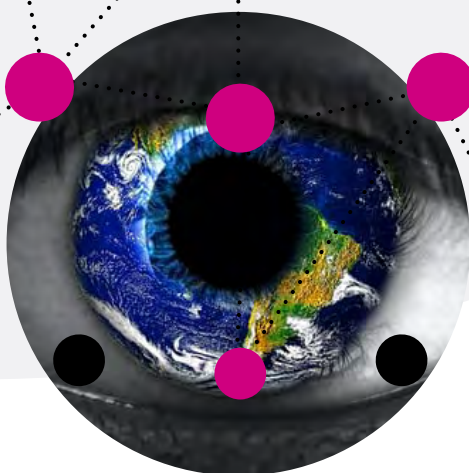




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# PRE-DEMOLITION ENVIRONMENTAL ASSESSMENT AND DECISION-MAKING FOR SOCIAL HOUSING (PREADEM)

## **The Challenge: What We Were Trying to Achieve**

The PreaDeM project aimed to improve circularity outcomes in the social housing sector by providing data for better decision-making. This requires quick estimation of materials in existing assets and their reuse potential, including those with high embodied carbon. However, there has been little work in circularity for social housing, with a lack of data and related measurement tools being a key challenge. Additionally, there has been little integration of circularity into asset management decision-making, which is primarily driven by operational energy and related costs. This has led to a focus on upgrading to meet carbon emissions targets with little consideration of embodied carbon. Therefore, there is a need for Pre-Demolition Environmental Assessment and Decision-Making (PreaDeM) support via a user-friendly platform to inform circularity decisions and raise awareness.

## **The Approach: How We Tackled the Challenge**

The team conducted a feasibility study to determine how to measure the type and number of materials, products, and elements in a residential building and how best to a) reuse and b) recycle them at the end of their life. Currently, pre-refurbishment and pre-demolition audits are used, but they can be time-consuming and carried out too late to be effective. The team's strategy was to develop an "automated bill of quantities" that links publicly available information on UK housing to building component specifications to generate detailed outputs of material quantities expected from the refurbishment/demolition of individual dwellings. This will enable better and quicker decisions on the future of buildings, including whether to refurbish or demolish them, and the impact on materials and operational and embodied carbon.

In line with the circular economy principles, it is important to retain the value of the materials that

may arise during refurbishment or demolition, i.e., they should be reused or recycled at the highest value possible. The project focuses on social housing since the property owner has an inherent drive to optimize their assets while considering the carbon and cost impacts of their operations. The team engaged with social housing providers to develop their thinking and methodology, which was then tested on several case studies of social housing developments across the UK. The case studies benefited from a collaborative approach by the project partners, bringing a breadth of knowledge and expertise in survey methods, building dimension modeling, operational energy, embodied and whole life carbon to support the core circularity expertise that drove the project.

## **Unexpected Outcomes: What We Learned Along the Way**

In the discovery phase of the project, the team began to appreciate how the current social housing sector has a relatively low level of understanding of the principles of circularity, and a relatively low level of understanding of how to address the issue of reducing carbon impact over the life cycle of a building asset. While this is starting to change in a number of quarters, it is still at an early stage for many. The day-to-day requirements of property maintenance and renewal, and other factors and influences including financing and the need to provide safe, healthy homes often take priority, and in many ways this is understandable.

We concluded that, to develop a successful methodology and toolkit, we needed to work within existing priorities and practices, making use of the existing systems and information that is available. That said, there was a clear desire in the sector to understand the positive outcomes and benefits that a more circular approach can bring, and a willingness in the sector to bring together those stakeholders who can act together to make a difference.

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It became clear that we need to develop methodologies and tools that are simple to use and understand, jargon-free and accessible to the different actors who play a role in housing regeneration and renewal.

### **Key Learning: What We Would Do Differently Next Time**

Key insights developed include:

- Reuse, recycling, and embodied carbon are low priorities in redevelopment options
- Site use intensification and providing healthy and safe homes take priority
- Early-stage option appraisal needs to include reuse, recycling, and embodied carbon considerations
- Only a quick and easy desktop tool will be used for early-stage option appraisals
- The desktop tool can be embedded into existing energy efficiency software used by social housing providers
- More accurate pre-demolition audits will still be needed for planning assessments
- The project developed a feasible tool to meet these requirements.

### **The Outcome: What We Achieved and How It Has Impacted the Business, Society and Key Stakeholders**

The team developed a draft methodology and a toolkit to aid decisions regarding whether to demolish or refurbish social housing assets. This approach can be applied to individual dwellings or groups of dwellings, and extended to site-wide regeneration and master planning. We have an initial idea of the dashboard for the tool and the necessary data. We made significant progress in integrating publicly available data (such as EPC assessments, Google Streetview, and Ordnance Survey) with the data from pre-demolition and pre-refurbishment audits based on a physical site survey.

We have essentially developed the concept of a pre-redevelopment toolkit which includes a desktop version that could be valuable for social housing providers, local planning authorities, and government agencies in early-stage option appraisal of reuse, recycling, and embodied carbon implications. It also fulfills the requirements of the circularity auditing process

of the planning process and enables a skilled assessor to quickly evaluate the reuse potential of materials present in social housing assets with less time and effort, both on-site and off-site processing.

If fully developed, the desktop platform could be embedded into widely used energy efficiency software tools. This could raise much needed awareness of circularity by providing information on reuse, recycling and embodied carbon as standard outputs alongside estimates of energy and heating cost and carbon saving. This would provide a ready source of this information whenever options for redevelopment were under consideration.

### **Looking Forward: Next Steps and Future Directions**

Although primarily a feasibility study, the output includes an embryonic tool that the project team members can use to significantly expedite pre-demolition audits. This was demonstrated in developed case studies and there is interest from significant industry players in utilising the team's skills to deliver such audits on live redevelopment projects. This simply would not have occurred without Innovate UK funding.

Every use of the tool will result in its expansion and improvement. However, to expand its use beyond the expert team, it needs to be developed from a spreadsheet-based assessment to a web-deployable or API-embeddable tool. Contacts have been made with potential hosts, but it is challenging to engage them without fully developed software to offer.

We have continually emphasized the need to raise awareness of circularity through the project, and this does mean that it is difficult to self-fund the development needed. The team will therefore continue to seek funding to fully develop the tool but with relatively low levels of profitability expected it is likely this will need to be from public sources or extended to cover different sectors (e.g., commercial).

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