

A COMPARISON OF CIRCULAR CONSTRUCTION & DEMOLITION DEBRIS MANAGEMENT IN TWO US CITIES USING THE CIRCULARITY ASSESSMENT PROTOCOL (CAP)

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Abstract

With their position at the frontlines of local consumption and waste management challenges, cities are critical to advancing the global circular economy (CE). As research continues to advance our understanding of how the CE can be translated into practice, there is growing recognition that circular interventions must consider the unique attributes of local economies, policies, and cultures. The Circularity Assessment Protocol (CAP), developed to meet this need, provides a standardized, but adaptive assessment for evaluating the full life cycle of material management to develop context-sensitive CE strategies in cities. Originally developed to focus on fast moving consumer goods such as single use plastic packaging, we present a variation of the CAP aimed at exploring construction and demolition (C&D) debris, which accounts for one of the largest waste streams globally. Specifically, the C&D CAP employs a hub-and-spoke model incorporating seven key elements: C&D analytics, building materials & construction, community, use, collection, end-of-cycle, and C&D emissions. Like the original CAP, the central hub brings together considerations of local policy, economics, and community influences from stakeholders including industry, academia, NGOs, and government entities. Here, we present an overview of translating the conceptual framework of the CAP to the C&D waste context and report pilot findings in two US-based case studies: Atlanta, Georgia and Pittsburgh, Pennsylvania.

Our comparative analysis of Atlanta and Pittsburgh revealed distinct challenges and opportunities in advancing C&D circularity in these respective contexts. Atlanta's rapid growth and development in recent years presents opportunities for implementing circular design principles focused on integrating recovered materials into new construction and developing a local appetite for concepts like deconstruction and design

for disassembly. In contrast, Pittsburgh's shrinking population emphasizes the need for reducing new construction, strengthening the city's existing deconstruction ordinance. Both cities face unique barriers in material recovery and reuse, as well as illegal dumping and abandoned properties, all of which are influenced by local policy frameworks and market conditions. This research advances the understanding of community-scale CE implementation by integrating principles of urban metabolism, geospatial analysis, and qualitative research methods. The adapted CAP framework also provides these municipal cases with a comprehensive tool for baseline assessment and identification of intervention strategies in C&D waste management. This work contributes to the growing body of knowledge on local scale CE applications and offers a replicable methodology for other cities transitioning toward circular building practices.