

High Field HTS SMES Coil

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Abstract - This paper discusses the recent test results of a high-energy-density coil for a Superconducting Magnetic Energy Storage System (SMES), built with High Temperature Superconductors (HTS). The magnet coil was successfully operated at 12.5 T at 27 K during the initial operation. This is the first time that such fields and energy densities have been generated at a temperature over 10 K. This coil was part of “high risk, high reward” R&D program funded by the US DOE/Advanced Research Projects Agency-Energy (ARPA-E) to develop a SMES system including a power electronics interface. The team included staff from ABB, Brookhaven National Laboratory (BNL), SuperPower and the University of Houston. The HTS conductors were fabricated by SuperPower. BNL’s Superconducting Magnet Division (SMD) designed, built and tested the HTS SMES coil that included several innovative features. The paper also provides an overview of the design and construction of the coils that have a design goal of 24 T at 4 K in a 100 mm bore solenoid.

Keywords (Index Terms) – High Temperature Superconductor, HTS, high field magnet, solenoid, Superconducting Magnetic Energy Storage, SMES.