

Assessing the Fire Safety of Smart Meter Installations in British Columbia

Revisiting Residential Structure Fires in BC between July 2010 and June 2014



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Introduction and Purpose of Research

In June of 2011, BC Hydro commenced implementation of its Smart Metering Program, which involved converting every residential property in BC from legacy metering to wireless technology smart meters. This Smart Metering Program involves replacing existing electrical meters that are obsolete, with a comprehensive wireless smart metering system. As of August 2014 an estimated 1.881million smart meters have been installed, representing approximately 99% of the total 1.9 million smart meters that BC Hydro expects to install as a foundation to its Smart Metering initiative.

This development in BC mirrors similar activity in other areas, with a general shift by utilities companies from around the world towards upgrading their electricity systems and adopting smart meter technology. It is predicted that by 2015, 250 million smart meters will be installed worldwide [1, citing research undertaken by Pike Research, November 2009].

It is anticipated that BC Hydro's Smart Metering Program will modernize the electricity grid and pay for itself through reduced theft of electricity, energy savings, and operating efficiencies [1]. Electricity theft is an increasing problem in BC and can result in structure fires due to tampering with household wiring and with electricity grid infrastructure. Smart meter installation provides an opportunity to identify and address safety issues such as an overloaded service and electrical bypasses. It is expected that electricity-related fires, including those due to marijuana grow operations, may decline with the installation of the smart metering system in BC.

A range of issues continue to be publicly discussed with respect to smart meters, the most recent of which has drawn links between these new apparatus and residential structure fires. As a result, two specific questions are again asked and these are the focus of this report:

1. Has there been an increase in the frequency of residential structure fires in BC, specifically caused by electricity and that may be associated with the deployment of smart meters?
2. Has there been an increase in the frequency of residential fires in the province in the presence of marijuana grow operations?

In order to respond to these two questions, the scope of this research involved:

- Undertaking an analysis of relevant, available documentation including BC Hydro's smart metering and Infrastructure Program Business Case[1], and the University of the Fraser Valley (UFV) Research Note entitled, "The increasing Problem of Electrical Consumption in Indoor Marihuana Grow Operations in British Columbia"[2].
- Analyzing the Office of the Fire Commissioner's fire incident reporting data that covers a four year period from July 2010 to June 2014: providing a pre and post deployment analysis of the impact of smart meters on residential structure fires.

Analysis

An initial dataset examined by the author in August 2012 contained 12,425 fires that had been reported to the BC Office of the Fire Commissioner and had occurred in BC between July 2010 and June 2012(inclusive). Of these, 3,946 (31.8 %) were residential structure fires. In August of 2014, the initial dataset for July 2010 to June 2012 was revisited, capturing an additional 1,087 fires previously not reported at the time of the initial review. An additional dataset spanning July 2012 to June 2014 was extracted from the BC Office of the Fire Commissioner database, to provide a cumulative updated review from pre-meter 2011 data to the most recent post-meter 2014 data. This subsequent review expands the total number of fires to 25,889 of which 7,899 (30.5%) were residential structure fires. Table 1 demonstrates the reporting areas within BC that provided details about these residential structure fires, separated into two groups: pre-meters (which included fires that occurred between July 2010 and June 2011), and post-meters (2012: July 2011-June 2012, 2013: July 2012-June 2013 fires and 2014: July 2013-June 2014 fires). For the purposes of this analysis, these two time periods have been compared to examine the broad impact of smart meters for fires. However, the author is aware that smart meters were not present in all residences from the start of the post-meter time period. However we can now assume smart meters are present in nearly all British Columbia homes.

