THE INCREASING PROBLEM OF ELECTRICAL CONSUMPTION IN INDOOR MARIHUANA GROW OPERATIONS IN BRITISH COLUMBIA

Jordan Diplock and Darryl Plecas

UNIVERSITY OF THE FRASER VALLEY

CENTRE FOR PUBLIC SAFETY & CRIMINAL JUSTICE RESEARCH

Introduction

The production of marihuana is a criminal activity that is very profitable for offenders and harmful to communities (Plecas, Diplock, & Garis, 2009). Growers in British Columbia commonly set up their operations indoors, in homes, and other buildings to avoid detection and to cultivate plants year round. Moreover, indoor buildings allow growers the opportunity to set up large and increasingly sophisticated operations that provide greater control over the growing process than can be generally maintained outdoors. These indoor operations are set up with the intention of making commercial profit, referred to as 'commercially viable growing operations' typically use large amounts of electricity to power high-wattage bulbs used for growing, along with other equipment. Along with the enormous consumption of electricity from the thousands of marihuana growing operations in British Columbia comes a myriad of serious problems that affect all British Columbians.

Indoor marihuana growing operations present a serious threat to public safety in the communities in which they operate.[1] For example, electrical hazards pose a very real threat to both occupants of the house and their neighbours. The changes made to houses and other buildings to supply power to marihuana growing operations require special training, certification, and inspection to ensure proper function and safety. However, in the pursuit of high profits, growers are more concerned with avoiding detection than preventing electrical hazards. Therefore, indoor marihuana growing operations, and the risks associated with any improper electrical work done to support them, are not subjected to the regulation and maintenance of safety standards that are in place to protect the public from serious risks.

Indoor growing operations consume much more electricity than normal residential homes, as they run multiple large wattage lights and other equipment (Garis and Plecas, 2007). This increased need for electric power means that the typical grow operation exhibits electrical hazards that can increase the risk of fire and other harms (Garis, 2008). The many electrical hazards combine to make indoor marihuana growing operations at least five times more likely to catch fire than normal residential homes (Plecas et al., 2009). The operations commonly lack electrical protection for fuses and circuit breakers, have improperly installed electrical systems, and show a failure to enclose electrical bypasses. Those within the grow site are at risk of shock and electrocution, as there is commonly water present (Garis, 2008). Not only are these hazards problematic for the growers and others inside the operations, but they also put unsuspecting neighbours, first responders, and utility workers at a great risk.

Recent trends suggest that these risks will get worse. Data from founded marihuana growing operations 'busted' by police in British Columbia in 2003 (Plecas, Malm, & Kinney, 2005) indicated that the average size of an indoor grow operation was 15.5 lights. At that time, growing operations had been increasing in size since 1997 (Plecas et al., 2005). The most current analysis of growing operations in at least several jurisdictions in the province indicated, where the use of electricity could be confirmed, that the average founded growing operation between 2006 and 2010 used approximately 27.5 lights (see Chaisson and Plecas, 2011a; Chaisson and Plecas, 2011b). The substantial increase in the number of lights since before 2006 is consistent with the finding that the average size of growing operations has more than doubled since the release of the Plecas et al. (2005) report (Chaisson and Plecas, 2011a; Chaisson and Plecas, 2011b). It is apparent that the trend towards using more electricity to produce larger crops continues. Growing operations are also more likely to use other

---

[1] For a detailed discussion of the numerous harms associated to marihuana growing operations see Plecas et al. (2009).

specialized equipment, such as dehumidifiers, machines to increase levels of CO2, and cooling units to reduce heat (Garis and Plecas, 2007). This equipment increases the energy requirements of the average grow operation. Furthermore, it is clear from the most current analysis of growing operations that a larger proportion of growers are stealing power (Chaisson and Plecas, 2011a; Chaisson and Plecas, 2011b). In fact, the proportion of growers stealing power appears to be approximately 52%, which is more than double the proportion reported by Plecas et al. (2005) based on information from 1997 to 2003.[2] This is not surprising given the increasing size of growing operations and the risks of detection that accompanies the increased energy consumption.

The purpose of this report is to provide further insight into the increasing problems associated with the electrical consumption of indoor marihuana growing operations in British Columbia. The problems are not just related to the well-documented dangers of electrical hazards within growing operations, but the increasing economic and societal threats. The analysis begins by using recent data from the number of founded marihuana growing operation police files from British Columbia to estimate the total number of operations currently operating across the province. This estimate will be based on existing estimation methods and information related to the proportion of indoor marihuana growing operations that steal electricity. Using the estimated number of growing operations in British Columbia, a discussion of the total electricity consumption of illegal marihuana growing operations will be provided, in addition to an analysis of the economic and societal problems caused. This report concludes by examining the need for action beyond current efforts, which may come in the form of new smart metering to curb the theft of electricity and the over-consumption of this limited resource for illicit purposes.

