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SIMULATION
WWW.CERECERTIFICATION.COM

CERE, by UL Solutions is a Testing, Simulation and Certification body that was originally set up as a Certification Entity in 2015.

CERE, by UL Solutions was created in its beginnings as a Certification Entity for Renewable Energies, with the purpose of being the access key to the different countries where certification of components, full installations certificates, modeling and software validation of components and facilities was required.

Currently CERE, by UL Solutions has expanded its capabilities and is dedicated not only to Renewable Energies, but also to Electric Vehicle chargers, Industrial Machinery, Medical Devices and Electrical and Electronic Products.

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Accreditations

We have accreditations that verify our technical competences as a Certification Body and Testing Laboratory. This fact ensures a deep knowledge of the international requirements for components and installations.

CERE, by UL Solutions is accredited by ENAC and a2la (IAF/ILAC members) as a Certification Body according to ISO 17065; and as an Accredited Testing Laboratory according to ISO 17025. We also belong to the IEC Scheme being CBTL Testing Laboratory and NCB Certification Entity.

In addition, we can provide solutions to countries such as North America, Israel, Colombia, Korea, Australia, etc.

Our team

Our team has a long-accumulated experience in testing, simulation and certification for all its business areas, including an in-depth knowledge of grid integration standards, design, safety, EMC and grid quality.

All this knowledge is applicable in renewable energy generators and controllers, electric vehicle chargers, photovoltaic trackers, household appliances, industry, industrial machinery, electrical and electronic products and medical devices, among others.

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What's CERE Simulation?

CERE, by UL Solutions Simulation is the Simulation department of CERE (Certification Entity for Renewable Energies)

CERE, by UL Solutions Simulation was created as a part of CERE, to be the access key on the target countries for Renewable Energies, where modeling is required.

Our offering includes electrical studies such modelling validation, electromagnetic transient analysis, Shortcircuit current, PQ diagram, grid quality, etc.

CERE, by UL Solutions Simulation personnel have more than 10 years experience in the field of grid code compliance studies and electrical assessment of renewable power plants

In order to be updated with the state of the art of the business, CERE Simulation actively participates in several International Standardization Committees related to electrical simulation models, apart from the Committees where CERE has presence.

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Reference Simulation Standars

CERE, by UL Solutions is accredited as Certification Body and Testing Laboratory for simulation according the following standards:

ACCREDITED STANDARDS WORLDWIDE REFERENCE FOR SIMULATION

NTS 631V2.1 SEPE Latest Version: Norma Técnica de Supervisión de la conformidad de los módulos de generación de electricidad según el Reglamento UE 2016/631: NTS-631 v2: Revisión 2.1; Versión del 9 de Julio de 2021, que actualiza y modifica la versión 2 publicada el 3 de noviembre del 2020, con la Aprobación de la Orden TED/749/2020 y del Real Decreto 647/2020, y que sustituye las versiones anteriores “Revisión 1.0 del 18 de Julio de 2019” y “Corrección de errores y aclaraciones de la versión 1.0. 21/10/2019”; Sistema Eléctrico Peninsular (SEPE)

NTS 631V1.1 SENP Latest Version: Norma Técnica de Supervisión de la conformidad de los módulos de generación de electricidad según el Reglamento UE 2016/631: NTS-631 v1: Revisión 1.1; Versión del 9 de Julio de 2021, que actualiza y modifica la versión publicada el 3 de noviembre del 2020, con la Aprobación de la Orden TED/749/2020 y del Real Decreto 647/2020; Sistema Eléctrico No Peninsular (SENP).

