

## THE PULSED POWER SUPPLY SYSTEM FOR IGNITOR

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Thyristor amplifiers are adopted to drive the IGNITOR poloidal (PFC) and toroidal (TFC) field coils generating the magnetic field necessary to confine the plasma column. In particular to regulate the plasma current and to control both plasma position and shaping, a distributed PFC system, made of 13 up and down symmetric coils, has been designed. The most appropriate current distribution within each PFC has been identified and the coil geometry modified, easing the requirements on the power supplies and on the adopted materials relative to previous analyses. An iterative optimization process of the whole power supply system, complying with the adopted plasma evolution scenario requirements, has been carried out in collaboration with ANSALDO Ricerche and ASI Robicon. The results of the relevant analysis are reported, noting that the total installed power (defined as  $V_{max} \cdot I_{max}$ ) has been reduced from about 3300 MVA to 2400 MVA.

The IGNITOR power supply system is connected to the 400 kV National Grid. A detailed study, involving also ANSALDO Ricerche, ASI Robicon and CESI, has been conducted with the purpose of reducing the requested reactive power and the current harmonics injected into the Grid by the thyristor amplifiers. In addition, an integrated Static VAR Compensator (SVC) and Harmonics Filtering (HF) unit has been designed to be installed on each secondary windings of the four main step down transformers (400/36/36 kV, 2x130 MVA). The final design of the SVC+HF unit is shown.

Thus, the peak power requested from the 400 kV Grid is 1000 MVA, including total 480 MVA locally generated by the SVC units. The appropriate government authority (GRTN) has carried out an in-depth analysis of the connection of the IGNITOR power supply to the Rondissone node (near Turin) that is the reference site for the experiment. The power requirements (max active power, max reactive power, max active power negative/positive steps and max frequency variation) were found to be consistent with the European 400 kV grid operational requirements.

In the context of the overall plant layout, all the power supply components are designed as of the outdoor kind. In particular, the power amplifiers, together with all power control and conditioning systems, are located inside standard containers that are electrically connected with the loads by means of outdoor, segregated bus-bars.