

# Assessing the Safety of Smart Meter Installations in British Columbia: Analysis of Residential Structure Fires in BC Between July 2010 and June 2015



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## Introduction and Purpose of Research

In June 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 now becoming obsolete, with a comprehensive wireless smart metering system. As of June 30, 2015, an estimated 1.921 million smart meters have been installed, leaving 4,200 smart meter exchanges remaining.

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 now estimated that 250 million smart meters are installed worldwide (Pike Research, 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 (BC Hydro, 2012). 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 now clear that electricity-related fires, including those due to marijuana grow operations, have declined with the installation of the smart metering system in BC.

Despite the predicted safety improvements resulting from the installation of the Smart Meters in B.C., while the installation program has been rolled out, 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 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 a marijuana grow operation?

In order to respond to these two questions, the scope of this research involved (1) undertaking an analysis of relevant, available documentation, including BC Hydro's smart metering and Infrastructure Program Business Case (BC Hydro, 2012), and the University of the Fraser Valley (UFV) Research Note entitled, "The increasing Problem of Electrical Consumption in Indoor Marijuana Grow Operations in British Columbia" (Diplock and Plecas, 2011), and (2) analyzing the Office of the Fire Commissioner's fire incident reporting data that covers a five year period from July 2010 to June 2015 and providing a pre- and post-deployment analysis of the impact of smart meters on residential structure fires.

## Analysis

This issue has been reported previously by the authors in August 2012 indicating that 12,425 fires 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 2015, 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. At the same time, an additional dataset spanning July 2012 to June 2015 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 available at that time.

In August 2015, this dataset was updated and expanded to June 2015. This subsequent review expands the total number of fires to 32,886 of which 9,944 (30.2%) 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. For the purposes of this analysis, these two time periods were compared to examine the broad impact of smart meters for fires. It should be noted that this is an approximation because the smart meters were not present in all residences from the start of the post-meter time period.

**TABLE 1: FREQUENCY OF FIRES BY REPORTING AREA FOR THE PRE-METER AND POST-METER TIME PERIODS – BC DATA, JULY 2010 TO JUNE 2015**

| Frequency of Fires By Reporting Area - BC<br>Data for Period July 1st to June 30th | Pre-<br>meters | Post-<br>meters | Post-<br>meters | Post-<br>meters | Post-<br>meters | Post-<br>meters           | Post vs<br>Pre-<br>Meter           |
|--|----------------|-----------------|-----------------|-----------------|-----------------|---------------------------|------------------------------------|
|  | 2011           | 2012            | 2013            | 2014            | 2015            | 2014 to<br>2015<br>Change | Pre-<br>meter to<br>2015<br>Change |
| <b>Municipal Areas</b>   | 1,742          | 1,891           | 1,934           | 1,990           | 1,641           | -17.5%                    | -5.8%                              |
| <b>Non-Municipal - Fire Protection</b>   | 122            | 120             | 102             | 104             | 80              | -23.1%                    | -34.4%                             |
| <b>Non-Municipal - No Fire Protection</b>  | 29             | 24              | 30              | 20              | 10              | -50.0%                    | -65.5%                             |
| <b>First Nations Band Area</b>   | 25             | 25              | 25              | 17              | 13              | -23.5%                    | -48.0%                             |
| <b>TOTAL</b>   | <b>1,918</b>   | <b>2,060</b>    | <b>2,091</b>    | <b>2,131</b>    | <b>1,744</b>    | <b>-18.2%</b>             | <b>-9.1%</b>                       |

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

1. What was the frequency of fires with respect to electricity?
2. What was 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 Table 2, in both periods of interest residential structure fires made up approximately one-third of the total fires reported during that time. With respect to the question of

the impact of smart meters on the frequency of residential structure fires, there was a general decline in electricity-related residential structure fires reported where the form of heat was electrical (8.1% decline) and where electrical distribution equipment was the igniting object (15.6% decline). Moreover, 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 – 0.3%, 2015 – 0.3%). It is likely that these types of fires are most closely related 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. At the time of the 2014 August review and data extraction, only one incident was recorded in this category and was subsequently corrected after further review. Therefore, for the pre-meter and post-meter periods reviewed, the revised data shows that no fires occurred on an exterior wall where the igniting object was the electrical panel board/switchboard.

**TABLE 2: ELECTRICITY-RELATED FIRES – BC DATA, JULY 2010 TO JUNE 2015**

| Electricity Related Fires - BC Data for Period July 1st to June 30th  | Pre-meters | Post-meters | Post-meters | Post-meters | Post-meters | Post-meters         | Post vs Pre-Meter        |
|---|------------|-------------|-------------|-------------|-------------|---------------------|--------------------------|
|   | 2011       | 2012        | 2013        | 2014        | 2015        | 2014 to 2015 Change | Pre-meter to 2015 Change |
| <b>Total Residential fires</b>  | 1,918      | 2,060       | 2,091       | 2,131       | 1,744       | -18.2%              | -9.1%                    |
| <b>% residential</b>  | 28.4%      | 30.4%       | 31.0%       | 32.7%       | 28.5%       |                     |                          |
| <b>Form of heat is spark electrical (includes arc discharge)</b>  | 172        | 170         | 170         | 176         | 158         | -10.2%              | -8.1%                    |
| <b>% residential fires were form of heat was a spark, electrical</b>  | 9.0%       | 8.3%        | 8.1%        | 8.3%        | 9.1%        |                     |                          |
| <b>Electrical distribution equipment as igniting object</b>   | 128        | 134         | 130         | 138         | 108         | -21.7%              | -15.6%                   |
| <b>% residential where electrical igniting object</b>   | 6.7%       | 6.5%        | 6.2%        | 6.5%        | 6.2%        |                     |                          |
| <b>Electrical distribution equipment - panel board, switchboard (includes fuse, circuit breakers)</b>                       | 7          | 2           | 8           | 6           | 5           | -16.7%              | -28.6%                   |
| <b>% residential where electrical igniting object was panel board, switchboard (includes fuse, circuit breakers)</b>        | 0.4%       | 0.1%        | 0.4%        | 0.3%        | 0.3%        |                     |                          |
| <b>Fires where Fire Origin Area was an exterior wall and the igniting object was an electrical panel board, switchboard</b> | 0          | 0           | 0           | 0           | 0           | 0.0%                | 0.0%                     |
| <b>% residential where origin area was an exterior wall and igniting object was an electrical panel/switchboard</b>         | 0.0%       | 0.0%        | 0.0%        | 0.0%        | 0.0%        |                     |                          |

