Assessing the Safety of Smart Meter Installations in British Columbia

Analysis of Residential Structure Fires in BC between July 2010 and June 2012

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The Purpose of this Research

The purpose of this report is to analyze key questions raised in the deployment of smart meters by BC Hydro in the Province of British Columbia (BC). The deployment of smart meters commenced in mid-2011 and at the time of producing this report it is estimated approximately 1.5 million smart meters have been installed: approximately 83% of the total that will be installed upon completion of this exercise. A range of issues have been 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 have emerged:

1. Has there been a noticeable change in the frequency of residential structure fires caused by electricity in the province that may be associated with the deployment of smart meters?

2. Has there been a noticeable change in the frequency of residential fires in the province in the presence of a marijuana grow operation?

In order to respond to these two questions, the scope of this research is as follows:

- 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 two year period from July 2010 to June 2012: providing a one year pre- and post-deployment for analysis of the impact of smart meters on residential structure fires.

Introduction

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 an almost 1.9 million existing electrical meters that are now becoming obsolete, with a comprehensive wireless smart metering system. This process is scheduled to be completed by the end of 2012.

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.

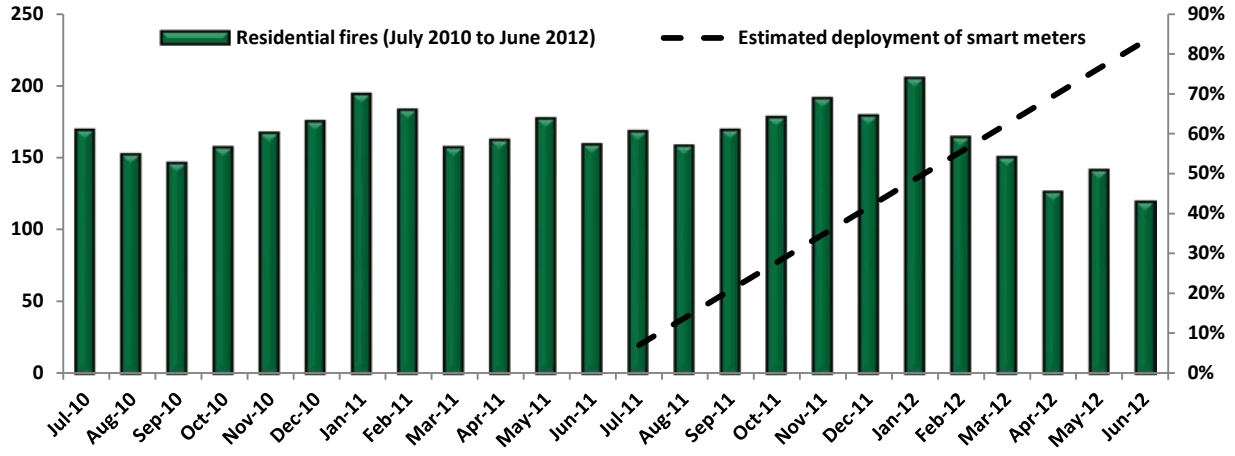
Analysis

The initial dataset that was examined 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. 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 (fires that occurred between July 2011 and June 2012). 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 authors realise that smart meters were not present in all residences from the start of the post-meter time period. The subsequent analysis should be considered with the graphical representation depicted in Figure 1 in mind. This demonstrates the estimated percentage of the province's residences that had smart meters installed over time, along with the monthly fire reports that have been examined.

TABLE 1. FREQUENCY OF FIRES BY REPORTING AREA FOR THE PRE-METER AND POST-METER TIME PERIODS – BC DATA, JULY 2010 TO JUNE 2012

Reporting Area	Pre-meters (July 2010 to June 2011)	Post-meters (July 2011 to June 2012)
Municipal areas	1,817	1,793
Non-municipal - fire protection	126	107
Non-municipal - no fire protection	30	23
First Nations Band area	25	25
Total	**1,998**	**1,948**

FIGURE 1. FREQUENCY OF RESIDENTIAL STRUCTURE FIRES IN BC PER MONTH (JULY 2010 TO JUNE 2012) WITH ESTIMATED DEPLOYMENT OF SMART METERS (% OF ALL RESIDENTIAL PROPERTIES IN BC)



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 summarise the main findings displayed in the table:

- There has been a general decline in electricity-related residential structure fires reported where the form of heat was electrical (9.9% decline) and where electrical distribution equipment was the igniting object (2.3% 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 (0.4% and 0.1% in the pre- and post-meters, respectively). It is likely that these types of fires are most closely related to the meter base, which is directly relevant to the smart meters. Interestingly, in conjunction with the deployment program for smart meters, there has been a corresponding reduction in the frequency of these types of fires.

