

Economic and Environmental Aspects of Energy Recovery to Complement Conventional Alkaline Batteries Recycling*

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Abstract

The article discusses a method of recovering energy from alkaline batteries to be recycled. The undertaking of a particular research topic was motivated by Author's observation of the energy waste associated with not fully discharged primary cell being recycled. It is estimated that at battery collection points for recycling, it is possible to find about 30% of primary cells from which the energy stored in them can be recovered. The proposed recovery method is based on increasing the voltage of discharged batteries by using a STEP UP converter. With this solution, it is possible to extend the life of the batteries and thus extract from them more energy than with traditional methods. The Authors have carried out comparative studies using a laboratory bench of their own design and presented the benefits of this type of solution. This article also describes a proposal for the recovery of electrical energy from partially depleted alkaline primary cells with the possibility of its transformation into AC current and voltage, with parameters consistent with those required for powering household devices. Such parameters were obtained by using an inverter. The benefits of such solutions are shown graphically on the characteristics made with both variants of battery connection. It was proven in the research that by raising the voltage on partially discharged batteries it is possible to extend their life by up to 23%. Raising the voltage alone ensures stable operation of the inverter.

Keywords: Alkaline Primary Cells, STEP UP Converter, Inverter