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After the Storm

Hydro Ottawa's response to the May 2022 derecho

HydroOttawa

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AFTER THE STORM:

A reflection from our President and CEO

From family barbecues to gardening, camping and cottaging, most Canadians associate the May long weekend with the start of summer – a pleasant time.

Our community, however, will now remember the May 2022 long weekend as the most devastating weekend our city experienced, certainly the most devastating event in Hydro Ottawa's history.

While our teams had been following the storm's path during the day, nothing could have prepared them for its impact. In the span of 15 minutes, winds of up to 190 kilometres per hour toppled transmission towers, damaged more than 500 hydro poles and downed kilometres of power lines. There were more than 1,000 simultaneous power outages across the city and 180,000 customers in the dark.

There was no illusion that restoration was going to be quick. The damage was significant and widespread, and our grid was ravaged. We swiftly mobilized additional resources and equipment through a provincial mutual-aid agreement, bolstering our efforts with an additional 335 workers from numerous utilities and contractor companies. While we were able to restore power to 50 per cent of customers within 48 hours, many were without power for days.

Like many utilities' approach to storm responses, our top priority was to restore power to first responders and essential services, followed by water treatment facilities and sewage treatment plants. We then prioritized maximizing our efforts for the greatest number of customers. **Six months post-storm, we continue to build back stronger by:**

- Expanding our forestry program with shorter and enhanced tree-trimming cycles
- Increasing system inspections to find problematic equipment and make the necessary repairs
- Deploying additional resources to respond to power-outage events
- Deploying infrared scanning to preemptively identify assets at risk of failure
- Reviewing our Business Continuity Management Program, and updating our incident management and crisis communications plans to include learnings and best practices

We know that electricity is vital to our economy, public health and safety. Because of their interconnectedness, utilities and municipalities must work together to scale up solutions that can build and maintain our community's resilience, while being cost-effective for our customers.

We hope you find this report to be a helpful summary of our storm response and look forward to extending our collaboration with you to strengthen our collective emergency response for future events.

Sincerely,

Bryce Conrad
President & CEO
Hydro Ottawa

This image shows the path of the derecho with blue areas estimated to have experienced EF1 tornado wind speeds (138–177 km/h) and green areas, EF2 wind speeds (178–217 km/h)

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Overview

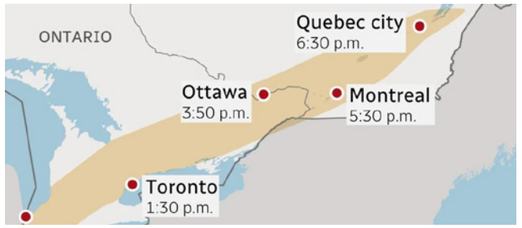
On May 21, 2022, Ottawa experienced winds of up to 190 kilometres per hour, extensively damaging Hydro Ottawa's electrical grid. This storm cost Hydro Ottawa an estimated $23.8 million ($15.1 capital expenditures; $8.7 operating, maintenance and other costs).

Total damages in Ontario are estimated at $720 million, making this the sixth costliest weather event in Canadian history in terms of insurance claims.

Purpose

The purpose of this report is to highlight Hydro Ottawa's efforts to repair and restore the electrical distribution system damaged by the May 21, 2022, derecho storm. It also aims to identify successes, lessons learned and recommendations to strengthen our Business Continuity Management Program as well as supporting business continuity and incident management plans.

While numerous external organizations supported the response, this report focuses solely on Hydro Ottawa's role in repairing and restoring the electrical distribution system between May 21 and June 5, 2022.



Customer Impact

At the peak of the aftermath, 180,000 Hydro Ottawa customers were without power – more than half of our customer base. Unlike previous storms, damage and power outages impacted our entire service territory.

There were a total of 1,000 individual outages on the system (in comparison to 200 after the 2018 tornadoes) and more than 1,500 known or reported tree contacts or interferences.

