Flexibility in energy networks

Theme**: Methodology proposal for free capacity calculations in the distribution network for flexibility transactions**

Introduction

As the global focus is set on the climate change problem and on the slowing down of global warming, every industry sector needs to do everything in their power to meet this common goal. For the energy sector, it means decarbonisation that is achievable by incorporating more renewable energy sources into the system. The challenge lies in the management of the irregularity of the supply due to the weather dependency of these sources. Previously, production was able to adjust to the consumption as needed but with the increasing share of renewables in the system, this type of regulation will no longer be possible. This issue is solvable by an increase of accumulation which is however a costly option. The other way would be learning to adjust the consumption itself, in other word flexibility. It is the perfect tool to maximize the utilization of renewables and thus support their further expansion.

Who is behind this initiative?

PREdistribuce, a.s. is the owner and operator of the distribution system in Prague, capital city of Czech Republic. The main mission is to provide a reliable and safe supply of electrical energy to all of its customers. Due to the growing demands for continuity and the quality of electricity supply as well as growing share of new technologies such as electromobility, AMM or accumulation, the company aims to ensure well in advance readiness of the distribution system for the arrival of modern energy trends.

What is the energy challenge:

Flexibility could be an option how to utilize every bit of produced electricity. In connection with technology development (such as electromobility, accumulation …) the potential of flexibility is growing and it is expected to grow further more. The key player in flexibility transactions securing is the DSO as its managed infrastructure allows the use of flexibility. The challenge is to create the best conditions for flexibility as possible and to put together a methodology for DSO that would describe the conditions for individual flexibility transactions in order to maintain safe and reliable distribution system.

- What types of flexibility could be determined?
- Simulations of different network conditions
- Principles derivation for free capacity calculation methodology in the distribution network for flexibility transactions
- Draft of conditions for flexibility transactions that ensure safe and reliable power system operation
- Decision-making of a customer based on price / How could be customers motivated to optimize their behavior?
- Flexibility encouraged by the tariff structure

Relevant considerations for the challenge / theme:

The modern trend among customers is to modernize their home to make it smart. If the DSO learns how to cooperate with these smart households and their functions, it could increase the potential of flexibility in the grid. Both customer and DSO could benefit from it, for the customer it is cost optimization and for DSO safety in the grid.

Relevant links below are given for inspiration only.

Relevant links:

Energies | Free Full-Text | DSO Flexibility Market Framework for Renewable Energy Community of Nanogrids (mdpi.com)
Energies | Free Full-Text | Characterization of TSO and DSO Grid System Services and TSO-DSO Basic Coordination Mechanisms in the Current Decarbonization Context | HTML (mdpi.com)
http://www.cired.net/cired-working-groups/flexibility-in-active-distribution-systems-wg-2019-3
http://www.pre.cz/en