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ACCREDITED STANDARDS WORLDWIDE REFERENCE FOR SIMULATION

VDE-AR-N-4105 Latest Version: Generators connected to the low-voltage distribution network – Technical requirements for the connection to and parallel operation with low-voltage distribution networks

VDE-AR-N 4110 Latest Version: Technical requirements for the connection and operation. Of customer installations to the medium voltage network (TAR medium voltage)

VDE-AR-N4120 Latest Version: Technical requirements for the connection and operation of customer installations to the high voltage network (TCR high voltage)

VDE-AR-N 4130 Latest Version: Technical requirements for the connection and operation. Of customer installations to the extra high voltage network (TCR extra high voltage)

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ACCREDITED STANDARDS WORLDWIDE REFERENCE FOR SIMULATION

Technical Guidelines for Power Generating Units and Systems PART 3 (TG 3): Determination of the Electrical Characteristics of Power Generating Units and Systems in Medium-, High- and Extra-High Voltage Grids; Latest Revision

Technical Guidelines for Power Generating Units and Systems PART 4 (TG 4): Demands on Modelling and Validating Simulation Models of the Electrical Characteristics of Power Generating Units and Systems; Latest Revision

Technical Guidelines for Power Generating Units, Systems and Storage Systems as well as for their Components PART 8 (TG 8): Certification of the Electrical Characteristics of Power Generating Units, Systems and Storage Systems as well as their Components on the Grid; Latest Revision

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CERE, BY UL SOLUTIONS IS ACCREDITED BY ENAC AND A2LA FOR RENEWABLE POWER PLANT CERTIFICATION ACCORDING TO (AMONG OTHERS):

FGW TR3, TR4 and TR8
NTS EU 2016/631 “Requirements for Generators”
P.O.12.2 - P.O.12.3

CERE, BY UL SOLUTIONS SIMULATION DEPARTMENT IS SKILLED TO WORK WITH DIFFERENT SIMULATION SOFTWARE, SUCH AS:

PSS/e
DIgSILENT PowerFactory
PSCAD
MATLAB SIMULINK
...

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COMPLIANCE WITH DIFFERENT GRID CODES SIMULATION REQUIREMENTS

Measurements, Simulation and Validation are needed to verify compliance and obtention of certification according Clients request target countries and grid codes

NTS-631V2.1-SEPE:Jul2021
NTS-631V1.1-SENP:Jul2021
EU 2016/631 “Requirements for Generators”

And specific deviations for European countries
P.O.9 - P.O.12.2 - P.O.12.3
CEI 0-16
CEI 0-21

EN 50549-1 / -2
FGW TR3, TR4 and TR8
- BDEW 2008 + AD 2013
- VDE AR N 4110: 2018
- VDE AR N 4120: 2018
- VDE AR N 4130: 2018

ENA-EREC G98
ENA-EREC-G99

Method: adapting schemes from manufacturer to a particular software + measurements + validation guidelines

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SCOPE OF MAIN SERVICES IN CERE, BY UL SOLUTIONS
SIMULATION FOR POWER PLANTS

Short circuit study: Short Circuit levels in different power plant locations until the grid connection point will be evaluated based on a Digsilent model prepared by CERE. Procedure and methodology will be based on the Standard “Standard 60909-Short-circuit currents in three-phase a.c. systems, 2001”, as well as the applicable local standards

Electrical loss calculation study: Electrical loss calculations will be analyzed with the evacuation system of the renewable installation in steady state, at different states of Load from 0 to 100% in discrete steps of 1%. For each state of charge, the losses will be totalized, and both the generated power and the Power at the Grid Connection Point will be indicated.

Load flow study: The load flow study will be analyzed in steady state mode of the power plant based in a Digsilent model prepared by CERE. On this scenario, the simulations will consider the different possible voltage references in the grid connection point, active and reactive power, etcetera. Load flows in lines and transformers will be analyzed, as well as the voltage references for the applicable standard requirements.

Study of harmonics: Harmonic Report according REE: Cere will provide a harmonic test report based on the information provided by the client. CERE will prepare a model of the power plant in Digsilent and will simulate the operation of the power plant at different power levels to analyze the harmonic distortion on the grid connection point based on the harmonic values provided by the manufacturer.