Some of the hardest hit neighbourhoods included:

- Pineglen and Pineglen Annex
- Carlingwood and McKellar Heights
- Fisher Glen and Cityview-Skyline-Fisher Heights
- Lincoln Heights and Britannia Heights
- Parkway Park and Kenson Park
- South Keys
- Carlsbad Springs
- Blackburn Hamlet
- Riverside Park and Hog's Back
- Tanglewood
- Stittsville and surrounding areas
- Manordale and Meadowlands
- Queensway Terrace South and Ridgeview
- Bells Corners East and Lynwood Village

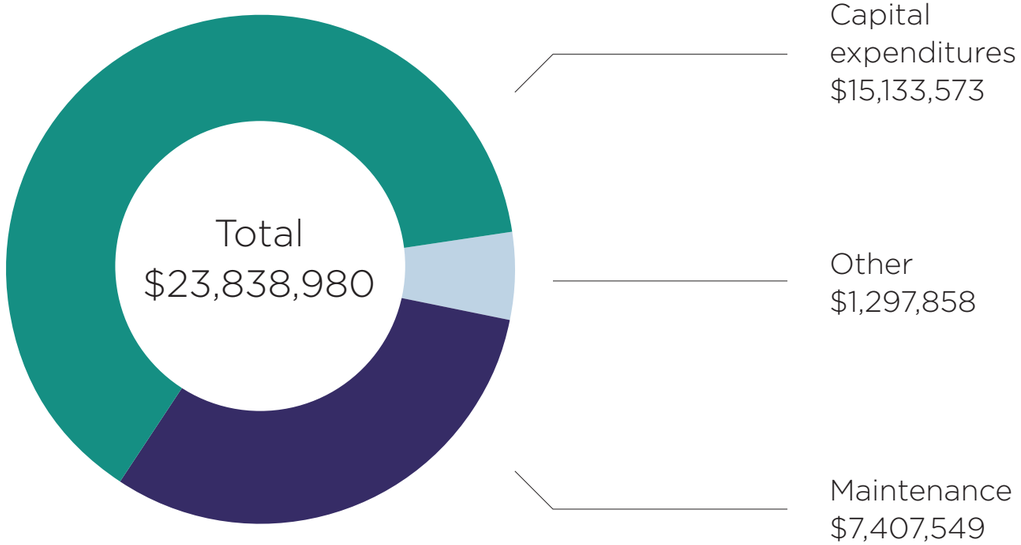
Damage Assessment

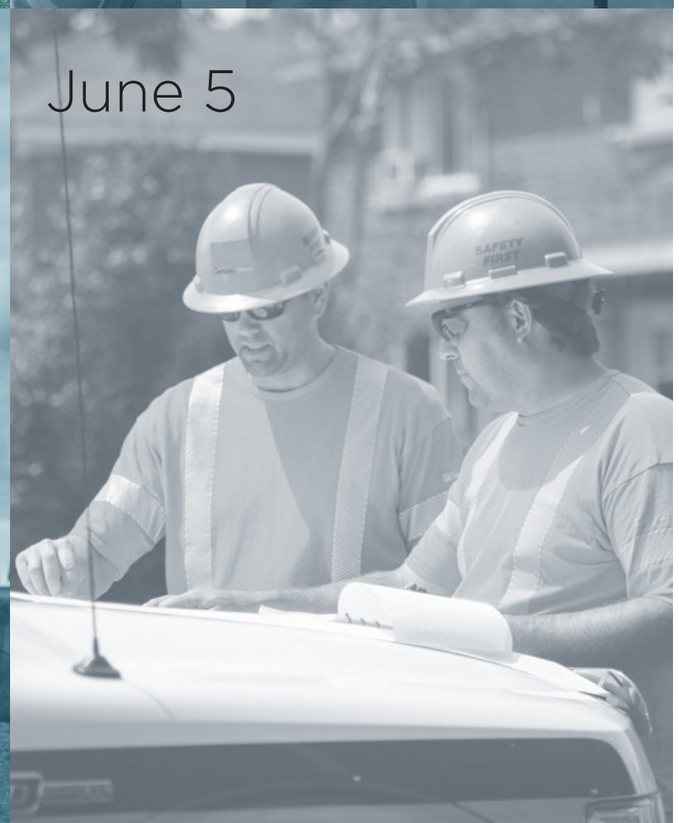
Initial damage assessments showed that more than 225 poles needed to be replaced; however, after the full extent of the damage became clear, we confirmed that number to be 540.

