

April 7, 2015
Public Utilities Board
Attention C. Blundon

Re: Inquiry into the 2013 and 2014 Power Outages

1. Your inquiry involves both the 2013 and 2014 outages. Yet no reference is made by Nfld Power's or Nfld Hydro's Presentation dated March 30, 2015 regarding the 2013 outage, as they reference only the 2014 outage.

Liberty Consulting concluded that the 2013 outage cause was not weather related, and the PUB seems to have accepted this.

I respectfully submit that Liberty they are in error in this, in an otherwise excellent report.

Investigating outages is a normal and regular activity for power companies, and seldom requires an external investigation. In my capacity as an electrical engineer with Nfld and Labrador hydro in the 1970s, I was engaged in such investigations as a Controls and Protection engineer. There are many temporary interruptions of power, others are long lasting. Weather related events are often caused by lightning, salt contamination flashovers, as well as damage from high wind or ice loading. Events that happen, many in less than a second, are recorded and reviewed and protective action taken. An outside consultant, such as Liberty, would review such event schedules, provided by the power company, as part of their review. Such events are parts of the record with the PUB, filed by Nfld Hydro, forming part of the record you have and which is online.

The events for 2013 clearly records that there were numerous "flashovers" at and near the Holyrood Station and power plant at the time of the 2013 outage.

A flashover is an electrical short circuit, caused by an accumulation of salt spray unto the insulators, from the ocean, and occurring under ideal humidity conditions. This provides a conductive path for the electricity to short circuit. Often this is a temporary situation that is detected and the breaker trips and quickly resets, and avoids an outage. If the conditions persists, an outage results.

The events of 2013 were unusual and severe for flashovers, and long lasting. These are weather related events. And other equipment problems then also occurred, which took out all 3 large generators at Holyrood. This put Holyrood into a "black start " situation. It needed another source of power to start the large generators. This is usually done at Holyrood by the small gas turbine of some 15 megawatts. However this unit was obsolete, unsafe and unavailable for a year or more prior.

Hydro had risked that in such a black start event, the Holyrood plant could be re-started from the grid power supply: that is, from remote hydro generation or the gas turbine generator at Hardwoods, near St. John's. To do this , you would back-feed Holyrood from these sources to get Holyrood generators back on line. This assumes the transmission lines in and out of Holyrood are in service, as well as the busses at the Holyrood Station.

With no gas turbine at Holyrood, the risk was taken by Nfld Hydro that an event would not occur such that the Holyrood plant in a black start mode while at the same time the incoming and outgoing transmission lines and busses would be out of service. Such an event would prevent the startup of the Holyrood units.

However, such a weather event did indeed happen. Salt contamination was severe, prolonged, and occurred at and beyond the Holyrood Station.

This should not be surprising, although relatively rare.

Salt spray is known to get deposited 25 kilometers or more inland from the ocean under high winds. Deposits of salt get lighter the further distance from the sea. Holyrood Station is right adjacent to the ocean, and flashovers there are fairly common.

On this occasion, flashovers occurred, not only on the 230kv breakers, but also on the station busses, and transmission lines. Attempts to re-energize the station by the remote power sources were therefore unsuccessful for hours due to more flashovers on the transmission lines or bus. Mother Nature usually solves this problem in a short time frame, to wash the salt off, but in this instance it took more than 5 hours.

That the power outages spread to remote areas and other generators through "generation and transmission equipment issues" as cited by Liberty, is, I submit, secondary, to the fact that many flashovers were the cause of the outage and long delay in getting Holyrood back in service. The events as recorded show that the first flashover was isolated and did not trigger an outage, but more came and continued over a long time frame at various locations in and around the Holyrood station.

A circuit breaker got damaged, and a later report by AMEC also cited this outage was caused by flashovers. Furthermore AMEC states that such an event can be expected once in 10 years. But that it may occur again this year or next.

Hydro plans to replace the 230 Kv circuit breakers at Holyrood with units that will give some additional protection against flashovers. However, other equipment like transformers, insulators on the busses and transmission lines pose risks from flashovers.

It seems peculiar that Hydro did not challenge Liberty's assertion that weather was not the cause of the 2013 event, given Hydro's own record of the event. I can only speculate that Nfld Hydro do not wish to call attention to the risks of flashovers by salt contamination in general, as all lines near the coast are at higher risk from this. In particular, I recall that from my experience in the 1970s that lines on the Great Northern Peninsula had higher incidents of outages from such flashovers. I was surprised, and felt it was inaccurate, to see Hydro claim that the Muskrat Falls line would be not subject to salt contamination, saying salt was "not a contaminant". For the same voltage, flashover is at higher risk for a DC line than an AC line, as AC voltage cycles from zero to peak while DC presents a constant voltage.