The Number of Indoor Marihuana Growing Operations in British Columbia

In a previous article (Plecas et al., 2009), the authors examined several methods for estimating the total number of marihuana growing operations in British Columbia. These estimates were based on data on the number of founded grow operations that came to the attention of police in 2003. Without current data, the final estimate was intentionally conservative, concluding that at least 10,000 growing operations were producing marihuana. This number was less than, but not substantially different, from estimates that arose from the adaptation of methods originally described by Easton (2004) and Bouchard (2007). With newly acquired recent police data, it is possible to provide a more accurate and up to date approximation of the number of growing operations in the province.

Information from police data indicated that there were 2,348 founded cases of marihuana production in British Columbia in 2010 (RCMP, 2011). Of these cases, approximately 90% were indoor operations; a total of 2,113 founded indoor grows. Without a range of detailed data on the offenders associated to these founded grows, using Bouchard's (2007) capture-recapture model was not possible. However, since the estimate produced

[2] This figure is nearly identical to the estimate provided to the authors from BC Hydro, which indicated that at least 51% of growing operations that came to the attention of their field inspectors were stealing electricity. It is also nearly identical to the estimate provided to the authors by individuals who have operated illegal grow operations and who have a broad knowledge of the industry. These individuals reported that generally "half" of all operators today steal electricity.

from Bouchard's model was very similar to that of Easton's (2004) model[3], Easton's economic model alone will be used to provide one of the alternative estimates of the number of marihuana growing operations in British Columbia. Based on an analysis of the costs and potential profit of operating a marihuana growing operation, Plecas et al. (2009) concluded that the value to cost ratio (1.5) used by Easton (2004) was consistent with their findings of an average of 1.41. Assuming that the risks, the costs of operating a growing operation, and the value of the product have not changed significantly since the analysis by Plecas et al. (2009), Easton's formula can also be used to estimate the number of active grow operations in the province in 2010. Changing only the number of founded indoor growing operations, Easton's method produces an estimated total of 13,206[4] active grow operations in British Columbia in 2010. Notably, this figure is also very close to the 13,500 estimate provided to the authors from BC Hydro, who came to this figure by extrapolating from Easton's (2004) calculations of the number of growing operations in 2000.

The Extent and Value of Consumption

The estimated 13,206 active growing operations present a considerable threat to the sustainability of hydro electricity in British Columbia. A typical growing cycle involves at least 18 hours of light each day for the first month, followed by two months of 12 hours per day. As a typical growing light is a 1000 W bulb, a grow operation uses, on average, 14kWh per day for each light over the course of a crop. Using the approximation that a crop takes 90 days to cultivate, and four crops can be produced in a year, the annual consumption of electricity per light is approximately 5,040 kWh. Further, using the findings of Chaisson and Plecas (2011a) and Chaisson and Plecas (2011 b), growers who diverted electricity for their operations used approximately 36 lights. This figure closely reflected the figures provided to the authors by BC Hydro, whose data indicated that, on average, 36.5 lights were used per growing operation that stole electricity. Accordingly, the average growing operation using diverted electricity stole 181,440 kWh per year. Given this, the 52% of growing operation that stole electricity represented 6,867 operations with an overall theft of nearly 1,246 GWh per year across the province.

As of April, 2010, BC Hydro charged $0.0627 per kWh for consumption up to the first 1,350 kWh used over a two month period, with the rate increasing to $0.0878 per kWh for the balance consumed during the period (BC Hydro, 2011). This residential "stepped rate" is the likely rate that would be charged to operators of marihuana growing operations within the company's service territory. Using only the lower rate ($0.0627/kWh), the total value of electricity theft would be $78.1 million per year. Of course, given that the vast majority of the electricity consumed per growing operation would be charged at the higher stepped rate of $0.0878 per kWh, the total annual value of the theft is likely closer to $109.4 million.

What must also be taken into account is the amount of electricity consumed by operators of marihuana growing operations not stealing electricity. This would include another 6,339 cases per year. Again, using the findings of Chaisson and Plecas (2011a) and Chaisson and Plecas (2011 b), each of these operations, on average, would use 21.8 lights or 109,872 kWh of electricity per year. The annual consumption then, which is, in effect, wasted consumption, on account that it is put toward an illegal enterprise, is nearly 696.5 GWh. At

---

[3] In Plecas et al. (2009), the use of Bouchard's model yielded an estimate of 11,500 total growing operations, while Easton's model produced an estimate of 12,500.

