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## New 400 kV underground cable system project in Jutland (Denmark)

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**Abstract:** This paper gives the history of the 400 kV Aarhus - Aalborg project in Denmark, describes the Environmental Impact Assessment process, from the public hearings to the political decision of undergrounding parts of the total route of the line.

After a short description of the three siphons (environment, cable route, etc) and the reasons why undergrounding has been decided, the technical issues regarding the integration of the three cable systems in siphons are addressed: cable dimensioning (thermal rating), overload capabilities, selected laying methods and techniques. The case of the crossing of the Mariager fjord is detailed

**Keywords:**EHV Cables, siphons

### 1. Introduction

The building of a 400 kV connection between Aarhus (Trige substation) and Aalborg (Nordjyllandsvaerket substation) will complete a ring structure of the main Jutland high-voltage transmission grid.

Planning and government evaluation of the 140 km transmission line have been going on for more than ten years. The Danish Energy Council approved the project in early March 2001. It is now intended that the high-voltage transmission line will enter operation in 2004. The line will be build and owned by the western Danish transmission system operator Eltra.

The overall project for the establishment of this 400 kV high-voltage connection between Aarhus and Aalborg includes three sections with underground cables. The three 400 kV cable sections (siphons) will run across the Mariager Fjord, the Gudenaa Valley, and through the Indkilde Valley, with an overall route length of 14 km.

Considered together, the three siphons are one of the world's largest cable projects. It is also the first time that 400 kV cables will be buried under agricultural land and nature reserves. For all three cable sections in connection with the Aarhus-Aalborg project, two 400 kV cable systems will be laid in parallel.

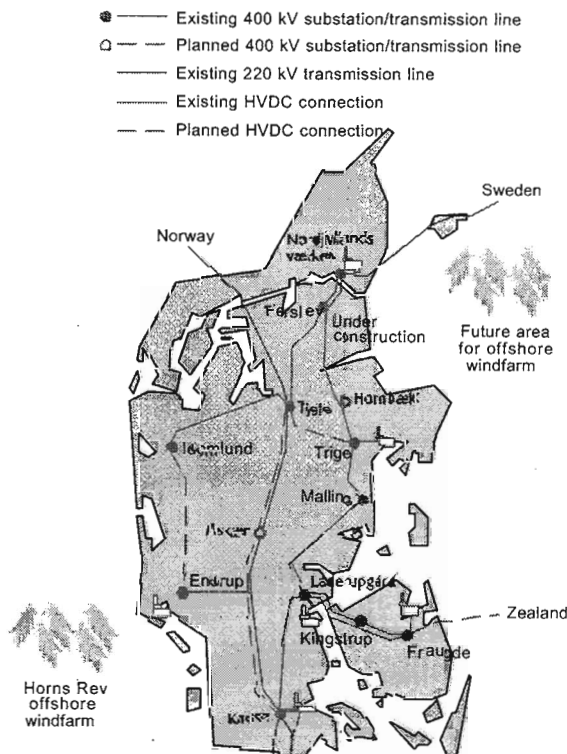
### 2. Project Description

**Résumé:** Ce rapport retrace l'histoire du projet 400 kV du Jutland, décrit la démarche d' Evaluation de l' Impact sur l' Environnement depuis les débats publics jusqu'à la décision de mise en souterrain de quelques sections de la ligne.

Après une courte description des trois siphons (environnement, tracé) et un rappel des raisons ayant amené à la décision de mise en souterrain, les aspects techniques liés à l'intégration des trois siphons sont abordés: dimensionnement du câble, capacités de surcharge, techniques de pose. Le cas particulier de la traversée du Fjord Mariager est abordé en détail.

**Mots clés:** Câbles THT, siphons

### 2.1 Purpose of the Aarhus-Aalborg transmission line



The 400 kV grid is the backbone of the electricity system in Denmark.