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MVDC 1 GW-scale MgB_2 Power Cables for the Green Superconducting Line of the Italian IRIS Facility and for the SCARLET EU Project

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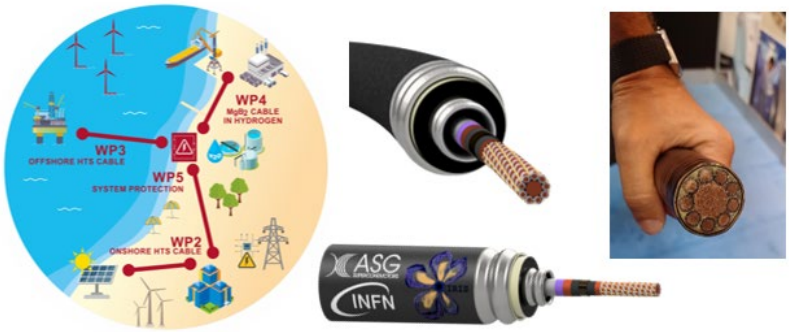
***Abstract*—In recent years, a large production of MgB_2 wires has been demonstrated for the manufacturing of high-current cables for several applications. In the scientific sector, the most important application is in the powering cables of LHC HiLumi magnets. Other projects are proving that cables based on MgB_2 technology are economically and technically viable solutions to energy transmission challenges in electricity grids, heavy industrial plants, and in connecting renewables.**

Two projects are supporting the development of MgB_2 superconducting lines: Iris and Scarlet. Iris is an italian NRRP (National Recovery and Resilience Plan) of Next GenEU funded project leads by INFN that aims to strengthen the infrastructures on the Italian territory in the field of high-temperature and high-magnetic field superconducting technologies. ASG will supply a single pole cable of 130 m long, transporting current up to 40 kA under 25 kV MVDC corresponding to a 1 GW power scale. This cable would be the highest power superconducting cable operated under medium voltage. The Iris facility will be equipped with a 500W/20K gas He cooling station, with a 40kA current power supply will be supplied at 25 kV and a monitoring system. The test facility will be made available in the future as an open-access platform for research institutes and companies to test any type of superconducting cable. Iris cable project will be completed within 2025.

Scarlet is an EU funded project supporting the development of GW class superconducting solutions for the grid, and in which one of the demonstration activities is about the manufacturing and testing of a 20 kA, 25 kV MVDC MgB_2 cable cooled in liquid hydrogen. Scarlet is expected to complete within 2027. In this paper, an overview of the ASG projects on superconducting cables will be presented, focusing on technical challenges encountered during the design and manufacturing phases.

***Keywords (Index Terms)*— MgB_2, Power Transmission Cable, Hydrogen, Power devices**



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