



Superconductivity for  
Sustainable Energy Systems  
and Particle Accelerators



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## Energy recuperating 4-quadrant power supply for inductive loads

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Over the past years the institute has developed an high-current power supply that can drive 14 kA into coils at a voltage of up to 25 V. Right from the start due to power grid limitations and energy conservation considerations a capacitor bank was included into the layout. This allowed the high-current power supply to be designed in a massively parallel H-bridge configuration.

Thus a full 4-quadrant operation is possible: Together with the capacitor bank the H-bridge enables an efficient recuperation of the magnetically stored energy in the powered (superconducting) inductance back into the capacitor. The stored electric energy can be exchanged between the capacitor bank and the superconducting coil with arbitrary polarities for current and voltage independently. A rather small 20 kW power supply replenishes the resistively lost energy in the copper bars and current leads while more than 300 kW are transmitted to and from the magnet.

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