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MICROGRID INFORMATION PROFILE AS AN INSTRUMENT FOR POWER SUPPLY QUALITY INCREASE

Over the past few decades, energy has played an increasingly important role in the technological and economic development. The global electrical energy demand is seen to be increasing in recent years and it is expected to double in the next 20 years. Fossil fuels that have been used as a source of energy till nowadays are rapidly depleting requiring us to look towards more alternative sources of energy. Wind and Solar PV are two of the major alternative sources of energy being utilized in many parts of the world.

Nowadays total installed wind and solar PV capacity is growing each year. However on the other hand, Ukraine relies on an aging electrical grid and pipeline distribution systems, some of which originated in the first part of XX century. Integration of renewable energy and DGs will support better utilization of the existing systems, reduce consumption of fossil based fuels, reduce transmission and distribution losses, and improve voltage quality. However, higher penetration of DGs creates technical and non technical issues which include power quality, reliability, power management, overall system efficiency, interconnection of grid and regulations. Ongoing generation, transmission and distribution permitting issues, weather related events, and limited maintenance have contributed to an increasing number of failures and power interruptions. They are some of the driving forces behind the microgrid concept.

Microgrids are receiving attention due to the increasing need to integrate distributed generations and to ensure power quality and provide reliable energy supply to the customers. Since renewables need to be in the mix for reliability increase, a high renewable-energy penetrated Microgrid should be analyzed.

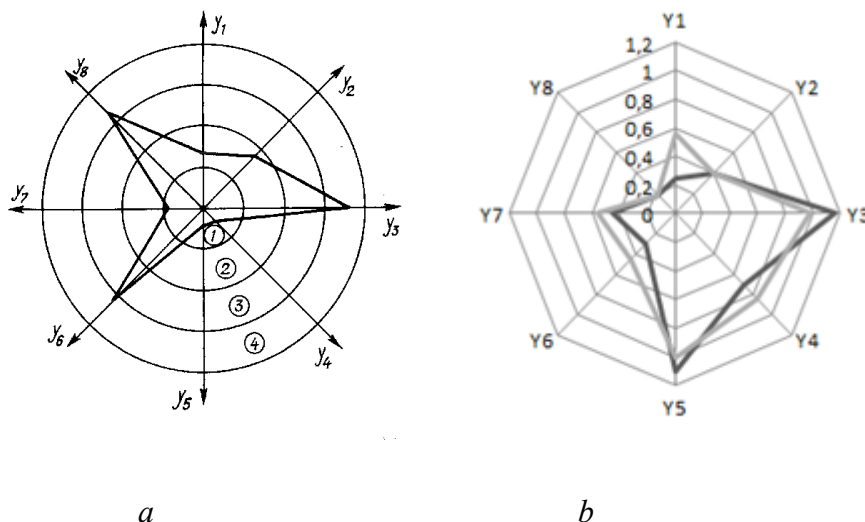


Fig. 1. Microgrid profile

The distributed generation (DG) and renewables are modeled in detail using taking into account the reliability issues and indexes presented in IEEE 1366:2012. The Microgrid reliability information profile (Fig. 1) allows to compare the levels of power quality and reliability of Microgrids with different levels of penetration of DG sources.