

Putting Brains Behind the Operation

Why Transformer Monitors are part of Toronto Hydro's 21st Century Distribution Grid

CASE STUDY Toronto Hydro

Grid Modernization Technology:

Transformer Monitors

The transformer monitor solution consists of a metering component, data collector and an analytics/visualization application.

Installation to Date:

Approximately 5,600 Elster transformer monitors deployed since 2009

How it Works:

- Similar to residential smart meters, transformer monitors are installed on single-phase overhead transformers with a capacity range of 50 kVA 167 kVA
- The devices measure near real-time loading on distribution transformers, provide outage monitoring and provide useful information for day-to-day operations



Toronto Hydro's distribution grid intelligence quotient is in the midst of a major boost. Like many electrical utilities across the globe, the company is working to develop a smart, continually evolving electricity network to meet the needs of its modern customers. The Asset Management division of the utility has been exploring the benefits of transformer monitors since 2009 as part of an overall grid modernization strategy.

A Crystal Ball, of Sorts

Toronto Hydro is using transformer monitor technology to unlock new information about transformer load management. The devices let the utility see which transformers are overloaded, and calculate where equipment has reached the end of its lifespan. In turn, this allows Toronto Hydro to upgrade equipment before it fails and helps to improve service reliability.

Transformer Monitors Lead to Fewer Outages of Less Duration

A typical outage period for reactive overhead transformer replacement work is approximately six to 10 hours. Thanks to the transformer monitor deployment, in the summer of 2011, Toronto Hydro identified 12 overloaded transformers on the brink of collapse and performed proactive upgrades and redistributed secondary connections to alleviate overloading. Through this work alone, the utility saved approximately 100,000 outage minutes.





As we work to renew our electricity grid, we're incorporating smarter technologies to meet the needs of today's customers. Transformer monitors allow Toronto Hydro to measure the behaviour and performance of the network and are ultimately enhancing our service reliability.



- **Richard Ford**, Manager, Grid Solutions, Toronto Hydro



About Toronto Hydro

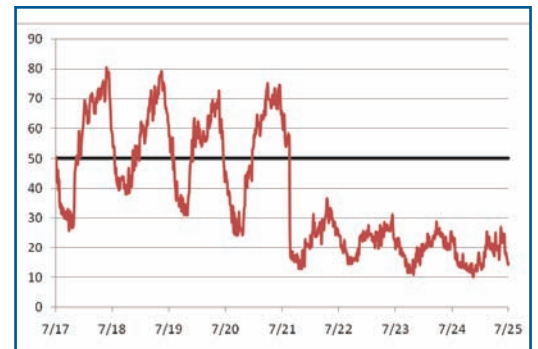
Established in 1911, Toronto Hydro is the largest municipal electricity distribution company in Canada. The utility serves approximately 705,000 customers in the City of Toronto and distributes approximately 19 per cent of the electricity consumed in the province of Ontario.

Toronto Hydro's distribution system is serviced from:

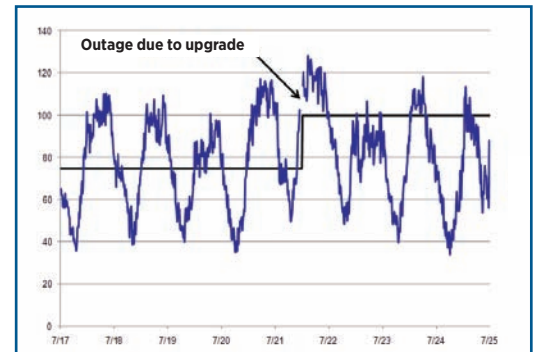
- 35 terminal stations
- 24 primary switches
- 60,500 distribution transformers
- 170 in-service municipal substations
- Over 15,000 kilometres of overhead wires supported by 139,900 poles and over 10,400 kilometres of underground wires
- 1 Control Centre

Lightening the Load on Overburdened Transformers

Transformer monitor analytics helped Toronto Hydro identify the overloaded transformer depicted in the graph (right). When the utility learned that it was operating at almost 80 per cent overcapacity, Toronto Hydro took action and installed a new transformer on the same secondary bus. This reduced the load on the original transformer by almost 50 per cent.



Here's another example of how transformer monitoring technology was useful in avoiding an outage. This graph (right) shows a transformer operating beyond its capacity. Toronto Hydro upgraded it from 75 kVA to 100 kVA before it reached its peak demand at 128 kVA – which would have been 171 per cent of its capacity.



Transformer Monitor Deployment Results to Date

- Through this program, Toronto Hydro has identified overloaded transformers prior to failure
- The utility has performed proactive work on 12 transformers, improving load capacity
- Saved approximately 100,000 outage minutes, improving service reliability and customer experience

Questions? Comments?

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