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(54) **POWER SUPPLY ASSEMBLY WITH REACTIVE POWER COMPENSATION**

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(57) **ABSTRACT**

A power supply assembly including a source connection system including a primary source connection, a load connection, a converter system including at least one converter controllable for reactive power compensation, an energy saving transfer route connecting the primary source connection electrically to the load connection, and bypassing the converter system, and a control system. The control system is adapted to provide an efficiency optimization operation including transferring energy through the energy saving transfer route, and controlling the converter system according to an optimal operating scheme that optimizes efficiency of the power supply assembly while keeping reactive power drawn from the source connection system within a required range, wherein the optimal operating scheme defines an optimal combination for the converters used for reactive power compensation such that each of the converters operates in a predetermined optimal efficiency range thereof.