Property damage, downed trees and debris littered the hardest hit areas. This hampered field crews' ability to initiate restoration as traffic control and clean-up crews were required first.

The overall capital expenditure cost of the derecho to Hydro Ottawa is estimated at $15.1 million, which equates to 21.3 per cent of the 2022 system renewal and system service budget as approved by the board of directors.

Total cost of the storm to Hydro Ottawa





Response Timeline

From the beginning of our storm response, Hydro Ottawa communicated that this would be a multi-day restoration effort. We needed to take a whole-of-city approach given the widespread nature of the damage.

May 21

The derecho storm hits Ottawa

May 23

Power is restored to 50 per cent of affected customers

May 28

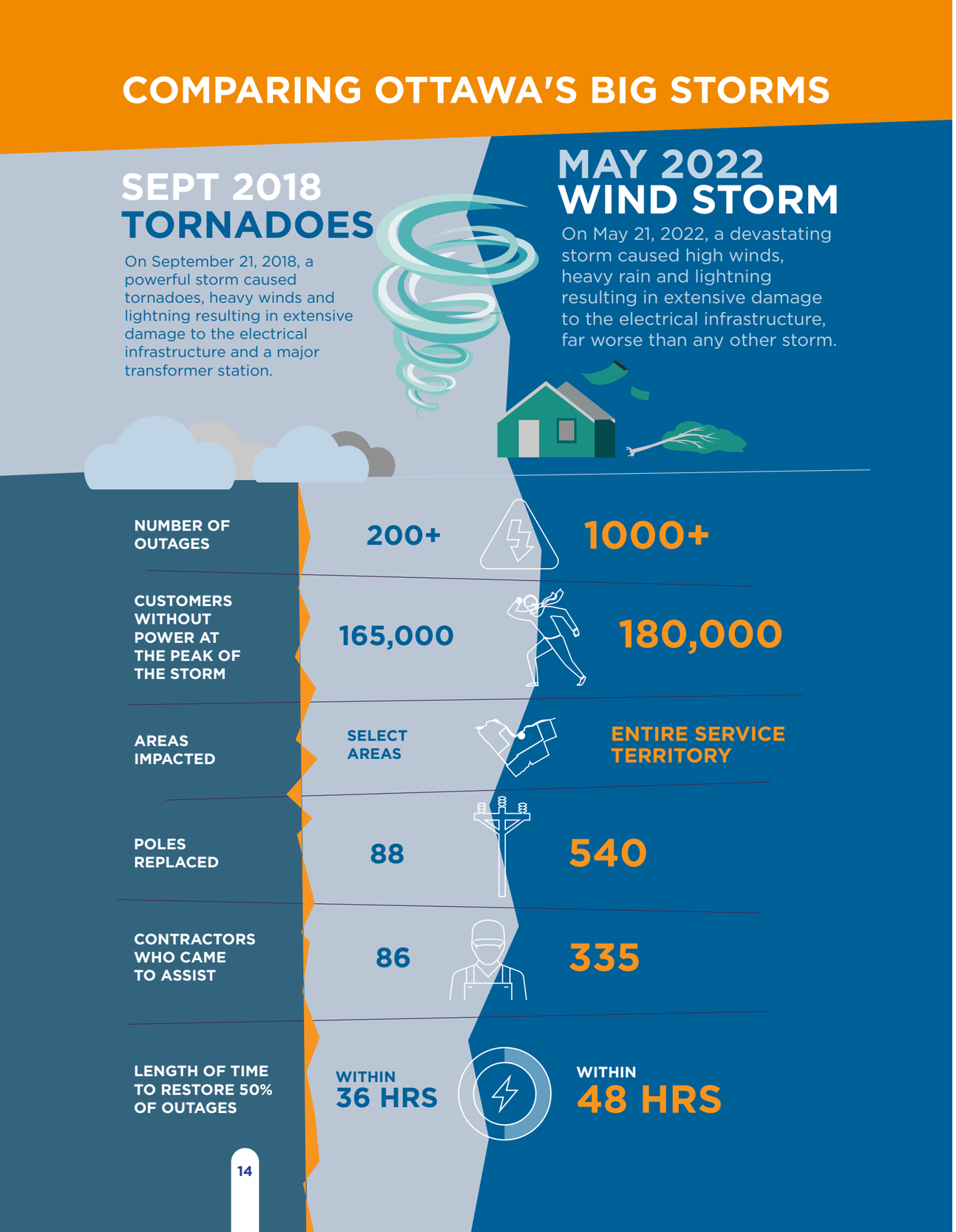
Most large repair projects are completed, restoring power to 90 per cent of affected customers