Given the events of the flashovers in the 2013 outage, I cannot see how an Inquiry into the power outage can ignore these facts. These flashovers knocked out 495 megawatts of Holyrood power. With the new 123 MW peak capacity gas turbine now in operation there, a similar event could knock out over 600 MW of capacity. Surely this should be a reliability concern, and is indeed weather related, and in this instance, should not be blamed entirely on equipment, transmission, or maintenance causes.

2. Liberty recommends that the our power companies be transparent with the ratepayers, their customers. I submit that the power companies are not transparent with respect to energy savings, efficiency and demand reductions issues. Take Charge is a joint program by both Nfld Power and Nfld Hydro that promotes energy savings.

With recent power outages, rotating outages has been used to curtail power demand to keep the power system from collapse. Liberty noted that this method is seldom used in North America, but is more

often seen in third world countries. Rotating outages are employed here as a method in association with a call for customers to reduce and conserve energy to reduce peak demand.

Liberty reported that very little demand reduction resulted from last year's attempt to conserve energy. Calculations show that, when averaged over the total number of customers, a mere 34 watts per customer resulted, equal to the energy of a small light bulb. Yet a reduction of 2 or 3 degrees in temperature should, in theory, reduce the demand by about 500 watts per house. The difference is explained in part due to the fact that houses have about 50 percent more heater capacity than required, and normally use just enough to meet the heating load. When the temperature is set back, a reduction should occur. But at the same time other houses are disconnected by the rotating outage, the temperature drops, and when re-connected, the heaters are now fully on, some 50 percent more than the original heating load. The result is that little reduction occurs overall.

Also more efficient lights, refrigerators, computers, TVs etc are promoted as efficient savers of electricity, and one would expect this to reduce demand at peak loads. Lights are promoted as savings 75 percent, fridges and TV as saving 50 percent. However, in reality, all these items are mini heaters and contribute to the heating load in a house. When lights, fridges and TVs use less electricity, the baseboard heaters must use more to compensate. So there is no saving on the power bill, except in July and August month when no heating is needed.

In a warm climate, not needing heat, these lights etc will save energy year round, but not in Newfoundland and Labrador. This fact is well known by the power companies. It is called an interactive effect. What is saved on one hand is most all lost on the other. Ratepayers and customers in general are not aware of this. This is not transparency.

The same goes for set back thermostats. Most of what is saved in the early hours of setback is lost in the morning warm up period. And in fact, it adds to the peak demand rather than reduces it. Typically a house that needs 4kw of heat when the heaters are on steady, it will see a temporary reduction to say 2.75 kw for some hours and then it pops up to about 7kw in the morning to reheat the house to normal temperature. And little energy is saved, perhaps 25 cents on a cold night. Rather than save significant energy, it merely delays energy use for a few hours, and then uses more energy doing catch-up. The result is that the power company sells lots of energy while giving the impression of significant saving to the customer.

Real energy savers save energy constantly, year round, rather than delay the energy use for a few hours. These real savers and demand reduction products are: insulation, energy star windows, and heatpumps in place of baseboard heaters.

For a typical house, a heatpump system, or the mini split can reduce demand for heating from 5kw to 2.5 kw on a cold night. At 34 watts per house reduction from a call for energy saving during rotating outages, it takes 73 houses to save the same as a single house with a minisplit heatpump.

Our Consumer advocate has asked if we could ramp up our CDM (Conservation Demand Management). Liberty has called for new demand reduction programs to be in place by September, to help avoid rotating outages. Liberty has also called for transparency in such programs, including cost saving that occurs on the system when customer demand is reduced.

But rather than transparency in energy savings, efficiency and demand reduction, I submit that our power companies continue their old ways: promoting of things that produce no meaningful savings or demand reduction, and a desire to reduce those things that do work, like insulation, and energy star

windows. And also a silence by the power companies on the benefits and cost effectiveness of efficient heating with heatpumps.

I submit we are paying the price , and will pay a higher price going forward, by the delay in achieving meaningful demand reduction through energy efficiency means. I call on the PUB and the Consumer Advocate to insist on transparency.

Winston Adams