EVALUATION OF THE CONDITION AND THE PERFORMANCE OF UNDERGROUND FLUID FILLED HV LINKS AT HYDRO-QUÉBEC

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ABSTRACT

As with most major utilities around the world, many transmission underground links in Hydro-Québec are approaching their expected end of life. With current budget restrictions, it is imperative that asset managers should be able to assess the actual condition and performance of each link, and prioritize the necessary actions.

*The **GI**obal **P**erformance **I**ndex (**GPI**) developed at Hydro Quebec has proven to be an efficient tool for evaluating the condition and performance of underground links with fluid filled cables installed in a duct and manhole system. It provides asset managers with the necessary data to identify and prioritize retrofitting and replacement projects.*

KEYWORDS

Fluid filled cables; Condition assessment; Performance evaluation; Asset management. Ducts and manholes

INTRODUCTION

Hydro-Québec –TransÉnergie has over one hundred and eighty (180) High Voltage Underground Links, mainly rated 120 kV and 315 kV. The network also includes one link operated at 450 KV DC. These links are mainly installed in major urban areas but a number of them are also installed in hydroelectric generating stations.

More than seventy (70) of these links, representing 60% of the network in length, were installed in the sixties and the seventies, using Fluid Filled Cables installed in duct banks and manholes. Since 1989, all new links are built using XLPE insulated cables and pre moulded accessories.

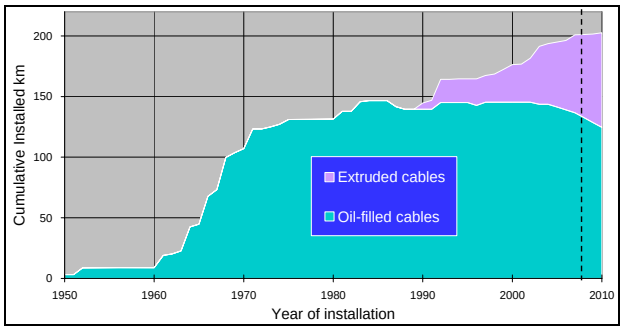

Figure1. Cumulative installed HV underground links at Hydro-Québec (km)

As with most major utilities around the world, the older links have been in service for more than forty (40) years and are approaching their expected end of life. The replacement of these links represents a major investment. With current budget restrictions, it is imperative that asset managers should be able to assess the actual condition and performance of each link, and prioritize the replacement projects in their annual action plan.

ASSET MANAGEMENT DECISION MAKING PROCESS

The asset management process can be described by the following four steps, as illustrated in figure 2.

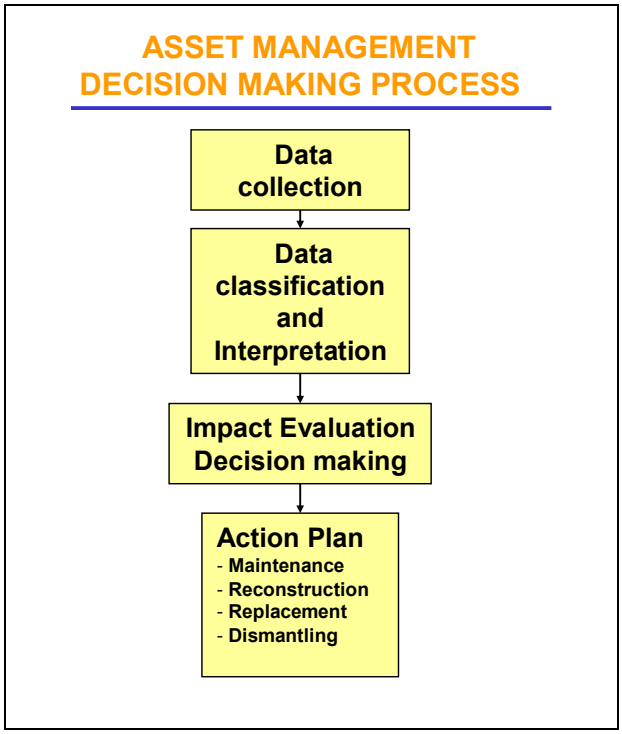

Figure 2. Asset management simplified process

- Step 1. Data collection. This includes all existing data, available from records, and operational data that are collected mainly by maintenance crews. In order to collect useful data, one must have a very good knowledge of the links to be evaluated.
- Step 2. Data classification and interpretation. This step consists of the organisation of data to filter out the most useful information from all the available data.
- Step 3. Impact evaluation and decision making. The evaluation of a link should take into account not only the available data, but also other factors like the strategic importance of a link. Each decision should be made taking into account its global impact on the system.
- Step 4. Action plan. All the decisions taken in step 3 will result in a global action plan; that will help achieve the expected goals of reliability of the network.

In the following sections, the application of those four steps is detailed in the case of underground high voltage fluid filled links at Hydro-Québec.