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This technical specification contains a section on electrical installation in general, but also specific requirements for electrical substations of nominal voltages . In this chapter, there is a requirement of the European Commission, adopted by the International Electrotechnical Commission (IEC), to be fulfilled by the use of copper -based cables . In this paper, a novel approach for the formulation of coherent substation planning is introduced that is based on an equivalent circuit of the substation and an associated capacitive grounding fault tree . This equivalent circuit allows for the correct simulation of the behavior of the network and, thus, the use of the correct parameters in the fault tree analysis. In this study, the performance of a fault tree-based planning approach is demonstrated using the example of a 400 kV substation on the North Sea coast. ## 2.2 Background In a fault tree analysis, a fault tree is a graphical representation of the relationships between components of a network to assess their impact in case of failure. A major advantage of using fault trees is the fact that these can be used in repetitive analysis over long periods of time. Moreover, their interpretation is rather straightforward . Using these fault trees in the context of substations, an improved coherence and consistence between components has been observed . The use of a fault tree can also improve the process of data recording and provide insight for how to improve it further . However, in the past, the fault tree approach was based on the assumption that the substation is split in a power supply line and a return line. In this way, it was possible to connect the various branches of the fault tree to these two lines . The calculation of these connection points required that no overcurrent would flow through both lines at the same time. This assumption, however, is not valid for many substations, where the supply line and the return line do not split at the same location. In this case, if one of the lines is broken, the fault tree becomes a probabilistic model and can no longer be used to analyze the system performance and its coherence. Considering the problem of splitting the lines and defining the different branches of the fault tree in this case, the IEEE and the IEC published a standard for the substation , and recommendations for the design of substations . In addition to the above mentioned publications, related publications by and exist. However, none of these publications considers the coherence of the substation 82157476af