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SCOPE OF MAIN SERVICES IN CERE, BY UL SOLUTIONS
SIMULATION FOR POWER PLANTS

Energy quality study: The energy quality studies will focus mainly on the analysis of harmonics, 'flicker' and the behavior under rapid voltage changes of wind farms and photovoltaic plants.

Stability study: Verification that the renewable installation remains connected to the grid in all required scenarios without losing stability or generating undesirable disturbances in the grid, in accordance with the provisions of the applicable Grid Code.

Protection adjustment and coordination study: This study will evaluate the impact of faults (short circuits) of different types at different points. Likewise, the protection adjustment and coordination study will define, for the different substation and line protections, the settings and action times of the different protection functions (according to their use) in order to meet the protection and protection criteria coordination for said line and the electrical infrastructures that it interconnects

Transient studies: These studies will consider slow, fast and very fast front overvoltages, as well as temporary overvoltages.

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SCOPE OF MAIN SERVICES IN CERE, BY UL SOLUTIONS
SIMULATION FOR POWER PLANTS

NTS certification: Mandatory through a CERE-type accredited entity.

Complementary simulations for NTS: done based on Mandatory Standard Requirements to obtain Certificate. Power plant modeled including the certified models of UGE and CAMGE.

Damping Analysis at power plant Level: Analysis based on the Applicable Standard NTS 631 - Chapter 5.10, and required by Spanish TSO (REE)

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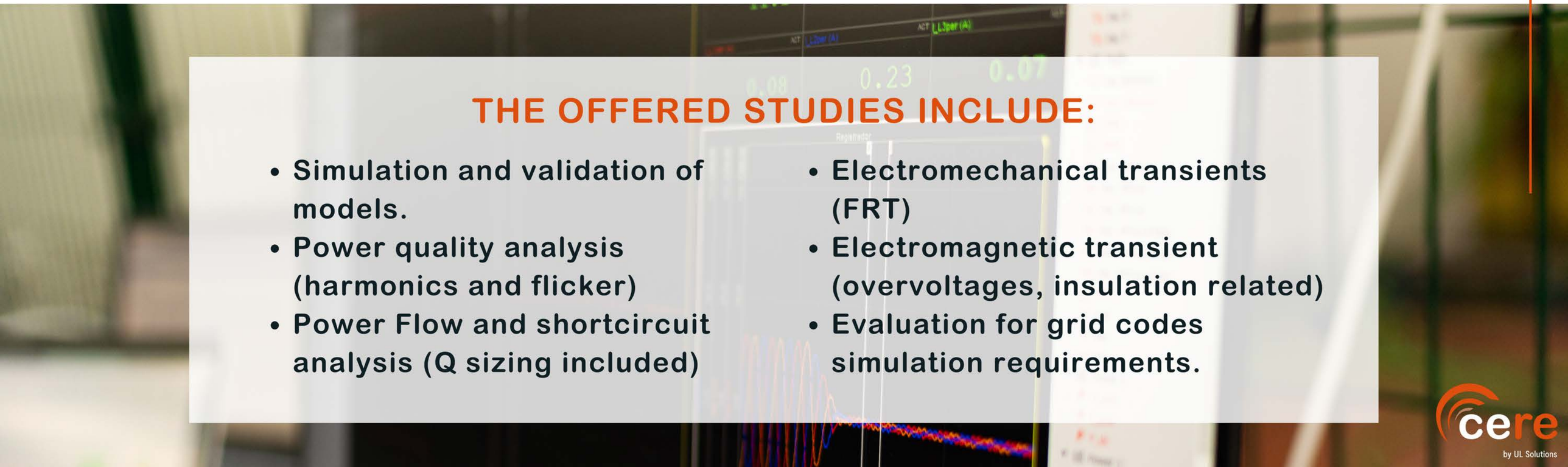
Electrical Studies

CERE, by UL Solutions Simulation Department has a wide expertise in the field of grid integration studies and grid code fulfilment according to the requirements of the most relevant TSOs worldwide in terms of renewable energies.

