Towards Extreme Weather Resilience: Working with the Electrical Sector

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Climate change is happening.
Ahead of the Storm: Climate Change Risk Management
Outline

1. Context
2. Strategy to engage the electrical sector
3. Actions to assist the electrical sector
4. Next steps
Temperature & precipitation-related extremes are forecast to increase in frequency & intensity

<table>
<thead>
<tr>
<th>Extreme Weather</th>
<th>Parameter</th>
<th>Units</th>
<th>2000 to 2009</th>
<th>2040 to 2049</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rainfall</td>
<td>Maximum amount in one day</td>
<td>MM</td>
<td>66</td>
<td>166</td>
</tr>
<tr>
<td></td>
<td># of days with more then 25 mm</td>
<td>Days</td>
<td>19</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Average annual daily maximum</td>
<td>MM</td>
<td>48</td>
<td>86</td>
</tr>
<tr>
<td>Heat</td>
<td>Maximum daily temperature</td>
<td>Degrees</td>
<td>37</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td># of days hotter then 30 degrees</td>
<td>Days</td>
<td>20</td>
<td>66</td>
</tr>
<tr>
<td></td>
<td>Number of heat waves per year</td>
<td>3-day events</td>
<td>0.6</td>
<td>2.5</td>
</tr>
</tbody>
</table>
Our infrastructure is built on the assumption of a stable climate
What happens if that climate isn’t stable anymore?
Drivers for Adaptation Action

1. Safety: avoid harm to public & employees

2. Customer Service

3. Maintain prosperity and achieve cost avoidance:
   - damage to infrastructure from extreme weather
   - credit & insurance risk rating
   - business / reputation disruption

4. Achieve efficiencies through co-operation, especially recognizing interdependencies of infrastructure

5. Corporate & personal legal liability
## City of Toronto - Climate Adaptation Milestones

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>Climate Change Adaptation Strategy</td>
</tr>
<tr>
<td>2009</td>
<td>Forum on Infrastructure &amp; CC Adaptation</td>
</tr>
<tr>
<td>2010 / 12</td>
<td>Climate Modelling for Toronto area. Risk Assessment Tool Benchmarking</td>
</tr>
<tr>
<td>2011</td>
<td>WeatherWise Partnership formed: Convened the electrical sector</td>
</tr>
</tbody>
</table>
Dependency on other sectors affected by weather

Municipalities don’t control all infrastructure – but we depend on it!
Multi – Sectoral Engagement WeatherWise Partnership

**Purpose** - Manage risks of extreme weather impacts on critical infrastructure & services

**Membership** - >50 organizations across Toronto region including banking, insurance, **electricity**, telecom, high rise residential & commercial real estate, retail, transportation, water management, emergency services, federal, provincial & local governments, NGOs and academia.

*Similar Models: London, New York & Barcelona*
Vote result: Focus on Electrical Sector

Over 50 WeatherWise Partnership Members collectively managing $100s of Billions in infrastructure & economic activity voted to focus on extreme weather vulnerability of the electrical sector.

Why is the business sector concerned the electrical sector?

Energy costs are important to business competitiveness but equally important Businesses and Critical Infrastructure owners seek an investment climate where energy supply is reliable and secure.
Emerging Issues: Energy Crunch in the City

• Population growth, more high rises, aging distribution system, capped electrical supply

• More frequent extreme weather:
  • Peak demand
  • Stress & damages to infrastructure
Approach with the Electrical Sector

1. Demonstrate **concern of key customers**.
2. **Benchmark** to prove other electrical jurisdictions are taking adaptation action.
3. Establish support for electrical **business case**.
4. Understand major **stakeholders’ tolerance** to power disruption.
5. Assess the potential impacts on a **representative sample** of the electrical system.
6. Identify where additional risk reduction **actions** are required (based on impacts & risk tolerance).
Tolerance Survey

Independent survey of critical infrastructure & service sectors’ tolerance for power disruption. 173 respondents provided info on emergency preparedness and operational tolerance.

• 57% of respondents have a formal Emergency Management Plan (up-to-date or otherwise).
• 48% respondents have a formal Business Continuity Plan (up-to-date or otherwise).
• 61% of respondents with +250 employees have a Business Continuity Plan.

Strong indication of lack of tolerance to power disruption.
Business Case: Unique High Rise Conditions for Vulnerability

- Large population in high rises
- Older buildings no A/C
- High dependency on electricity:
  - Water supply & elevators
Map of Toronto highlighting percentage of families in high rise apartments that are low income by postal code -
Map of Toronto highlighting power disruption by postal code
Map Overlay – Electrical System Vulnerability and Potential Human Vulnerability
Key Vulnerability – Frequent Power Disruption & Low Income Residents in Apartments

More specific risk information for the electrical regulator
Risk Assessment

A pilot “Climate Change Engineering Vulnerability Assessment” of a small sample of Toronto Hydro infrastructure completed using protocol developed by Engineers Canada.

- Involved Reps form Field, Control Room, Engineering & Planning.
- Discussions on weather impact based on design criteria, equipment condition, industry standards, protection systems etc.
- Impact and reactions of components and system.
- 2nd Phase in progress examine future weather risks.

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http://www.pievc.ca/e/casedocs/TorontoHydro/Toronto_Hydro_PIEVC_Pilot_Case_Study_Final_Report.pdf
WeatherWise: Lessons Learned

• Education, then customer voting (pressure) worked!

• Multi-sectoral co-ordination is time consuming

• Private sector helped sustain momentum

• Need for ongoing staff facilitation
Lessons from 2013 storms

• We were right...electrical system very vulnerable!
• Need to enhance communication systems
• Need to track vulnerable people better
• Trees on wires and flooding key vulnerability
• Demand due to A/C will be future concern
NEXT STEPS ......

WeatherWise Partnership Forum Nov. 2012:
Selection of priority sectors

• 73 Votes, 66 organizations represented
GIS Based Risk Assessment:

Ontario Food Terminal
Towards a culture of climate change risk management

Balancing priorities:

- Public & employee safety
- Engagement of interdependent sectors & public
- Fiscal responsibility
- Liabilities
- Address current & future needs
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