TABLE 1. FREQUENCY OF FIRES BY REPORTING AREA FOR THE PRE-METER AND POST-METER TIME PERIODS – BC DATA, JULY 2010 TO JUNE 2014

Frequency of Fires By Reporting Area - BCData for Period July 1st to June 30th	Pre-meters	Post-meters	Post-meters	Post-meters	Post-meters	Post vs Pre-Meter
	2011	2012	2013	2014	2013 to 2014 Change	Pre-meter to 2014 Change
Municipal areas	1,741	1,891	1,922	1,720	-10.7%	-1.2%
Non-municipal - fire protection	122	120	101	90	-9.2%	-26.2%
Non-municipal - no fire protection	29	24	30	19	-45.8%	-34.5%
First Nations Band area	25	25	25	15	-40.0%	-40.0%
Total	1,917	2,060	2,078	1,844	-11.4%	-3.8%

The following analysis examines the frequency of fires in the pre- and post-meter groups, with a view to answering two main research questions:

1. What is the frequency of fires with respect to electricity?
2. What is the frequency of fires with respect to illegal activity associated with marijuana grow operations?

Frequency of Fires with Respect to Electricity

As can be seen from examination of Table 2, in both periods of interest (pre- and post-meters) residential structure fires made up approximately one-third of the total fires reported during that time. With respect to the question about the impact of smart meters on the frequency of residential structure fires, the following points can be made about the main findings displayed in the table:

- There has been a continued decline in electricity-related residential structure fires reported where the form of heat was electrical (11.6% decline) and where electrical distribution equipment was the igniting object (7.8% decline).
- On a more specific level, electrical distribution equipment generally made up a very small percentage of the overall residential structure fires in both groups (pre-meters:0.4% and post-meters: 2012 – 0.1%, 2013 – 0.4%, 2014 – 0.4%). It is likely that these types of fires are close in proximity to the meter base, which is directly relevant to the smart meters.
- To further examine any potential negative impact of the smart meters for fire safety the frequency of fires that occurred on an exterior wall where the igniting object was the electrical panel board/switchboard was examined. Only 1 of these incidents was recorded, which took place in the pre-meter time interval.

TABLE 2. ELECTRICITY-RELATED FIRES – BC DATA, JULY 2010 TO JUNE 2014

Electricity Related Fires - BCData for Period July 1st to June 30th	Pre-meters	Post-meters	Post-meters	Post-meters	Post-meters	Post vs Pre-Meter
	2011	2012	2013	2014	2013 to 2014 Change	Pre-meter to 2014 Change
Total Residential fires	1,917	2,060	2,078	1,844	-11.4%	-3.8%
% residential fires of total fires	30.1%	33.7%	31.0%	31.0%		
Form of heat is spark electrical (includes arc discharge)	172	170	170	152	-10.6%	-11.6%
% residential fires were form of heat was a spark, electrical	8.6%	7.9%	8.3%	8.3%		
Electrical distribution equipment as igniting object	128	134	128	118	-7.5%	-7.8%
% residential where electrical igniting object	6.6%	6.6%	6.2%	6.2%		
Electrical distribution equipment - panel board, switchboard (includes fuse, circuit breakers)	7	2	8	6	-100.0%	-14.3%
% residential where electrical igniting object was panel board, switchboard (includes fuse, circuit breakers)	0.4%	0.1%	0.4%	0.4%		
Fires where Fire Origin Area was an exterior wall and the igniting object was an electrical panel board, switchboard	1	0	0	0	0.0%	-100.0%
% residential where origin area was an exterior wall and igniting object was an electrical panel/switchboard	0.1%	0.0%	0.0%	0.0%		

Frequency of Fires with Respect to Illegal Activity Associated with Marijuana Grow Operations

With respect to the question about the frequency of residential structure fires related to illegal activity associated with marijuana grow operations; the following main findings capture the results displayed in Table 3:¹

- Fires that were recorded as having been caused by an act or omission associated with illegal operations declined by 67.9% over the period of interest.
- Fires where the igniting object was an electrical bypass (typically associated with theft of hydro associated with production of marijuana) reduced by 62.5%.
- Fires where the igniting object was classified as a grow lamp and the activity was illegal declined from five fires in 2011 to no fires reported for the 2014 period.
- Considering the limited number of fires caused by grow lamps where the activity was legal the data has been very stable (pre-meters: 2011 - 1 fire and post-meters: 2012 – 2 fires, 2013 – 0 fires fire, 2014 – 1 fire).