June 1

Power is restored to all customers except those with outstanding property/equipment damage

June 5

Power is restored to remaining customers



Lessons Learned

Hydro Ottawa's Business Continuity Management Program and supporting business continuity and incident management plans were strained due to the unprecedented nature, scope and duration of the May 2022 derecho. Since extreme weather events are occurring more frequently, we will review and enhance our plans to ensure they are scalable to events of this scope and duration.

Here's where we need to improve:

Future planning

Assumptions for future planning, design, construction and maintenance must expand to encompass the conditions experienced in this event.

Customer communication

Throughout this multi-day event, we struggled to effectively communicate estimated times of restoration and neighbourhood-specific information with customers due to the wide-spread damage, which is why we removed the outage map from our website. Recognizing that this was a critical concern for our customers, a review of our internal outage management systems and communication tools and strategies is underway in order to provide quicker and more reliable data on a continual basis moving forward.

System resilience

In addition to enhancing our storm-response capabilities, we must work to further harden our distribution system against storm damage, including, where feasible and where it makes financial sense, moving parts of our infrastructure underground.

Successes

Mutual Aid

We secured, mobilized and deployed 335 mutual-aid resources from neighbouring utilities and contractors.

Repair volume and speed

We completed the equivalent of four years of emergency asset replacements to our distribution system during the outage period.

Dedication, resilience and ingenuity

Teams worked long hours, and applied considerable ingenuity to resolving issues, and to expanding our response efforts to meet the demand of the situation.

Minimal injuries

Despite dynamic and evolving circumstances, we experienced only one medical aid injury to a contractor's employee.

Website performance

Between May 21 and June 2, 2022, our website had almost 600,000 unique visitors and 3.8 million page views.

Stakeholder communications

Daily public service announcements, memos to council and City media briefings; proactive and reactive media interviews; emails to business improvement areas and community associations; social media and website updates.

Successes

No work delays

Our procurement team ensured materials were brought in and available as needed to support all restoration efforts in spite of the long-weekend closures and existing global supply-chain issues.

24/7 fleet support

Mechanics were responsive to help with fleet-related breakdowns, including those impacting our contractors and mutual-aid crews.

Fueling efficiencies

Mobile night-time refueling of vehicles and generators ensured work staging remained and allowed crews to stay on site.

Waste-management efficiency

We provided refuse and debris bins directly to worksites for coordinated removal.

Equipment innovation

We sourced and used logging trucks and cranes creatively to handle, offload and deliver poles.

Taking care

Employees from across the organization were deployed on 720 trips to deliver 23,400 meals to worksites.

Strategic Priorities

1. OVERHEAD INFRASTRUCTURE

Hydro Ottawa has initiated plans to further storm-harden the distribution system. These plans include targeted infrastructure-hardening measures as part of the 2023 capital program, an update to the 2019 Distribution System Climate Risk and Vulnerability Assessment and the development of a Strategic Undergrounding Plan to enhance system resiliency.

2. DAMAGE ASSESSMENT

Hydro Ottawa will enhance integration of our damage assessment process and reports with our outage management system.

3. OUTAGE MANAGEMENT SYSTEM AND STORM MODE

Hydro Ottawa is establishing a process to support a systematic and simultaneous change across all systems and communication channels when “storm mode” is initiated.

4. OUTAGE MAP

Hydro Ottawa is conducting a comprehensive evaluation of the current outage map and needed features to best support customers across all scales of outages. We will implement an appropriate solution.

5. CUSTOMER-FACING TELEPHONY

Hydro Ottawa is implementing scalable telephony that leverages cloud-based technology to triage and process inbound calls to our outage centre. We will launch an SMS communication channel to support one-on-one outage reporting and restoration updates and are evaluating options to simplify outage reporting through both our website and mobile app.

