The field-weakening operation of a doubly fed induction generator (DFIG) connected to a dc-link is analyzed in this paper, in order to optimize the efficiency. In the considered DFIG-dc system, the stator feeds a constant-voltage dc link by a diode bridge, and the rotor current is controlled using a voltage-source inverter connected to the same dc link. Since the stator voltage amplitude is imposed by the dc-link, a variation in stator flux magnitude results in a frequency change. However, in this system, a stator frequency variation over a wide range can be accepted, if the rated flux is not exceeded. Thus, the stator flux amplitude can be adjusted through the magnetization current component by the voltage-source inverter and according to the load level, in order to reduce losses in the machine and in the inverter. This paper presents an optimization analysis and simplified formulae determining the optimal reference magnetization current in the control of the system. Conversely to field weakening in conventional drives, in this case, the enabling of field weakening control is not dependent on rotor speed, but depends on the reference torque. The proposed optimal control is validated through simulation and experimental results.