[4] Easton (2004) estimated the number of marihuana growing operation using the formula T = B[1+PQ/C)]/[(PQ/C)-(1+R*), where T is the total number of growing operations, PQ/C is a ratio of value to cost = 1.5, R*=.10 is the assumed return to legal activities, and B is number of founded marihuana growing operations discovered by police during the year.

$0.0627/kWh, this equates to another $43.7 million worth of electricity per year. Priced out at the higher rate, the cost would actually be $61.2 million. That said, BC Hydro would not peg the cost this high, as its investigators have estimated that the average growing operation not involving theft uses just 10 lights. BC Hydro's estimate would be particularly accurate in those locations that currently employ electrical and fire safety inspection (EFSI) initiatives, as growing operations with 10 or more lights would consume more electricity than the 93kWh per day threshold for over-consumption, and would come to the attention of EFSI inspection teams, rather than BC Hydro's own inspectors. According to the BC Hydro estimates, at the higher rate ($0.0878), we should expect their estimate to be substantially lower at $28.1 million.

The Economic and Societal Problems

There are numerous economic problems associated with this level of energy consumption going toward illegal ventures. Perhaps the most obvious is the threat to British Columbia's electricity suppliers, primarily BC Hydro, as the nearly $109.4 million dollars of lost revenue presents a real challenge to supplying British Columbians with sustainable, low-cost energy. Those revenue losses will be ultimately borne by legitimate electricity customers in British Columbia, who will face higher rates for their electricity consumption. This should be especially concerning for legitimate customers because the actual revenue lost by BC Hydro translates into much higher costs for British Columbians.

The current supply of electricity that can be offered relatively cheaply by BC Hydro as a result of their existing Heritage Resources is not enough to meet the growing demands of the province (BC Hydro, 2011). As such, the company must contract to independent power producers (IPPs) to meet the demand. According to BC Hydro's Clean Power Call (2010), this additional source comes at a much higher cost of $0.124 per kWh. Given that the production of marihuana is illegal, the power consumed by this industry illegitimately increases the province's demand for electricity, requiring the purchase of the more expensive electricity from IPPs. Therefore, if all theft of electricity from growing operations were eliminated, the savings to all other electricity consumers would be nearly $154.5 million. Furthermore, although electricity providers do not lose revenue from 'paid' growing operations, legitimate electricity consumers are still affected. These customers must pay increased rates because these operations still require a great deal of electrical power, which increases the overall demand for electricity above what would normally be needed, causing the rates to account for the higher priced energy provided by IPPs. Therefore, the total economic cost to legitimate electricity consumers in British Columbia of indoor marihuana growing operations is even higher than $154.5 million.

There are societal costs of this electricity consumption as well. Putting the very real problems of organized crime and substance abuse aside, the illicit marihuana production industry is a constant drain on British Columbians. Adding to the problem is the fact that the increased consumption caused by marihuana growing operation requires electricity providers to spend more money and more natural resources to develop new sources of power. BC Hydro (2011) reported that it was investing $6 billion to improve its capacity meet growing demand and provide electricity to its consumers. Building the infrastructure to supply electricity has an environmental impact, as well as an economic one.

It is particularly troubling that the illicit marihuana production industry profits so greatly, stealing valuable resources from legitimate users and negatively impacting communities and the environment, without contributing any money in taxation to even begin to offset the high societal costs. Using the Marihuana Indoor Production Calculator (Plecas, Diplock, Garis, Carlisle, Neal, & Landry, 2010) with the new figures from the current article, and assuming that the rate of domestic cannabis use in British Columbia has decreased, as it has across Canada (Health Canada, 2010), the total annual revenue generated by the domestic and export wholesale distribution of marihuana is in the range of $3.6 billion to $4.5 billion.[5] The calculation indicates that only 9% to 12% of the marihuana produced in the province is consumed by British Columbians. Overall, this is an enormous amount of money generated tax free by criminals at the expense of British Columbians.

The Need For Action

This report has demonstrated that the indoor marihuana production industry is extremely costly for British Columbians, as it increases the economic and societal costs of electricity for the legitimate electricity consumers in the province. While growers who steal electricity are particularly costly for British Columbians, all grow operators negatively affect the costs of providing power for the province. At a time when British Columbians are encouraged to conserve electricity to ensure that this valuable resource can continue to be sustained in the future, a small, criminal segment of the population is profiting from a highly disproportionate level of consumption, leaving the law-abiding population to bear the costs. For the most part, the estimates presented in this article are conservative suggesting that the true costs are much higher. Also, as this report has focused specifically on the issues of electricity consumption, these figures do not come close to reflecting the total costs, which would also include, for example, law enforcement and health care spending.