Some of the most important projects carried out recently are located in Spain, Germany, Morocco, Saudi Arabia, Mexico, USA, South Africa and Jordan



THE OFFERED STUDIES INCLUDE:

- Simulation and validation of models.
- Power quality analysis (harmonics and flicker)
- Power Flow and shortcircuit analysis (Q sizing included)
- Electromechanical transients (FRT)
- Electromagnetic transient (overvoltages, insulation related)
- Evaluation for grid codes simulation requirements.

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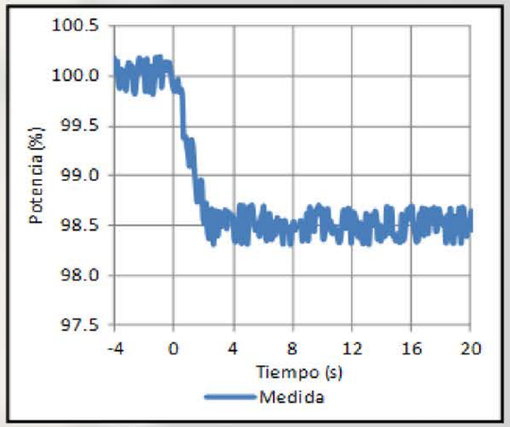
MODELLING AND VALIDATION

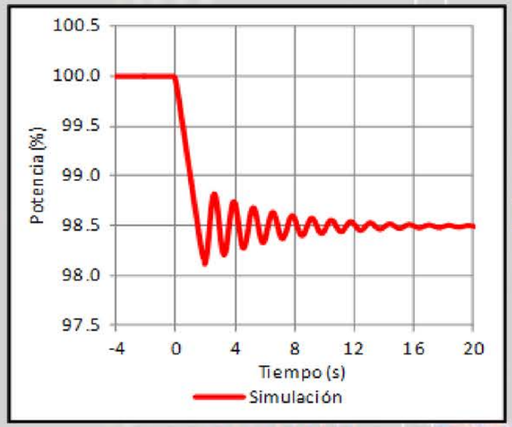
Measurements



Measurements of:

- Faults (UVRT and/or OVRT)
- Setpoint changes

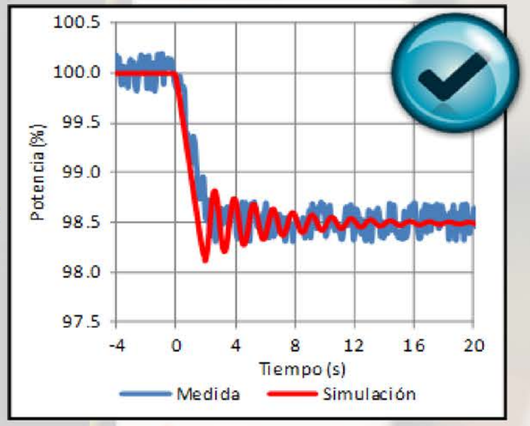
Simulation



Modelling:

- PSS/E? PowerFactory?
- Generic model? User defined?

Validation



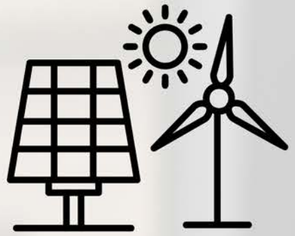
Validation method:

- FGW TR4? (IEC 61400-27-1 ed1)
- PO 9?

