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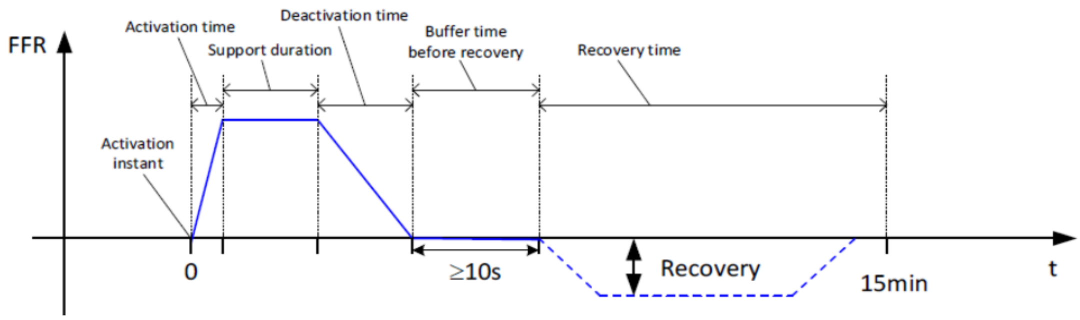
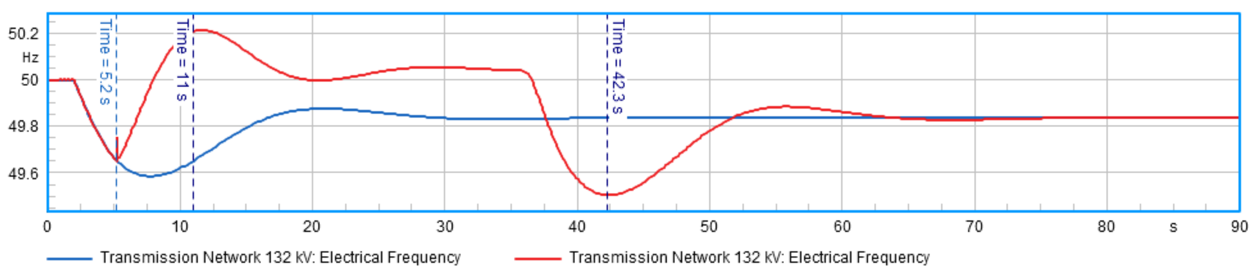
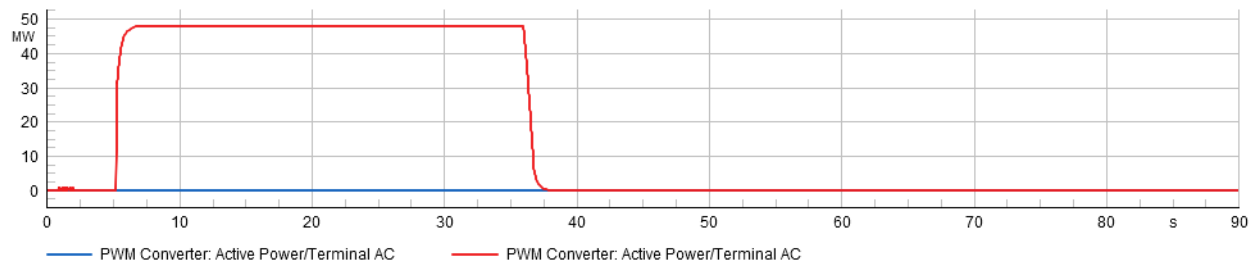
| **Title of Presentation** | Fast Frequency Response Implementation in Low Inertia Power Systems |
| **Oral or Poster Presentation?** | Oral/poster |

**Summary:**
Nowadays, low-inertia power systems deal with a significant frequency security problems due to the increasing penetration of Renewable Energy Sources (RES). Normally, due to the increasing RES penetration, grid operators must decrease the number of conventional power plants. However, conventional power plants are currently the major units providing inertia support and frequency control in power systems. Hence, TSO's are required to meet certain minimum reserves of conventional units to ensure the secure frequency response after a disturbance. As a result, system operators in low-inertia grids are frequently forced to curtail RES generation at certain hours in the day to ensure frequency security. To address this issue and avoid RES curtailment, new technologies have been developed to provide active power support to the system after a disturbance and alleviate the need for conventional power plant support. These technologies try to tackle problems related to the Rate of Change of Frequency (RoCoF) and the Nadir (minimum frequency) after a disturbance. Fast Frequency Response (FFR) is one of the methods widely adopted by system operators to tackle RoCoF and Nadir problems and it relies on the rapid injection of active power after a disturbance by batteries.




In this work, we present an FFR model developed in DIgSILENT PowerFactory and analyze the technical requirements related to the activation and deactivation process. The model is applied to the Cyprus dynamic model and the challenges related to the sizing of the FFR supply are investigated. More specifically, the impact to the system frequency during the deactivation of the FFR, as a function of the FFR sizing and deactivation behavior is analyzed. Moreover, the need for sectioning the FFR support in stages to avoid adverse impact due to over-activation of the FFR is showcased.
These challenges and observations are briefly shown in the figures below by simulating the dynamic response of the Cyprus transmission system after a generator disconnection.



In study case 1 (blue color), no FFR implemented and the frequency Nadir falls to 49.59Hz. With the FFR implemented in study case 2 (red color), the frequency Nadir is increased to 49.65Hz. However, we notice that in the 2nd study case, there is an overfrequency $(f > 50.2)$ and the the system delays to reach steady-state.