



DSO EDITION



BACKGROUND

The increasing interest in renewable energies has long been noticeable for DSOs. Apart from the environmental aspects that promote the **integration of Renewable Energy Systems (RES)** into energy production, the interest of private individuals, public institutions and companies is also increasing. Here, the motivation could be rather based on the **increase of self-sufficiency** and the reduction of the amount of energy to be drawn from the grid, which in turn contributes to cost reduction. Regardless of the motivation, the consequences of this, namely the increase in volatile RES in the distribution grid, are the same. This brings new additional challenges for the DSOs, which are addressed within MERLON.

OBJECTIVES

In view of the demand to increase production from renewable energy systems in order to generate clean energy, the number of wind farms, photovoltaic plants and other renewable energy systems is constantly increasing. However, these systems are no longer exclusively connected to the high-voltage transmission grid. There is a trend towards decentralised Renewable Energy Systems which are connected within the distribution grids at medium or low voltage level.

This in turn changes the consumption behaviour of the entire distribution grid, since the consumption from the higher-level transmission grid is reduced by the corresponding power generation. It can even reach the point where power is fed from the distribution grid into the transmission grid. One major challenge here is the **lack of controllability of energy generation**, as is the case with biomass-fired power plants for example. Due to this lack of controllability it is advisable to prepare corresponding production forecasts. **Predicting and estimating consumption and production** also shows in which periods overproduction occurs and when consumption is higher than production.

These facts reveal further considerations, which try to harmonize consumption and production behavior through the use of novel technologies. Keywords that fall into this category are, of course, the **increase in self-consumption** and **generation curtailment avoidance**. **Battery Storage Systems** are also regarded as a potential solution, or part of the solution, since their application allows the temporary storage of excess energy for times of increased energy demand.

In addition to the technologies used, the creation of an appropriate market in which the new participants in the distribution grid can communicate with each other and with the consumers is also essential. Within such a market, flexibility in terms of consumption and production could then be traded in order to ensure maximum use of available resources.



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SOLUTION

Within MERLON, solution strategies are developed and applied that enable the direct/physical integration of distributed energy resources. A combination of decentralised generation, supply, energy storage, electric vehicles and heterogeneous local energy networks is aimed at and optimised in their cooperation. Here, the **optimised generation output** is to be enhanced by possible flexibility with regard to storage possibilities and energy procurement. Furthermore, it is important to avoid curtailment in order to increase the share of production from Renewable Energy Systems. Another objective of the MERLON project is to improve the **possibilities of balancing and ancillary grid requirements**.







The technological concepts to be applied include, for example:

-  **Demand Response**
-  **Electric Vehicle** charging optimisation
-  **Synergies with other energy vectors** (Central Heating Plants)
-  Integration of **Battery Storage Systems**
-  Establishment of **Local Energy Communities** and **Local Flexibility Markets**

WHY SHOULD WE CARE?

Improving the quality of services in the distribution network by **reducing supply interruptions** is a goal that DSOs always aim to achieve. At the same time, it is also desirable to be able to offer the production and consumption of renewable energy resources within the distribution network in order to smooth the **transition to a decarbonised economy**.

In order to achieve this goals, the following relevant points are considered to be desirable and should subsequently be implemented using the technologies obtained from MERLON.

-  Accurate **forecasting of local generation and demand**.
-  Promotion of **self-consumption**
-  Identification of further **flexibility requirements** of the local system
-  Accurate sizing and implementation of **Battery Storage Systems**
-  Attainment of operational **stability and reliability for Local Energy Systems**
-  Transformation of Local Energy Systems into an active balancing asset

GOOD TO KNOW

With the MERLON solution, grid reinforcement can be avoided or at least reduced to a minimum, depending on the given case. This also means that the MERLON solution can be applied in areas where grid reinforcement is simply impossible for various reasons.

Due to its modular design, the MERLON solution can easily be adapted for different distribution grids. This refers not only to the distribution grid components to be integrated but also to the desired tools to be developed in the course of the project.

The MERLON solution is therefore an overall package that can show how to deal with the distribution grids of the future and the challenges they will bring.