The way forward: Advances in maintaining Right-of-Way of transmission lines

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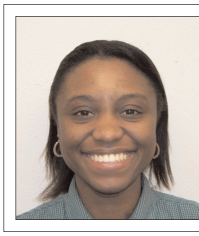
An up-to-date inventory and tracking system for the vegetation growing along the Right-of-Way is vital. Tree-related incidents account for a large portion of electric power failures. Most powerline monitoring is conducted manually which is very costly and time-consuming. Moreover, manual Right-of-Way inspection does not provide the timely answers that are possible in surveying using today's latest technology. However, LiDAR is fast becoming the dominant corridor mapping method—the primary source for anomaly detection—and images from digital cameras are being used to verify these anomalies. This paper compares conventional methods of Right-of-Way maintenance with the remote sensing techniques using LiDAR and digital cameras. It was found that powerline inspection and maintenance can be faster, simpler, and save significantly in man-hours when the powerline corridor is surveyed with the latter method. The technology also supports important maintenance decisions by helping to maintain legislated clearances between powerlines and physical objects or encroachments.



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Il est vital d'avoir un inventaire à jour et un système de suivi de la végétation qui croît le long des emprises des lignes de transmission. Les incidents reliés aux arbres sont responsables d'une grande partie des pannes de courant électrique. La plus grande partie de la surveillance des lignes de transmission se fait manuellement, ce qui est très coûteux et prend beaucoup de temps. De plus, une inspection manuelle des emprises existantes n'offre pas les réponses en temps opportun qu'on obtient par arpentage en utilisant la technologie naissante d'aujourd'hui. Toutefois, le LiDAR est en train de devenir rapidement la méthode dominante de cartographie des corridors – la source première de détection d'anomalies – et des images provenant d'appareils photo numériques sont utilisées pour vérifier ces anomalies. Cet article compare les méthodes conventionnelles d'entretien des emprises des lignes de transmission aux techniques de télédétection qui se servent de LiDAR et d'appareils photo numériques. On a découvert que l'inspection des lignes de transmission et leur entretien peut se faire plus rapidement, plus simplement et épargner significativement en heures-personnes lorsque le corridor des lignes de transmission est arpenté selon la dernière méthode citée. La technologie appuie également des décisions importantes d'entretien en aidant à garder les dégagements législatifs entre les lignes de transmission et les objets physiques ou empiétements.

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1. Introduction

Canada's bulk transmission network consists of more than 160,000km of high voltage powerlines [*Industry Canada* 2008], specifically lines operating at or above 115 kV. The bulk transmission system is a network of generating plants, powerlines, circuits and substations that make up the backbone of our electricity grid. Canada and the U.S. share a common bulk power grid which is why the largest power blackout in North American history—the Northeast Blackout of August 2003—had started in the U.S. yet affected residents in Canada: the transmission system failure cascaded through the shared power grid.

Canada is the 2nd largest exporter of electricity and the fifth largest producer of electric power in the world, generating 4 percent of the world's total. The electric power industry in Canada also earns $35 billion annually in revenue [*Industry Canada* 2008]. These figures underscore the importance of Canada maintaining its position of leadership by continually supplying electricity in a reliable and safe manner.

The corridor of land over which electric transmission lines are located is called the right-of-way (ROW). Proper upkeep of the ROW is crucial in ensuring the utility companies operate safely, deliver their services uninterrupted, and respond to unforeseen events such as windstorms or wildfires. Trees and shrubs create the most obstructions on the ROW, hence utility companies closely scrutinise where and how trees on or close to the ROW grow. Interruptions by tree contact account for over 20% of total electric service interruptions [*Eckert* 2004]. The convention is to not include the outage statistics due to severe storm events, therefore the problem of tree-related power interruptions must be higher than this reported figure.