gloria Lindsay Luby, James Maloney, Josh Matlow, Pam McConnell, Mary-Margaret McMahon, Joe Mihevc, Denzil Minnan-Wong, Ron Moeser, Frances Nunziata (Chair), Cesar Palacio, John Parker, Gord Perks, Anthony Perruzza, Ceta Ramkhalawansingh, Jaye Robinson, David Shiner, Karen Stintz, Michael Thompson

No: 1	James Pasternak
Absent: 3	Doug Ford, Giorgio Mammoliti, Kristyn Wong-Tam

6a - Motion to Amend Item moved by Councillor Janet Davis (Carried)
That City Council amend Executive Committee Recommendation 15 by adding the words "and forward this request to other large Ontario municipalities and to the Association of Municipalities of Ontario to seek their endorsement" so that the recommendation now reads:

15. City Council request the Province of Ontario to expand the existing provisions in the Ontario Building Code to require continuous power supply for back-up generators in certain building types (i.e., buildings more than six stories, care occupancies and hospitals) and forward this request to other large Ontario municipalities and to the Association of Municipalities of Ontario to seek their endorsement.

Vote (Amend Item) Jul-08-2014 5:03 PM

Result: Carried	Majority Required - EX43.3 - Davis - motion 6a
Yes: 42	Paul Ainslie, Maria Augimeri, Ana Bailão, Michelle Berardinetti, Shelley Carroll, Raymond Cho, Josh Colle, Gary Crawford, Vincent Crisanti, Janet Davis, Glenn De Baeremaeker, Mike Del Grande, Frank Di Giorgio, Sarah Doucette, John Filion, Paula Fletcher, Rob Ford, Mary Fragedakis, Mark Grimes, Norman Kelly, Mike Layton, Chin Lee, Peter Leon, Gloria Lindsay Luby, James Maloney, Josh Matlow, Pam McConnell, Mary-Margaret McMahon, Joe Mihevc, Denzil Minnan-Wong, Ron Moeser, Frances Nunziata (Chair), Cesar Palacio, John Parker, James Pasternak, Gord Perks, Anthony Perruzza, Ceta Ramkhalawansingh, Jaye Robinson, David Shiner, Karen Stintz, Michael Thompson
No: 0	
Absent: 3	Doug Ford, Giorgio Mammoliti, Kristyn Wong-Tam

6b - Motion to Amend Item (Additional) moved by Councillor Janet Davis (Carried)
That City Council request Toronto Hydro to report to Council in the second quarter of 2015 on the implementation plans for the Independent Review Panel recommendations.

Vote (Amend Item (Additional)) Jul-08-2014 5:08 PM

Result: Carried	Majority Required - EX43.3 - Davis - motion 6b
Yes: 43	Paul Ainslie, Maria Augimeri, Ana Bailão, Michelle Berardinetti, Shelley Carroll, Raymond Cho, Josh Colle, Gary Crawford, Vincent Crisanti, Janet Davis, Glenn De Baeremaeker, Mike Del Grande, Frank Di Giorgio, Sarah Doucette, John Filion, Paula Fletcher, Rob Ford, Mary Fragedakis, Mark Grimes, Norman Kelly, Mike Layton, Chin Lee, Peter Leon, Gloria Lindsay Luby, James Maloney, Josh Matlow, Pam McConnell, Mary-Margaret McMahon, Joe Mihevc, Denzil Minnan-Wong, Ron Moeser, Frances Nunziata (Chair), Cesar Palacio, John Parker, James Pasternak,

	Gord Perks, Anthony Perruzza, Ceta Ramkhalawansingh, Jaye Robinson, David Shiner, Karen Stintz, Michael Thompson, Kristyn Wong-Tam
No: 0	
Absent: 2	Doug Ford, Giorgio Mammoliti

Motion to Adopt Item as Amended (Carried)

Vote (Adopt Item as Amended) Jul-08-2014 5:08 PM

Result: Carried	Majority Required - EX43.3 - Adopt the item as amended
Yes: 43	Paul Ainslie, Maria Augimeri, Ana Bailão, Michelle Berardinetti, Shelley Carroll, Raymond Cho, Josh Colle, Gary Crawford, Vincent Crisanti, Janet Davis, Glenn De Baeremaeker, Mike Del Grande, Frank Di Giorgio, Sarah Doucette, John Filion, Paula Fletcher, Rob Ford, Mary Fragedakis, Mark Grimes, Norman Kelly, Mike Layton, Chin Lee, Peter Leon, Gloria Lindsay Luby, James Maloney, Josh Matlow, Pam McConnell, Mary-Margaret McMahon, Joe Mihevc, Denzil Minnan-Wong, Ron Moeser, Frances Nunziata (Chair), Cesar Palacio, John Parker, James Pasternak, Gord Perks, Anthony Perruzza, Ceta Ramkhalawansingh, Jaye Robinson, David Shiner, Karen Stintz, Michael Thompson, Kristyn Wong-Tam
No: 0	
Absent: 2	Doug Ford, Giorgio Mammoliti

3a Transmittal of Toronto Hydro's Independent Review Panel Report - The Response of Toronto Hydro-Electrical System Limited to the December 2013 Ice Storm

Background Information (Committee)

(June 24, 2014) Report from the City Manager on Transmittal of Toronto Hydro's Independent Review Panel Report: The Response of Toronto Hydro-Electrical System Limited to the December 2013 Ice Storm (http://www.toronto.ca/legdocs/mmis/2014/ex/bgrd/backgroundfile-70975.pdf)
(June 24, 2014) Attachment 1 - Transmittal letter, dated June 24, 2014, from Toronto Hydro President and CEO Re: Independent Review Panel - Final Report (http://www.toronto.ca/legdocs/mmis/2014/ex/bgrd/backgroundfile-70997.pdf)
(June 19, 2014) Attachment 2 - Toronto Hydro Independent Review Panel Report, The Response of Toronto Hydro-Electrical System Limited to the December 2013 Ice Storm (http://www.toronto.ca/legdocs/mmis/2014/ex/bgrd/backgroundfile-70991.pdf)

