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A new generation of optimised 120 kV cable systems at Hydro-Quebec  
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#### Abstract:

In 1999, a technical committee was formed at Hydro-Québec to evaluate the company's standard practices in high voltage underground cable systems and find and implement some cost reduction solutions. After a rigorous analysis of the proposed technical solutions, the optimal system design was adopted.

This paper describes the optimisation process, details the cost reduction solutions accepted and their impact on total project cost.

The new optimized cable system was implemented for the first time in 2002 in Montreal. It confirmed that the total project cost reduction achieved using this new cable system design and installation is in the range of 25%.

**Keywords:** HV cables, XLPE, cost reduction, optimisation, installation techniques

#### Résumé:

En 1999, Hydro-Québec a formé un comité technique chargé d'évaluer les pratiques usuelles dans les domaines des lignes souterraines à haute tension et de trouver des pistes d'optimisation des coûts. Après une analyse rigoureuse, la combinaison optimale des solutions a été retenue.

Cet article décrit le processus d'optimisation, détaille les pistes d'optimisation retenues et leurs impacts sur les coûts des nouveaux projets.

La nouvelle génération de système de câbles optimisés a été utilisée pour la première fois à Montréal en 2002. Ce projet a confirmé la réduction anticipée des coûts de l'ordre de 25 %

**Mots clés:** Câbles à haute tension, PRC, réduction de coûts, optimisation, techniques de pose

### 1. Introduction

Increasing environmental pressures makes building new overhead lines more and more difficult, especially in urban areas. The alternative, building underground lines, is still much more expensive.

Improvements in materials, equipments, and design can lead to a significant reduction in total cost of underground cable systems, making them more competitive with overhead lines in urban areas.

Hydro-Quebec has been installing XLPE cables at the 120 kV level since 1989, using the same well proven installation technique, namely in ducts and manholes, used for over 40 years with oil-filled cables.

In 1999, a technical committee of high voltage cable specialists involved in every aspect of cables, including design, construction, operation, maintenance, research and development was formed to examine the company's standard practices in high voltage underground cables and recommend some cost reduction solutions.

Specifically, the main objective of the committee was to develop a new generation of cable system at 120 kV for installation in urban areas, (over 70% of all high voltage cables in Hydro-Quebec).

While providing cost reduction, the new system had to maintain the same excellent level of reliability as the existing one.