## FREQUENCY OF FIRES WITH RESPECT TO ILLEGAL ACTIVITY ASSOCIATED WITH MARIJUANA GROW OPERATIONS

With respect to the question of the frequency of residential structure fires related to illegal activity associated with marijuana grow operations<sup>1</sup>, fires that were recorded as having been caused by an act or omission associated with illegal operations declined by 75% over the period of interest (see Table 3). Moreover, fires where the igniting object was an electrical bypass, typically associated with theft of hydro associated with production of marijuana, reduced by 87.5%. In addition, 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 2015 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, 2014 - 1 fire, 2015 - 0 fires).

**TABLE 3. ILLEGAL ACTIVITY-RELATED (MARIJUANA GROW OPERATION) FIRES – BC DATA, JULY 2010 TO JUNE 2015**

| 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-meters         | Post vs Pre-Meter        |
|---|------------|-------------|-------------|-------------|-------------|---------------------|--------------------------|
|   | 2011       | 2012        | 2013        | 2014        | 2015        | 2014 to 2015 Change | Pre-meter to 2015 Change |
| <b>Total Residential fires</b>  | 1,918      | 2,060       | 2,091       | 2,131       | 1,744       | -18.2%              | -9.1%                    |
| <b>% residential</b>  | 28.4%      | 30.4%       | 31.0%       | 32.7%       | 28.5%       |                     |                          |
| <b>Act/Omission illegal operations/activities (e.g., grow ops, meth labs)</b>                               | 28         | 19          | 14          | 10          | 7           | -30.0%              | -75.0%                   |
| <b>% residential fires where act/omission was illegal operations/activities (e.g., grow ops, meth labs)</b> | 1.5%       | 0.9%        | 0.7%        | 0.5%        | 0.4%        |                     |                          |
| <b>Igniting object was electrical distribution equipment - electrical bypass (illegal operations)</b>       | 8          | 6           | 3           | 3           | 1           | -66.7%              | -87.5%                   |
| <b>% residential where igniting object was electrical bypasses (illegal operations)</b>                     | 0.4%       | 0.3%        | 0.1%        | 0.1%        | 0.1%        |                     |                          |
| <b>Igniting object was grow lamps/lights (illegal)</b>  | 5          | 1           | 2           | 0           | 0           | 0.0%                | -100.0%                  |
| <b>% residential where igniting object was grow lamps/lights (illegal)</b>                                  | 0.3%       | 0.0%        | 0.1%        | 0.0%        | 0.0%        |                     |                          |
| <b>Igniting object was grow lamps/lights (legal)</b>  | 1          | 2           | 0           | 1           | 0           | -100.0%             | -100.0%                  |
| <b>% residential where igniting object was grow lamps/lights (legal)</b>                                    | 0.1%       | 0.1%        | 0.0%        | 0.0%        | 0.0%        |                     |                          |

<sup>1</sup> 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 (see Table 4). Fires caused by electricity were relatively infrequent compared to those resulting from commonplace activities, such as cooking (approximately 29% of fires in 2011 and 2012; and 34.1% of fires in 2013, 33.5% of fire in 2014, and 35.1% of fires in 2015) 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 2015**

| 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-meters         | Post vs Pre-Meter        |
|---|------------|-------------|-------------|-------------|-------------|---------------------|--------------------------|
|   | 2011       | 2012        | 2013        | 2014        | 2015        | 2014 to 2015 Change | Pre-meter to 2015 Change |
| <b>Total Residential fires</b>  | 1,918      | 2,060       | 2,091       | 2,131       | 1,744       | -18.2%              | -9.1%                    |
| <b>% residential</b>  | 28.4%      | 30.4%       | 31.0%       | 32.7%       | 28.5%       |                     |                          |
| <b>Cooking equipment fires</b>  | 561        | 592         | 714         | 714         | 613         | -14.1%              | 9.3%                     |
| <b>% residential where cooking equipment was igniting object</b>                                  | 29.2%      | 28.7%       | 34.1%       | 33.5%       | 35.1%       |                     |                          |
| <b>Smoker's material fires</b>  | 294        | 338         | 353         | 373         | 292         | -21.7%              | -0.7%                    |
| <b>% residential where smoker's material was igniting object</b>                                  | 15.3%      | 16.4%       | 16.9%       | 17.5%       | 16.7%       |                     |                          |

## Conclusions

With respect to the two main research questions of interest, available data does not indicate that there has been an increased frequency of residential structure fires associated with electricity since July 2010. Declining trends are observed. Moreover, available data does not indicate that there has been an increased frequency of fires caused by electricity associated with illegal activity since July 2010. Declining trends are observed. However, given the very small numbers of events that occur in these categories, both of these findings need to be interpreted with caution. Still, having drawn attention to this issue, it should also be noted that the analysis presented here includes all fires reported for the entire province of British Columbia 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 recognize that these types of 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.

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