Method: adapting schemes from manufacturer to a particular software + measurements + validation guidelines

POWER QUALITY, HARMONICS SPECIFICALLY

Steps of the process



WIND AND PV CONVERTERS

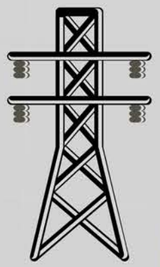
Modelling

- IEC 61400-21 (Power Quality assessment)
- PowerFactory model

CALCULATION

Integration of model and measurements

- WTG/PV Inv – Current sources
- PoC – Voltage source
- IEC 61000-3-6 (PowerFactory)



POINT OF CONNECTION

Measurements

- IEC 61000-4-30
- Specific procedure of target country

RESULTS

Reporting

- According to TSO / DSO requirements
- According to Client's
- requirements

Method: National requirements (PO9, G5/4, IEEE519, etc.) + IEC standards

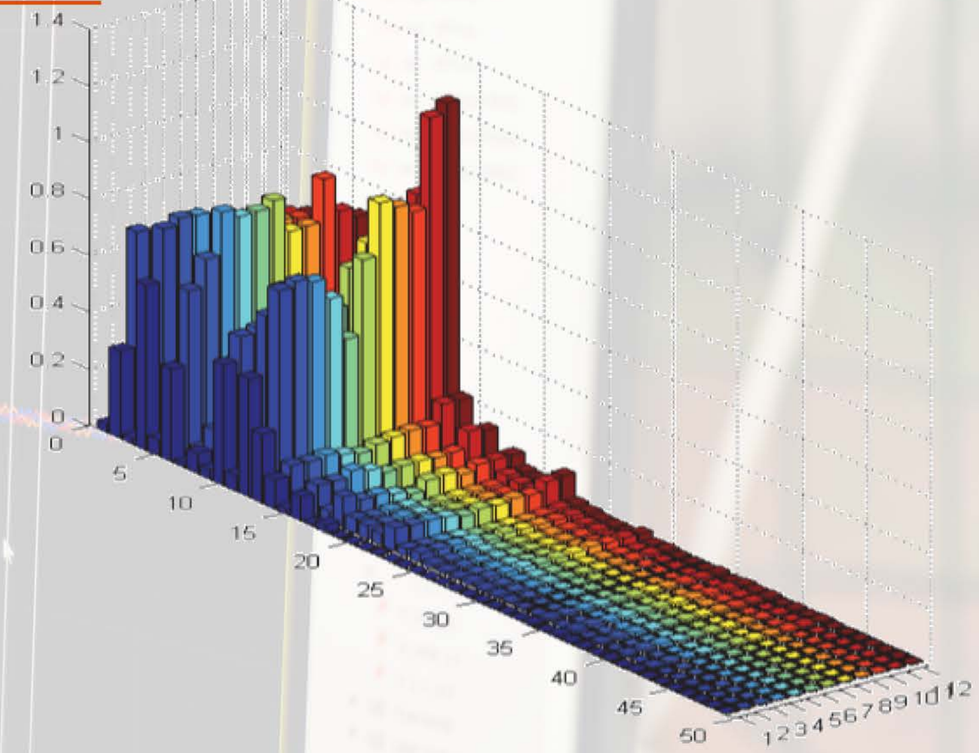
POWER QUALITY, HARMONICS SPECIFICALLY

Different conditions, different values

Picture of harmonic results in any condition of operation

Exemplary figure:

- X axis, from 0 to 50:harmonic order
- Y axis, from 1 to 12:production of the wind power plant
- Z axis, from 0 to 1.4: amplitude of the harmonic in %



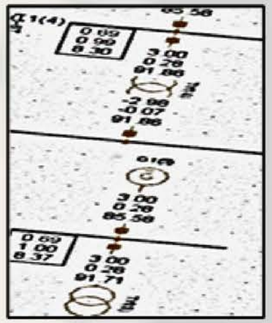
Dependency of the results:

- Production of the Wind Power Plant
- Operation mode of the Wind Power Plant
- Status of the reactive power compensation system

