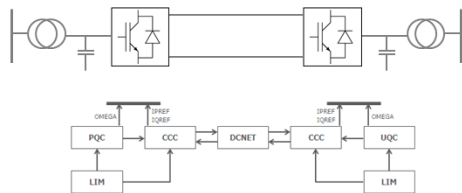


Release 5.1

EUROSTAG® Release 5.1 continues with the successful concepts of the *EUROSTAG®* software while adding new powerful features improving the business processes of network planners, network operators, consultants and researchers.

HVDC



After focussing on distributed generation in *EUROSTAG® - 4.3*, on user-defined automatons and protective devices in *EUROSTAG® - 4.4*, wind turbines and combined cycles in *EUROSTAG® - 4.5*, the central theme of the new release, *EUROSTAG® - 5.1*, is HVDC technology. HVDC systems are increasingly used for interconnections and wind power connections, and even allow for the development of supergrids.

The growing importance of HVDC technology in power systems calls for accurate modelling and detailed calculations: Significant efforts have been made to allow *EUROSTAG* meet these challenges:

- The Load Flow computation module has been completely rewritten: the AC and DC systems are now solved simultaneously, thus greatly increasing the user friendliness. The static equipments library, which already contained a Current Source Converter (CSC) model, has been enriched with a Voltage Source Converter (VSC) model. *EUROSTAG®* static modelling covers now the full spectrum of HVDC systems, from single links to complex multi-terminal installations.
- An accurate dynamic VSC model has been developed. True to the *EUROSTAG®* philosophy, the model is extremely flexible, and allows for the representation of complex multi-terminal HVDC systems. A simplified model is also available for use when the HVDC system is not the main subject of the study.
- Two new exercises have been added to the tutorial, covering the whole process of HVDC simulation from the Load-Flow configuration to the dynamic simulation.

New and improved static modelling

New equipments and functionalities have been added in the static model. In addition to the HVDC modelling extension, we also added the SVC while supporting new regulation modes for generators (voltage of step-up transformer) and transformers (flow). These new equipments and developments allow for a more realistic modelling of the system, a better compatibility with international standards (CIM and PSS/E for example) and an easier mapping between the static and the dynamic models. The PSS/E import has been updated and is now supporting the last version (33).

The EUROSTAG API: The way to automate the simulation and the control of your system

Dynamic simulations are now more and more used as part of a whole process dedicated to complex control algorithms to improve and to optimize the system operation. *EUROSTAG® - 5.1* is now delivered with an Application Programming Interface (API) allowing the user to integrate the power of the *EUROSTAG®* dynamic simulation engine into an external process. With this API, the simulation can be controlled from an external program or script implemented in Matlab, Python, C++ or other software able to interact with C-based external libraries. A scenario can be played, paused and restarted after having retrieved all the necessary information from the system and the behaviour of the dynamical simulation can be modified at

every moment based on the control actions calculated in the external program. This new API opens the doors for new applications to better control and optimize your system.

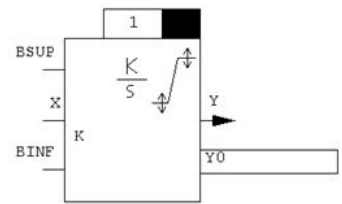
CIM compliance



RTE and Tractebel Engineering actively collaborate to the definition of the dynamic extension of the CIM ENTSO-E profile. In addition to the already supported CIM ENTSO-E profile Revision 1, *EUROSTAG® - 5.1* proposes the import and export of dynamic standard models in the 2012 draft of the CIM ENTSO-E profile Revision 2. In the frame of this CIM version, several standard models (turbine governor, system stabilizer, excitation system, mechanical and static load) have been added to the standard model library and can be directly used.

Enriched and more flexible macro-language (user-defined modelling)

In addition to the static modelling enhancements, a new block, the "Variable limits integrator" has been added to the Eurostag macro-language. This powerful block will allow for a better support of the CIM standard models. Furthermore, the "Simple lag", "Limited Simple lag", "Lead lag" and "Limited lead lag" blocks are now accepting a zero time constant. This allows also for a greater flexibility, an increased productivity and a wider compatibility when importing models from other software.



User-friendliness

The use of user-defined models becomes ever more widespread and their complexity grows as well. Providing support to the user for problem analysis becomes a priority. In case of failure of the simulation, the list of variables which contribute the most to the error is provided to the user to enable him to understand what happened and possibly adjust its model or simulation parameters to address them.

In the Post-processor, a "Measure tool" functionality has been added allowing a better curve analysis. The COMTRADE (Common format for Transient Data Exchange for power systems) format is now supported for export.

New functionalities in the Network Editor

In order to facilitate the one line diagram drawing, the list of the connected equipments is provided by the new "connectivity analysis" functionality. Several additional useful functions are introduced such as the deletion of a graphical object without deleting the electrical data, the possibility to display the name of the equipments in their cartridge,... All the parameters of the cartridge configuration are now saved in addition to the colourisation parameters. Combined with the saving of the five latest configurations used, analysing results in the Network Editor becomes easier and more efficient.

Thanks to the expertise of the power systems engineers and development teams of Tractebel Engineering and RTE, who are directly involved in complex power system exploitation, the new features developed for the release 5.1 will contribute to make EUROSTAG a unique worldwide reference for dynamic simulation.

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