



Voltage Quality Monitoring

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Factors influencing Voltage quality

- **Networks structure and operation**
- **Faults on network and customer facilities**
- **Connection criteria**
- **Product standards**
- **Usage of energy within installations**
- **Increasing penetration of Renewable Dispersed Generation and Electric Vehicles**



Voltage Quality in distribution networks is a shared responsibility between TSOs, DSOs, equipment manufacturers and connected end-users/producers

Ensuring Voltage Quality at reasonable cost requires:

- imposing appropriate emission and immunity limits for customer equipment and/or installations**
- improving and strengthening the network**



Cooperation between System Operators and Industry

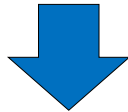
To increase customers knowledge and awareness of:

- Voltage Quality levels**
- Immunization Techniques of equipment and processes**



Voltage quality monitoring

- To assess indicative Voltage Quality levels
- To estimate trends



appropriate resources have to be foreseen for System Operators for proper monitoring schemes



Role of Standardization in VQ monitoring

- To define the measurement techniques
- To define the requirements of the whole measurement chain
- To define the minimum number of instruments to be used and the duration of the monitoring to ensure statistical relevance
- To harmonise the output format in order to ensure a uniform data interpretation across Europe



Improving the Voltage Quality

- To find the best compromise in mitigating voltage disturbances on equipment and/or network, taking into account who are the beneficiaries and the payers
- To take into account the new scenario with increased penetration of DG, EV
- To develop coherent connection requirements and product standards



Conclusions

- Voltage Quality monitoring is useful to assess levels and understand relationships with influencing factors
- A continuous dialogue among DSOs – and to some extent with CEER/national regulators – is necessary to foster cooperation on voltage quality measurement programmes. The resulting data can be used in the standardisation process as well as in national regulation
- The participation of Regulators in EN50160 development and this Workshop demonstrates that this dialogue is feasible and effective



Thanks for your attention