Complete set of results – Custom reports

FAULT RIDE THROUGH CAPABILITY

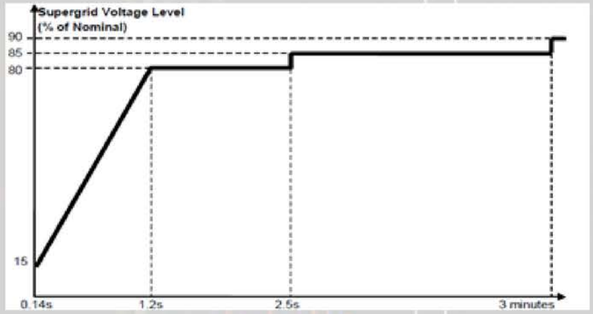
Modelling



Fault definition
Modelled in reference software

- Impedance adjustment without WPP
- Depth & time according to standards

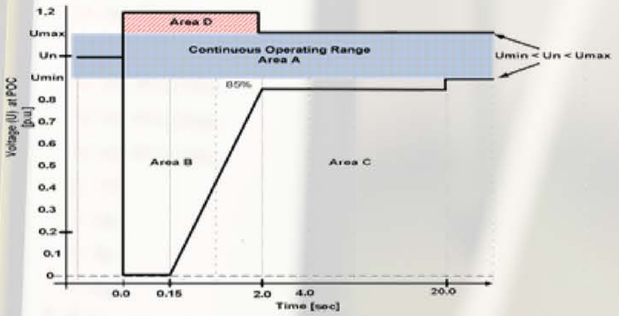
UVRT



Under Voltage Ride Through (e.g. UK)
Checking requirements:

- Checking the WPP withstand capability
- Dynamic Grid Support

OVRT



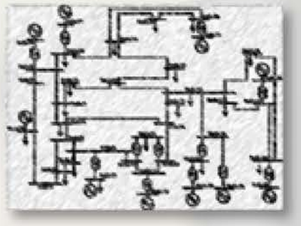
Over Voltage Ride Through (e.g. ZA)
Checking requirements:

- Same process than UVRT. Usually, to verify reactive current absorption

Definition of voltage profile at POC without WPP → Reporting of WPP parameters facing the fault

EMT STUDIES

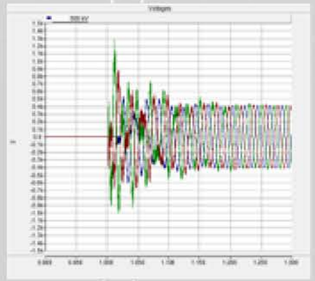
Steps of the process



RENEWABLE POWER PLANT AND POWER GRID

Modelling

- Cables & Circuit breakers
- Transformers (hysteresis included)



WHAT TO CHECK, e.g.

- Switching over-voltages
- Transient over-voltages at a CB vs TRV
- Energizing and de-energizing capacitors
- Over-voltages after lightnings

ANALYSIS

Through ATP, PSCAD or similar

- statistical analysis
- considering non linear effects
- according to manufacturer data

RESULTS

Reporting

- information about overvoltages

Method: manufacturer data + EMT analysis + statistical analysis

Laboratory Capabilities

EMC

- Full Anechoic Chamber of 3 meters and up to 6GHz both in emission and radiated immunity.
- Complete test capacity of IEC 61000 in both radiated and conducted.

Test Benches

- ✓ Test bench up to 500kVA for converters
- ✓ 3 test benches up to 166kVA with parallel connection capacity.
- ✓ DC voltage range up to 1500V and AC voltage range up to 800V and 400Hz
- ✓ Passive loads up to 100kVA and electronic load up to 500kVA for island testing.

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Environmental and Climate Laboratory

TEMPERATURE RANGE FROM -40ºC TO 85ºC WITH 85%RH OR 125ºC WITHOUT HUMIDITY REFERENCE.

- ✓ Low temperature chamber
- ✓ High temperature chamber
- ✓ Temperature chamber
- ✓ Dycometal temperature chamber
- ✓ Binder temperature chamber
- ✓ IP and Nema Camera
- ✓ Vibration table
- ✓ Saline atmospheres chamber

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