- 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. ELECTRITY-RELATED FIRES – BC DATA, JULY 2010 TO JUNE 2012

	Pre-meters (July 2010 to June 2011)	Post-meters (July 2011 to June 2012)	% Change
Total Residential fires	1,998	1,948	-2.5%
% residential	30.1%	33.7%	12.2%
Form of heat is spark electrical (includes arc discharge)	171	154	-9.9%
% residential fires were form of heat was a spark, electrical	8.6%	7.9%	-7.6%
Electrical distribution equipment as igniting object	131	128	-2.3%
% residential where electrical igniting object	6.6%	6.6%	0.2%
Electrical distribution equipment - panel board, switchboard (includes fuse, circuit breakers)	7	2	-71.4%
% residential where electrical igniting object was panel board, switchboard (includes fuse, circuit breakers)	0.4%	0.1%	-70.7%
Fires where fire origin area was an exterior wall and the igniting object was an electrical panel board, switchboard	1	0	-100.0%
% residential where origin area was an exterior wall and igniting object was an electrical panel/switchboard	0.1%	0.0%	-100.0%

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 35.7% over the period of interest.
- Fires where the igniting object was electrical a bypass (typically associated with theft of hydro associated with production of marijuana) reduced by 25%.
- There were no fires recorded in the post-meter time period where the igniting object was classified as a grow lamp and the activity was illegal. This declined from 5 such fires in the pre-meter time period.
- The only increase in any activity associated with electricity and marijuana was for fires caused by grow lamps where the activity was legal (an increase from 1 event in the pre- period to 2 in the post-period).

TABLE 3. ILLEGAL ACTIVITY-RELATED (MARIJUANA GROW OPERATION) FIRES – BC DATA, JULY 2010 TO JUNE 2012

	Pre-meters (July 2010 to June 2011)	Post-meters (July 2011 to June 2012)	% Change
Total residential fires	1,998	1,948	-2.5%
% residential	30.1%	33.7%	12.2%
Act/omission illegal operations/activities (e.g., grow ops, meth labs)	28	18	-35.7%
% residential fires where act/omission was illegal operations/activities (e.g., grow ops, meth labs)	1.4%	0.9%	-34.1%
Igniting object was electrical distribution equipment - electrical bypass (illegal operations)	8	6	-25.0%
% residential where igniting object was electrical bypasses (illegal operations)	0.4%	0.3%	-23.1%
Igniting object was grow lamps/lights (illegal)	5	0	-100.0%
% residential where igniting object was grow lamps/lights (illegal)	0.3%	0.0%	-100.0%
Igniting object was grow lamps/lights (legal)	1	2	100.0%
% residential where igniting object was grow lamps/lights (legal)	0.1%	0.1%	105.1%

[1] Some degree of caution is required when interpreting these results. The authors are 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 both time periods) and smoking (approximately 17% of fires in both time periods).

TABLE 4. FREQUENCY OF COOKING FIRES AND SMOKER'S MATERIAL FIRES – BC DATA, JULY 2010 TO JUNE 2012

	Pre-meters (July 2010 to June 2011)	Post-meters (July 2011 to June 2012)	% Change
Total residential fires	1,998	1,948	-2.5%
% residential (as a function of all fires reported)	30.1%	33.7%	12.2%
Cooking equipment fires	575	557	-3.1%
% residential where cooking equipment was igniting object	28.8%	28.6%	-0.6%
Smoker's material fires	321	340	5.9%
% residential where smoker's material was igniting object	16.1%	17.5%	8.6%

Conclusions

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

- Available data does not indicate that there has been an increased frequency of residential structure fires associated with electricity since July 2010. If anything, there is a slight decline.

- Available data does not indicate that there has been an increased frequency of fires caused by electricity associated with illegal activity since July 2010. If anything, there is a slight decline.

Both of these findings need to be interpreted with caution, given the very small numbers 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 the time period of interest. As a result, these are the best estimates available.

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 marihuana 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.

Author Biographical Information

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