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Abstract:

In the 21st century, a great amount of electrical and electronic waste (e-waste) has accumulated, and the unregulated nature of its disposal and recycling represents a particular hazard in a global context. For the purposes of e-waste management, there must be more emphasis on the scientific processes for recycling, reusing and remanufacturing precious materials. Resource management is related to energy management; therefore, the harvesting of costly materials from e-waste is important for both energy management and sustainable development. At present, a lack of scientific recycling of a significant amount of e-waste is a source of environmental pollution and health hazards that are having a detrimental effect on sustainable development goals. It is necessary to find a process for recovering valuable materials from e-waste with the minimum possible environmental impact. At present, it is essential to modify the process of electrical and electronic products (e-products) becoming e-waste, and the subsequent process of e-waste recycling, in order to lessen the impact in terms of pollution. E-waste scientific recycling initiatives can reduce the environmental impact of the process, which in turn can support a shift from the current linear flow of costly materials to a more sustainable circular flow. Furthermore, internal consumption loss, emissions, and heating loss from e-products are the main factors contributing to the loss of energy efficiency in the process, which in turn contributes to environmental pollution. Promoting green innovation in the manufacturing process of e-products, as well as their reuse, can reduce the environmental impact of e-waste in near future. Both of these pathways are imperative for a less polluted, low-toxic environment and sustainable development. However, the sustainable development initiative of the United Nation Environmental Programme (UNEP) policy framework is the ultimate goal. This is expected to support the management of environmental pollution, maintaining it at an acceptable level, while also preventing hazardous risks to human health. Hence, this review examines the prospects for achievable environmental sustainability through technological developments.