

also for countries in which DSOs are not directly participating to the consortium activities. The only drawback related to the use of DiNeMo consists of the software limitations and time effort required for the construction of a network model of whole countries. For this reason, at the expense of the geographic position of distribution nodes and lines, a simpler network synthesizer will be adopted [13]. This tool has the advantage of generating artificial distribution grids on the basis of few metrics/statistics which can be easily extracted from the analysis of real networks. The procedure for the creation of the distribution scenario will be based on the following steps:

1. DSOs involved within the FlexPlan consortium provide metrics on their actual network infrastructure for the countries in which they are operating.
2. For the remaining European countries, DiNeMo will be used in order to generate few artificial networks, to be used in order to deduce the necessary statistics provided by the DSOs.
3. Thanks to the collected metrics and the processing of the algorithm described in [13], the entire distribution system of the regional cases will be developed synthetically.

As anticipated above, the adopted algorithm is not capable of returning geographical coordinates for the generated network. However, having assumed a distribution planning approach which is not considering the development of new grid branches (but consider possible reinforcement of the existing ones), the geographical dimension is not a critical input of the FlexPlan tool.

VI. CONCLUSION

On the basis of the previous lines, it should be clear that the FlexPlan project comes in a moment of great expectation on the contributions storage and flexibility can provide in support to the planning process of transmission and distribution grids. Our expectance from the six detailed regional cases is to be able to build up a map of where and how storage and flexibility can be useful to prevent the deployment of new grid lines on the territory. In our opinion, the build-up of new lines in the future has to be attentively evaluated against possible alternatives (i.e. exploitation of storage and flexibility) for three important reasons:

1. the level of uncertainty on the development of generation and demand scenarios in the next years as compared with the big investments needed and the long amount of time till the new lines are finally put in service: a concrete risk subsists of generating stranded costs;
2. the increasing opposition of the public opinion to new grid investments, which entails longer time for the approval of new infrastructures;
3. the fact that RES variability, which generates intermittency in the grid flows, can be the cause for short-lasting congestion due to generation peaks, compensated by many hours in which the flows stay well below maximum grid capacities; in such cases new investments are hardly justified whereas exploiting

local storage and flexibility can prove to be the ideal solution.

From the regulatory point of view, it is reasonable to foresee that investments in storage and flexibility will remain mostly in the hands of private investors. That means that depending on the results of the planning phase carried out by the System Operators, National Regulatory Authorities should translate the suitability of deploying new storage or flexibility in strategic network locations into opportune incentivization forms towards those who are possibly going to invest in that direction. This complicates a lot the scheme with respect to traditional planning modalities, where System Operators after carrying out their planning analyses were the only subject entitled to invest.

In this framework, FlexPlan is going on one side to provide a System Operators with a tool to allow including storage and flexibility into their grid planning analyses, on the other side to provide National Grid Authorities with a set of regulatory guidelines to allow optimal exploitation of the advantages storage and flexibility could provide to the system.

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