While this report speaks to the issue of electricity theft in British Columbia, since all indoor grow operations require power, the matter of electrical theft as it relates to marihuana growing operations is one that should be given serious attention by other jurisdictions as well. There have been some successful initiatives targeting marihuana growing in British Columbia, specifically the EFSI initiatives, which uses a public safety approach to curbing marihuana production by focusing on over-consumption of electricity and the inherent hazards those levels of usage create in residential environments. However, the unintended consequences of these initiatives may have been to increase the likelihood that growers will divert electricity, not only reducing their production costs, but also decreasing their chances of being discovered as a result of over-consumption. Furthermore, EFSI initiatives are not viable in all parts of the province, which is potentially leading to the displacement of illegal marihuana production to those parts of the province without EFSI. It is imperative that policy makers, law enforcement, and electric utilities continue to develop innovative responses to this problem in order to reduce the economic and societal burden of this illegal behaviour. Given the British Columbia experience, which shows that growers are increasingly likely to steal power, and given that power costs should be expected to steadily increase significantly most everywhere in the near future, without serious attention, it would be safe to assume that the cost to the public (as high as it is now) will become increasingly expensive in the future.

---

[5] The Marihuana Indoor Production Calculator estimates the size of the marihuana industry by incorporating estimates of the population of the jurisdiction, the percent of the population who have used the drug in the past year, the average number of lights used in growing operations, and the number of growing operations in the jurisdiction. The tool assumes that each light produces one pound of marihuana for each crop, and that four crops can be produced per year. Using the average number of lights and total number of operations, one can calculate the total amount of marihuana produced in the jurisdiction. The calculator uses the price of $2000/lb for domestic sales and $3000/lb for export sales. Based on the population, the proportion of users, average weight of marihuana cigarettes, and average number of marihuana cigarettes smoked per person per year, the calculator determines the size of the domestic market and assumes that the remaining product is exported. See Plecas et al. (2010) for a detailed description of the tool.

References

BC Hydro. (2010). *Clean power call requests for proposals: Report on the RFP process.* Retrieved April 16, 2011 from http://www.bchydro.com/planning_regulatory/acquiring_power/clean_power_call.html.

BC Hydro. (2011). Residential rates. Retrieved April 16, 2011 from http://www.bchydro.com/youraccount/content/residential_rates.jsp.

Bouchard, M. (2007). A capture-recapture model to estimate the size of criminal populations and the risks of detection in a marijuana cultivation industry. *Journal of Quantitative Criminology, 23*, 221-241.

Chaisson, K., &Plecas, D. (2011a). The Nature and Extent of Marihauna Growing Operations in Mission, British Columbia: A 14 Year Review (1997-2010).

Chaisson, K., & Plecas, D. (2011b). The Nature and Extent of Marihuana Growing Operations in the Cariboo Region of British Columbia: A 14 Year Review (1997-2010).

Easton, S. T. (2004). *Marijuana Growth in British Columbia*. Vancouver, BC: Fraser Institute.

Garis, L., & Plecas, D. (2007). An *Analysis of Marihuana Grow Equipment Seized From Lower Mainland Operations.* Abbotsford, BC: University of the Fraser Valley.

Garis, L. (2008). Eliminating residential hazards associated with marijuana grow operations and the regulation of hydroponics equipment: A brief on, British Columbia's Public Safety Electrical Fire and Safety Initiative.

Heath Canada. (2010). Canadian alcohol and drug use monitoring survey: Summary of results for 2009. Available from http://www.hc-sc.gc.ca/hc-ps/drugs-drogues/stat/_2009/summary-sommaire-eng.php.

Plecas, D., Diplock, J., & Garis, L. (2009). Commercially viable indoor marihuana growing operations in British Columbia: What makes them such a serious issue? Abbotsford, BC: University of the Fraser Valley.

Plecas, D., Diplock, J., Garis, L., Carlisle, B, Neal, P., & Landry, S. (2010). The marihuana indoor production calculator: A tool for estimating domestic and export production levels and values. *The Journal of Criminal Justice Research, 1*(2). Available from http://www.icjrc.org/jcjr_research_papers.

Plecas, D., Malm, A., & Kinney, B. (2005). *Marihuana growing operations in British Columbia revisited, 1997–2003*. Abbotsford, BC: University College of the Fraser Valley.

RCMP (2011). One page summary data sheet on marihuana growing operations in British Columbia (2004-2010). Based on data from the Ministry of Public Safety and Solicitor General, Vancouver, BC. and provided by E Division Operations Strategy Branch to the authors for this report.

Published in April, 2011