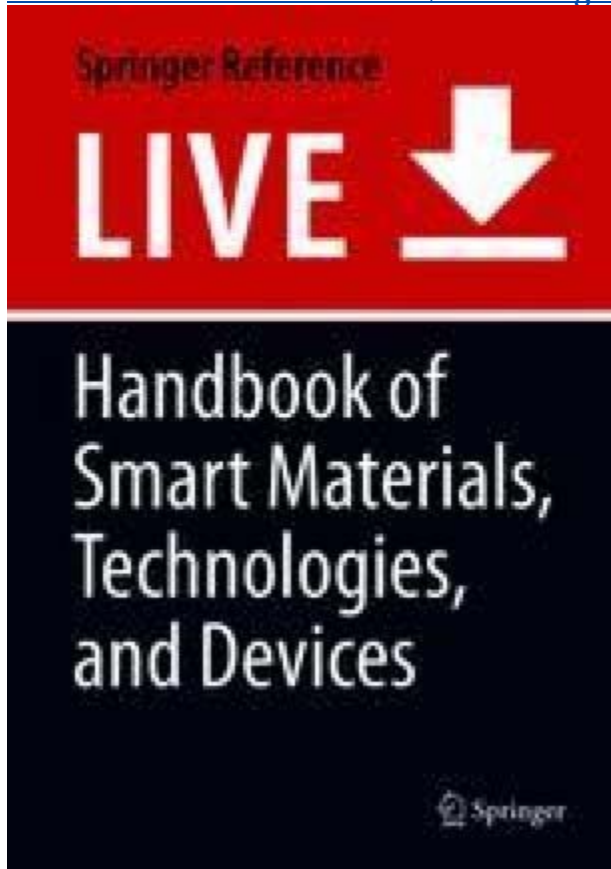


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Fossil Fuel Combustion, Conversion to Near-Zero Waste Through Organic Rankine Cycle

- [Authors](#)
- [Authors and affiliations](#)
- A. B. Fakeye
- S. O. Oyedepo
- O. S. I. Fayomi
- J. O. Dirisu
- N. E. Udoye

Abstract

Zero waste manufacturing (ZWM) conceptually transforms the economies of nations to a circular economy by employing sustainable technologies in reducing waste to barest minimum possible through the entire value chain. A number of indicators have therefore been proposed by many researchers to assess zero waste management right from producing raw materials to product manufacturing and finally waste disposal. Much attention has been given to waste disposal and recycling in ZWM. However, for better resource efficiency, zero waste index (ZWI) was proposed to quantify energy, material, and water conservation through recycling efforts rather than simply measuring waste diverted from landfills. The most significant influence on the earth is energy generation and consumption. Hence, to limit the exploitation of the earth within its carrying capacity, the zero waste energy index (ZWEI) is hereby proposed to assess and promote energy efficiency in value chain through low-grade energy utilization and waste heat recovery (WHR). The ZWEI is a measure of the energy efficiency in product manufacturing processes and the potential of energy recovery from product waste. In this study, organic Rankine cycle (ORC) technology is being proposed to achieve ZWEI in energy-intensive industries.

Keywords

Zero waste energy index Organic Rankine cycle Waste heat recovery Energy conservation Low-grade energy

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