

## Hybrid Energy Transfer Line with Liquid Hydrogen and Superconducting $MgB_2$ Cable – First Experimental Proof of Concept

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**Abstract** - Transfer of high-power flow over long distances will be the one of the major task for energetics in this century. Liquid hydrogen's attraction is clear -- it has the highest energy content of any known fuel and when it's burned, the "waste" is water. It could be transferred via cryogenic tubes like other cryogen liquids. Moreover, with the use of "gratis" cold to cool a superconducting cable an extra electrical power can be delivered with the same line. One of solutions is to use of  $MgB_2$  based DC power cables with single phase liquid hydrogen as a cooler and energy carrier. The team of Russian researchers developed and tested the first experimental prototype of the future hydrogen and superconducting energy transport system. In the paper presented the analysis of superconducting materials to work at temperatures  $\sim 20K$  are considered and choice of  $MgB_2$  is justified. Experimental  $MgB_2$  cable design and test facility are described. Test results of the first proof of concept of hybrid energy systems are presented. Future prospective of hybrid energy transfer systems is discussed.

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