TABLE 3. ILLEGAL ACTIVITY-RELATED (MARIJUANA GROW OPERATION) FIRES – BC DATA, JULY 2010 TO JUNE 2014

Illegal Activity-related (Marijuana Grow Operations) Fires - BC Data for Period July 1st to June 30th	Pre-meters	Post-meters	Post-meters	Post-meters	Post-meters	Post vs Pre-Meter
	2011	2012	2013	2014	2013 to 2014 Change	Pre-meter to 2014 Change
Total Residential fires	1,917	2,060	2,078	1,844	-11.4%	-3.8%
Act/Omission illegal operations/activities (e.g., grow ops, meth labs)	28	19	14	9	-26.3%	-67.9%
% residential fires where act/omission was illegal operations/activities (e.g., grow ops, meth labs)	1.4%	1.0%	0.8%	0.5%		
Igniting object was electrical distribution equipment - electrical bypass (illegal operations)	8	6	3	3	0.0%	-62.5%
% residential where igniting object was electrical bypasses (illegal operations)	0.4%	0.3%	0.2%	0.2%		
Igniting object was grow lamps/lights (illegal)	5	1	2	0	-200.0%	-100.0%
% residential where igniting object was grow lamps/lights (illegal)	0.3%	0.1%	0.1%	0.0%		
Igniting object was grow lamps/lights (legal)	1	2	0	1	50.0%	0.0%
% residential where igniting object was grow lamps/lights (legal)	0.1%	0.1%	0.0%	0.1%		

¹ Some degree of caution is required when interpreting these results. The author is not confident that fires caused by this type of illegal activity are always reported consistently. Having said this, these findings are the best current estimate available.

Locating Electrical Fires within the Broader Context for BC

To put these incidents within the broader context of residential fire activity in BC over the period of interest, it is important to examine the relative frequency of cooking related fires and fires that resulted from smoker's material, as displayed in Table 4. As can be seen, fires caused by electricity are relatively infrequent compared to those resulting from commonplace activities such as cooking (approximately 29% of fires in 2011 and 2012; and 34.5% of fires in 2013 and 2014) and smoking (approximately 17% of fires for pre-meters and post-meters).

TABLE 4. FREQUENCY OF COOKING FIRES AND SMOKER'S MATERIAL FIRES – BC DATA, JULY 2010 TO JUNE 2014

Frequency of Cooking Fires and Smoker's Material Fires - BC Data for Period July 1st to June 30th	Pre-meters	Post-meters	Post-meters	Post-meters	Post-meters	Post vs Pre-Meter
	2011	2012	2013	2014	2013 to 2014 Change	Pre-meter to 2014 Change
Total Residential fires	1,917	2,060	2,078	1,844	-11.4%	-3.8%
Cooking equipment fires	560	592	710	626	-14.2%	11.8%
% residential where cooking equipment was igniting object	28.8%	28.6%	34.5%	34.5%		
Smoker's material fires	294	338	350	318	-9.5%	8.2%
% residential where smoker's material was igniting object	16.1%	17.5%	16.8%	16.8%		

Conclusions

In conclusion, with respect to the two main research questions of interest, the following can be summarized:

- Available data is a strong reference for a continued decreased frequency of residential structure fires associated with electricity since July 2010.
- Available data does not indicate that there has been an increased frequency of fires caused by electricity associated with illegal activity since July 2010.
- Both of these findings need to be interpreted with some caution, there are a number of events that occur in these categories. However, having drawn attention to this issue, it should also be noted that the analysis presented here includes all fires reported for the whole of BC over a significant time period where the results continue to assert the installation of Smart Meters have not resulted in adverse fire safety outcomes.

A final point worth emphasizing relates to the relative frequency of fires caused by electricity when compared to those that result from cooking and smoking. Without wishing to minimise any fire event, it is important to maintain perspective that these every day activities result in many more fires for BC than those caused by electricity.

References

- [1] BC Hydro, *Smart metering and infrastructure program business case*, 2012, BC Hydro: Vancouver, BC.
- [2] J. Diplock and D. Plecas, *The increasing problem of electrical consumption in indoor marijuana grow operations in British Columbia*, 2011, Centre for Public Safety and Criminal Justice Reserach, School of Criminology and Criminal Justice, University of the Fraser Valley: Abbotsford. p. 8.

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