6. ELECTRICITY EMERGENCY RESPONSE PLAN

Hydro Ottawa is conducting a comprehensive review and update to our Electricity Emergency Response Plan with specific considerations to ensure its scalability for large-scale, long-duration events. The review will include learnings and adaptations from the May 2022 derecho.

7. STAKEHOLDER COMMUNICATIONS

Hydro Ottawa will review and update our stakeholder communications plan to include learnings and adaptations made during the May 2022 derecho, as well as best practices used by utilities that regularly deal with large-scale weather events such as hurricanes.

8. SUPPLY CHAIN AND MATERIALS MANAGEMENT

Hydro Ottawa is conducting a thorough review of our supply chain and material management processes, including usage data from the storm. Our findings will inform our threshold inventory levels and the development of a supply-chain playbook for events of this scale.

9. BUSINESS CONTINUITY AND INCIDENT MANAGEMENT PLANS

Hydro Ottawa is reviewing and updating all business continuity and incident management plans to ensure they can scale for large-scope and long-duration events. We will be benchmarking against this storm response (e.g., city-wide impact, 500+ poles damaged, two-week response duration, mutual-aid resources required).

We will work with the City's emergency management team to review our role in the City's Emergency Operations Centre (EOC) during large-scale emergency events to ensure that we optimize communications protocols and channels with City departments, emergency services and other utilities, in support of both the restoration work, and the residents' needs.

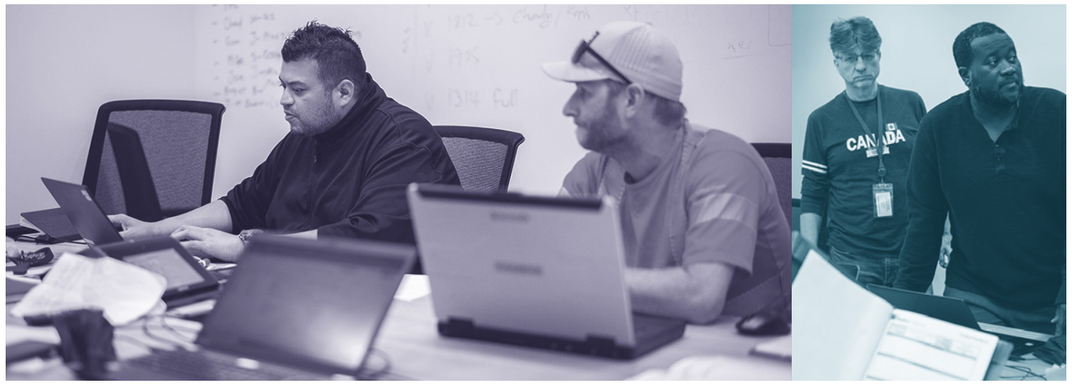
Conclusion

Adapting for the future.

Hydro Ottawa's emergency response plans are well executed and rooted in a strong foundation, as demonstrated by our day-to-day outage-response operations.

With an expected increase in more frequent and extreme weather events as a result of climate change, we're integrating learnings and focusing our efforts on both the grid and our emergency response plans to ensure scalability across our people, processes and technologies.

We're committed to keeping the lights on for our customers.



Appendix: Debrief Methodology

Debrief sessions were held during June 2022 with various divisions as well as the crisis management team, the crisis communications team and the incident command centre group. These sessions focused on identifying processes that worked well, gaps in processes and/or resources as well as opportunities for improvement.

Consultations and business continuity management program debriefs were conducted with the following:

- **Chief Information and Technology Officer Division:** infrastructure, grid technology, customer-facing technology
- **Chief Customer Officer Division:** external communications
- **Chief Electricity Distribution Officer Division:** internal contractor management team, distribution engineering and asset management team, system operations response, use of mutual aid/contractors
- **Chief Financial Officer Division:** facilities, fleet and fuel, supply chain, materials management
- **Chief Human Resources Officer Division:** human resources, safety, food, lodging
- **Executive Management Team**
- **Union Executive**

Some combined debriefs were then necessary to review the coordination among various divisions and/or groups. Information from these debriefs was consolidated and used to prepare this report.