



# SERVICE EXPERIENCES FOR MV CABLE NETWORK – OPTIMISTIC OR PESSIMISTIC STATE OF THE ART?



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## ABSTRACT

The answer to the question put in the title of the paper depends on the quality of cable lines elements, the quality of installation works and the proper maintenance during service. The most important are service experiences. The analysis of service data is focused on MV cable lines.

## KEYWORDS

MV cable lines, cable insulation quality, XLPE insulation, service experiences.

## INTRODUCTION

The observed dynamic development of urban areas and the necessity of electrical energy supply to the objects located in the cities is the reason of the inseparable grid system development. Investors building new and modernizing the existing electrical lines face the dilemma: what kind of lines should be used: overhead or cable? More and more often the answer seems to be very clear because of the protest of people against installing high voltage overhead lines in the vicinity of their houses and gardens. Recently, the social aspect has gained the primary importance among factors influencing investment decisions. Therefore, in the next years one should expect much more rapid development of the cable systems of all levels of voltage.

Table 1 is based on information provided by [1] and presents the length of medium voltage networks in a number of European countries, as well as the percentage of underground cables in these networks. It can be seen that most of the countries have achieved to underground more than two thirds of their medium voltage networks, while the rest countries have achieved quite important percentages of cable lines.

Table 1. Situation of European MV networks [1]

| Country     | Km of network | Length of network [m/habitant] | Percentage underground [%] |
|-------------|---------------|--------------------------------|----------------------------|
| Austria     | 57 000        | 7,0                            | 15                         |
| Belgium     | 65 000        | 6,4                            | 85                         |
| Denmark     | 55 000        | 10,5                           | 59                         |
| France      | 574 000       | 9,5                            | 32                         |
| Germany     | 475 000       | 5,8                            | 60                         |
| Italy       | 331 000       | 5,7                            | 35                         |
| Netherlands | 101 900       | 8,9                            | 100                        |
| Norway      | 92 000        | 20,5                           | 31                         |
| Portugal    | 58 000        | 6,1                            | 16                         |
| Spain       | 96 448        | 2,4                            | 30                         |
| Sweden      | 98 700        | 12,3                           | 53                         |
| UK          | 372 000       | 6,3                            | 81                         |

General data about network sizes in Poland, at the end of 2005, in respect to the network voltage are following [2]:

- 400 kV 4 831 km
- 220 kV 8 123 km
- 110 kV 32 310 km
- MV 233 855 km
- LV 486 994 km
- terminals LV 143 666 km

Overhead lines are used in the first two voltage levels only. The highest level of voltage in Poland for cable lines is 110 kV. It should be pointed out that Polish grid system exploits in some power plants four sections of 700-800 m length of cables at voltage of 220 kV with paper-oil insulation. Network of 110 kV lines are made as cable lines in a small percentage. The share of cables in the 110 kV network is small but since last few years it can be observed its dynamic increasing. The MV network also contains mainly overhead lines. Underground cables constitute only about 27% of the total MV network length.

Presently published data concerning the length of 110 kV cable lines refer unfortunately only to the lines exploited by public utility power industry. Up to now the data about the cable lines installed by industrial electrical network have not been collected as well as in case of grid systems operated by the rail and by industry. The Fig. 1 shows only the 110 kV cable lines length development operated by the distribution companies and National Grid Company. Underground lines are very often only short sections of cable lines operating in industrial plants. But cable lines are used more often in medium voltage systems [3].

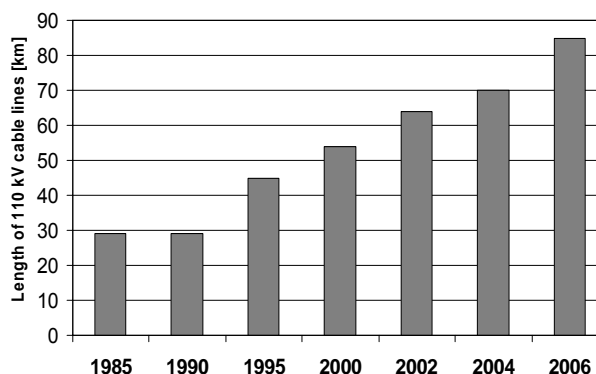


Figure 1: Length of 110 kV cable lines in PL network

Every year the percentage share of cables in electrical power network is increasing. This tendency is observed in medium voltage and high voltage systems. But the answer