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High Temperature Superconductors for the Electric Power Grid

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High Temperature Superconductor power equipment is positioned to play a key role in addressing our national and global energy challenges. While the most obvious benefit is efficiency by using the superconductor's lossless current flow to cut the 10% power lost in the grid, other benefits are likely to be even more impactful. These benefits arise from the high current density of superconductor wire which enables design of highly power-dense and compact equipment including high capacity cables and rotating machinery – generators and motors. Vast and dense urban areas are becoming home to an increasingly large proportion of world population, and high capacity ac superconductor cables offer a non-interfering and easily installed solution to increasing urban power needs. Longer term, the ultra-low loss of long-distance dc superconductor cables offers strengthened links and power sharing across wide geographical areas. Compact superconductor generators are the key to high power off-shore wind turbines, a major source of renewable energy. Some of these applications have reached a sophisticated level of demonstration, initiating commercial use.