Executive Committee consideration on July 2, 2014

Source: Toronto City Clerk at www.toronto.ca/council

Appendix G: Glossary of Terms

Term	Description
AED Map	All Electric Distribution map. Breaks down service territory into grids with each grid documenting a portion of the distribution system.
Area-based restoration	In area-based responses, a utility will decentralize crew and work management to regions or divisions. A central system operations group retains control over crews restoring feeder lockouts and responding to 911 calls, but all major restoration work is referred to the decentralized region. The regions prioritize work, identify resource needs, manage resources, and develop ETRs.
Bird Dog	A local utility resource dedicated to helping off-system/mutual assistance crews with daily work needs (e.g., navigating the territory, coordinating work with other crews, ensuring the safety of the work site, accessing food). These resources are typically local company line workers and recent retirees who are familiar with the system and are trained to operate the switching devices in the field. Bird dogs may support one or more crews.
Blue Sky	Refers to day-to-day, normal operating conditions
Canadian Electricity Association (CEA)	The industry association for Canadian electric utilities.
Circuit	A continuous flow of electricity from a source to a load or loads. In utility distribution, a circuit is the main (usually 3 phase) line and all three, two, and single phase sections (laterals) served by a single substation circuit breaker.
Circuit-based restoration	A circuit-based approach is typically used in the highest level incidents (Level 3 and greater), where the widespread devastation requires complete rebuilding of the electric delivery infrastructure. In circuit-based restorations, crews are assigned to rebuild an entire circuit or portions of a circuit. The circuit is usually isolated from the rest of the system to ensure that it does not become energized during the work. The field crews energize portions of the circuit as work is completed.

Appendix G: Glossary of Terms

Term	Description
Circuit sectionalization	The practice used by utilities to break an electric circuit into sections that can be isolated from the rest of the circuit in case of an outage to protect all of the customers from getting an outage as a result. This also allows the utility to switch the source of power to the circuit from one feeder or substation to another during an outage, if another source is available.
Damage Assessment	The process for systematically collecting damage information in the field to support the restoration planning, resource acquisition, and development of restoration estimates.
EHS Officer	Environmental, Health, and Safety Officer
Estimated Time of Restoration (ETR)	An estimate of the restoration time. The ETR can be provided at multiple levels, including global, regional, neighbourhood/substation, circuit, and individual customer.
Event-based restoration	Event-based (or order-based) restorations are typically limited to small events, where the utility manages resources and work based on individual outage management system (OMS) orders.
Functional Exercise	A functional exercise simulates an emergency in the most realistic manner possible, short of moving real people and equipment to an actual site. As the name suggests, its goal is to test or evaluate the capability of one or more functions in the context of an emergency event.
Incident Command System (ICS)	A standardized, on-site management system designed to enable effective, efficient incident management by integrating a combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure. ICS is used to manage an incident or a non-emergency event, and can be used equally well for both small and large incidents.
Lateral	A three, two or single phase section off the main line (backbone) of the circuit, constructed to extend to loads that are not directly in the path of the main line. Laterals are typically connected to the main line through fuses or reclosers.

Appendix G: Glossary of Terms

Term	Description
Mutual Assistance	The process by which electric utilities provide resources to each other to support major restoration efforts. This process is unique to the industry and is crucial for responding to large emergencies since no single utility has adequate resources to quickly restore normalcy after full-scale events.
Network Management System (NMS)	A common architecture supporting both the Outage Management System (OMS) and Distribution Management System (DMS). These software systems are real-time, integrated, and configurable solutions that help utilities reduce restoration times, improve operational efficiency, and safeguard workers and the public.
Off-System Resources/Crews	Individuals who do not work on Toronto Hydro system day-to-day but who are deployed by their company (a contractor or another utility) to support the restoration effort. Once the restoration is completed, these resources return to their home company.
Pole Guying	The practice of installing one or more tensioned wires on poles designed to add stability to a free-standing structure so that it can withstand higher speed winds without blowing over.
Service Drop	An overhead electrical line running from a utility pole to a customer's building or other premises. It is the point where electric utilities provide power to their customers.
Smart Meter	Usually a digital device that records consumption of electric energy in intervals of an hour or less and communicates that information, at least daily, back to the utility for monitoring and billing purposes. Smart meters enable two-way communication between the meter and the central system.
Storm Hardening	Activities that a utility may undertake to improve the durability and stability of infrastructure to withstand the impacts of severe weather events with minimal damage.
System Operations Centre (SOC)	A facility that houses system operators and data management system, providing real-time status and the ability to remotely operate the distribution

Term	Description
	system. The Incident Management Team at Toronto Hydro uses an SOC during major events.
Tabletop Exercise	A tabletop exercise simulates an emergency situation in an informal, stress-free environment. The participants – usually the decision-makers during an emergency – gather around a table to discuss general problems and procedures in the context of an emergency scenario. The focus is on training and familiarization with roles, procedures, or responsibilities. An advantage of a tabletop exercise is that it can allow people to test a hypothetical situation without causing disruption in the community.
Unit Price Contract	Negotiating pricing with on-system contractors for units of work (includes labour and materials).
Vegetation Management (VM)	Refers to the cyclical and reactive program for maintaining trees and tree limbs at a safe distance from the distribution power lines. A VM program is guided by a set of industry standards and local City by-laws as well as the electric distribution company guidelines.