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## Long term test of a directly buried GIL prototype

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### Résumé

Cet article présente le programme de développement de Lignes à Isolation Gazeuse (LIG) souterraines initié en 1993 par EDF, et en particulier sa phase actuelle : essai de longue durée d'un prototype LIG de 300 m construit par ABB sur le site EDF des Renardières

### Abstract

This paper presents the development program of underground Gas Insulated Lines (GIL) launched by EDF in 1993, and particularly its present stage : long duration test of a 300 m prototype constructed by ABB on « Les Renardières » EDF site

## 1. INTRODUCTION

In France, for several decades, the development of the 400 kV electrical network has made it possible to improve considerably the cost and the security of the electrical supply. This result was however acquired at the price of an appreciable increase in the visual impact of the networks, because the only solution economically acceptable for the electricity transmission at long distances is the overhead line. However, at the present time, the public accepts with more and more difficulty any additional damages to its environment. Thus, although significant needs are still existing as regards new electric transmission facilities, the new projects of 400 kV links meet a systematic opposition. This is why EDF is led, like other electric companies, to study and promote measures allowing the development of the power grid by minimizing its environmental impact.

The development program of underground Gas Insulated lines (GIL) constitute one of these measures, as GIL could offer a solution to build invisible 400 kV transmission links. The purpose of this paper is to expose the general outline of this program, and in particular its current phase: long duration tests of a 300 m GIL prototype built by ABB on the EDF site of Les Renardières.

## 2. GIL GENERAL CHARACTERISTICS

The GIL are " electric pipelines " filled with insulating gases, in which one would have placed live conductors (figure 1). Because of the low dielectric performances of insulating gases, the size of these products is significant: the diameters of enclosures and conductors are respectively around 500 mm and of 200 mm. These dimensions confer however on

the GIL interesting electric characteristics (low resistance, low inductance), allowing the massive transfer of energy over long lengths.

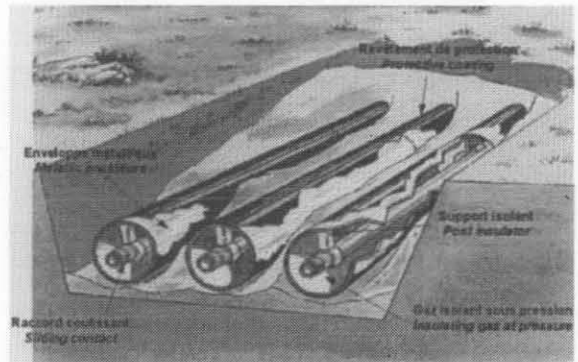


Figure 1 Sketch of an GIL

From the functional point of view, the GIL are thus rather close to the current lines 400 kV and are indeed good substitute products, even if the reduced inductance of the GIL compared to the one of the lines can sometimes cause an imbalance in flows of energy in the network.

## 3. THE UNDERGROUND GIL DEVELOPMENT PROGRAM

Products similar to the GIL, the gas insulated busbars, are used since the Seventies in some metal enclosed substations. They are short connections, installed above on the ground surface, and their the structure and their cost are unsuited to the installation of long lengths underground links. The purpose of the EDF development program is to fill these gaps, by