

# RECRÉ

## Power System Restoration Support Tool

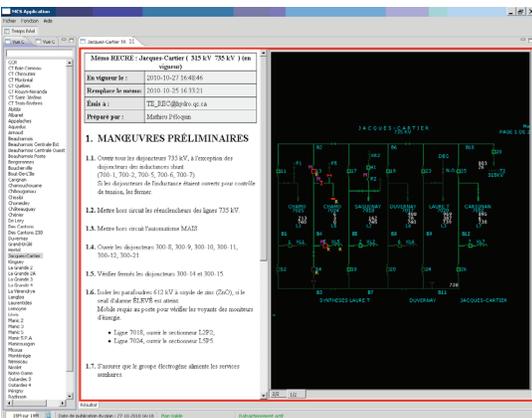
A blackout has many negative impacts: in addition to jeopardizing public security, it causes severe economic and property losses. For example, the blackout of August 13, 2003, which affected 50 million people in Ontario and the U.S. Midwest and Northeast, caused losses of \$4 to \$10 billion in the U.S. alone. To minimize the impacts of blackouts, regulatory bodies require operators to have a power system restoration plan and to update it regularly.

### *Developing and maintaining expertise*

The configuration of the Hydro-Québec power system is rather unique in that the generating facilities are very far away from the load centres. In the event of a blackout, load is restored from the 735-kV bulk transmission system. The system restoration plan is a rigorous procedure based on system response studies and on technical and practical criteria. The plan must be continually updated to take into account the facilities available and equipment outages for maintenance. Previously, this updating was done manually by personnel with highly advanced expertise, and the updates were distributed as printed documents. With the aging and retirement of the workforce, expertise in the field was becoming more and more precarious, both for the production of the plan and for its execution. This highlighted the importance of developing a support tool for power system restoration.

### *Planning, training and operations*

With RECRÉ (REmise en Charge du Réseau, or power system restoration), Hydro-Québec now has a modern task support tool to ensure coordination and follow-up in the event of a blackout. The main interest of RECRÉ is that it groups together all the processes involved in system restoration: planning, training and operations. This knowledge-based system applies solutions, validated by the people in charge, for the production of new restoration plans. In addition, RECRÉ is open-ended and can systematically integrate new knowledge and more advanced analysis methods.



## A strategic advantage

RECRÉ has three interdependent modules: the planning module, which includes a knowledge system and a planning system; the applied training module; and the coordination and follow-up module. RECRÉ addresses Hydro-Québec's main concerns with regard to system restoration. In addition to shortening the time it takes to restore service to customers after a blackout, it reduces the cost of prolonged blackouts, for both the utility and its customers.

### Main advantages

- Helps maintain expertise and transfer knowledge. Models and sets out the restoration strategy in a structured and continually updated knowledge base.
- Rapidly provides an up-to-date restoration plan, even if an unexpected problem occurs during restoration. Rapidly provides optimum solutions that are prevalidated and formatted for distribution.
- Enriches operator knowledge through training sessions. Using its simulator, dispatchers and operators are exposed to realistic system restoration scenarios; they are thus better prepared to deal with blackout situations.

### Case-based reasoning

With RECRÉ, Hydro-Québec has an improved process for restoring the bulk transmission system. In developing this task support tool, the utility's goal was to consolidate the expertise acquired over the years, rather than replacing it with more ambitious planning procedures based solely on numerical methods and expert systems. Case-based reasoning leaves greater room for engineers' judgment while introducing advanced methods for automating certain aspects of solution design.

### For information

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