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Abstract

This comparative life-cycle assessment highlights three main alternatives for renovation of waste water sewerage: pipe replacement, cured- in- place pipe (CIPP) lining (also called sliplining) and renovation by coatings. The functional unit of this study is a six-story block house that was built in 1960 and has 29 apartments. The characterized results of environmental impacts display an advantage for CIPP-lining over pipe replacement in 14 of the 18 studied impact categories. Regarding those categories in which impacts were comparatively large, when looking at the average impact from a European citizen according to the ReCiPe methodology for life cycle inventory list, pipe replacement has greater impacts than CIPP-lining. In general, the impacts of pipe replacement are related to new tiles, expanded polyester cement, the screed, and the material for waterproofing, as well as the electricity needed for drying the structure. The CIPP-lining method displays higher impacts than pipe replacement in just four categories. These impacts are, to a large extent, caused by the use of consumables such as gloves and cotton cloths. From an LCA-perspective, the study shows that the CIPP and coatings relining methods have advantages over pipe replacement under the condition that the technical lifetime is the same for these methods. Still, the uncertainty of service life, as well as Bisphenol A (BPA) emissions, remain as issues of concern for further study. There are also other differences among the alternatives that ultimately influence a property owner's choice of method, such as costs, inconvenience for the residents, renewal of bathroom interiors, and the way in which the property owner values the alternative technologies.

Graphical abstract

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