

Electrification Potential of Light Construction Equipment

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Abstract

In addition to the imperative of limiting greenhouse gas emissions from construction equipment, local emissions such as particulates, soot, and noise impact human well-being on construction sites. While there is evidence that electrification of machinery offers advantages for smaller equipment classes, such as power tools, electrified hand-operated construction equipment has not yet seen market readiness on a wide scale. Hence, this paper aims to assess the opportunities and limitations associated with electrified hand-operated construction equipment. First, a clear delineation of this equipment category is established by proposing a precise definition of "light construction equipment" (LCE). Methodologically, expert interviews are conducted in conjunction with a product portfolio analysis and a systematic literature review. In addition to technical characteristics and boundary conditions commonly encountered in construction environments, the evaluation considers typical construction processes for which LCE is utilized. The study's findings suggest a fundamental gap in research into LCE's considerable potential for emission-free operation. The paper also finds that adoption rates of electrified LCE are highly dependent on typical employment scenarios, construction process sequences, and the existing infrastructure on-site.

Keywords

Construction Equipment, Light Equipment, Compaction, Electrification, Zero-emission, Battery-powered.