

Material banks and marketplaces

The starting point for circular construction is to transform buildings or reuse structures on-site, so that we do not have to handle CDW. When we do have to demolish or construct a building, a main challenge for circularity is to match supply and demand: to get the right amount of reused or recycled construction materials in the right quality and at the right time for a renovation or construction project. Physical material banks and digital marketplaces are essential to connect the materials from demolition sites (supply) with construction sites (demand).

This replication package presents the CityLoops experiences from establishing and running physical material banks for CDW and soil, as well as experiences with digital marketplaces.

Considering the tight and overlapping timelines in the construction industry, storage of secondary materials is necessary until their destination and onward use are confirmed. Local authorities may allocate space and explore local sites for the possibility of providing storage space as part of a reuse hub, but storage can also be provided by demolition or material handling companies. Many business models are currently under development e.g., land provided by local authorities, temporary land use prior to an urban project, private landlords and public-private co-operations. In CityLoops the examples are based on the municipalities allocating an area for temporary material storage in urban development areas.

Digital marketplaces are essential drivers for tracking and mapping resources. They enable matches between suppliers and procurers, by allowing the materials visibility and availability (where and when), and providing information (quantity, quality, cost). However, digital platforms do not have to be developed by local authorities themselves. Many of them are already headed by private companies and sometimes by public ministries. If possible, it is highly recommended to plug in to an existing one, as it will take time and money to develop a new website and it can be hard for one city to provide enough materials to attract users. The CityLoops cities started out by using digital databanks to provide an overview of their own accessible materials for their own projects, not for selling or exchanging resources with others – but this has already started to change.

Recommendations from lessons learnt

Physical material banks

- It is the municipality's responsibility to set demands for reuse and recycling regarding the handling of CDW as well as new construction.
- Incentives to buy reused materials are lacking, but demands in tendering will push the market.
- Different types of material banks require different set-ups and are useful in different scenarios. With temporary/pop-up material banks you can have fewer rigid rules, but with permanent/central material banks you need very rigid rules for what materials enter, their documentation (material passport), and who has access to these materials.

- Temporary material banks for large construction projects or urban development are recommended to avoid transport and support local reuse.
- Contractors are more likely to perceive less risk if they can see the materials.
- Local material banks can create large CO₂ and economic savings from reduced transport. However, sometimes longer transport is preferable for the best treatment of the resources.
- Contractors are very interested in using the temporary material banks for storing or collecting materials.
- Preparing the materials for reuse or recycling is a valuable service for a material bank – e.g., crushing concrete or measuring the quality of sand.
- EOW criteria apply when the materials leave the demolition site. Testing is a crucial part of dealing with the materials, some testing is needed to be allowed to put materials in a material bank, otherwise they are classified as waste.
- The environmental risk, as well as assessing usability should be handled before entering the material bank.
- It can be a challenge and takes some effort to digitalize the materials to make them visible to possible users and thus get a faster turn-over of the materials in storage.
- A material storage that is supported by automated sensors and a proper digital infrastructure linked to databases would be a great improvement

Digital marketplaces

- It is recommended to connect to a well-known digital marketplace instead of creating your own as it will take time and money to develop a new website and to attract users.
- When comparing different digital marketplaces, it is recommended to consider the following points:
 - The rates of effectiveness and efficiency of the matching process strongly differ.
 - Differences can be found in input and output.
 - Handling costs of the products offered are a traditional point of concern.
 - The ease with which one can upload the specifications of materials onto the platform is being tackled in different ways.
 - Insights in the environmental costs and benefits of reusing materials are not yet provided by every platform.
- Integration between the database storing information about the materials and the marketplace is difficult. Finding ways to automate and standard data entry is important to limit labour.
- The stakeholders are often sceptical to risk, insurance policies and legal issues. The marketplace should have a standard agreement between the seller/buyer under standard regulations that addresses the legal risk: the responsibility of failure of materials.

CityLoops instruments

- **Blueprint for replication: Databank and digital marketplace for recovered materials:** Mikkeli created their own databank and marketplace. It combines data from the 3D scanning tool (using drone imaging) and Miksei's demolition planning on construction materials (CDW) from demolition sites around the city of Mikkeli. The databank stores information on materials such as volume, location, date available, material composition and basic characteristics. This data about material stocks is then fed into the digital marketplace.
This instrument is available [here](#).
- **The digital marketplace DuSpot in Apeldoorn:** Different possibilities were investigated by the municipality, and they ended up choosing to use the existing digital material bank "DuSpot" DuSpot is already used by several municipalities in the Netherlands.. DuSpot is used to facilitate the reuse of materials needed and becoming available from Apeldoorn's construction projects in public space. DuSpot is also used to show the inventories of the material depots Apeldoorn is operating.
[Read more here](#) about why and how Apeldoorn is using DuSpot.

CityLoops demonstration experiences

- **Apeldoorn - Experiences with physical material banks and digital marketplace:** In Apeldoorn, the municipality operates soil sites and sand sites for temporary storage of multiple qualities and different quantities of soil and sand. Two new material banks were established to store other materials for public constructions. Pavers and other concrete products are being stored if they are destined for reuse within one year. Due to the depots limited size concrete for crushing and recycling is not stored at this site. Apeldoorn looked into designing their own digital marketplace but ended up by choosing to use the already existing marketplace DuSpot.
Read about Apeldoorn's experience [here](#) and in the [report](#) on facilitating a local soil and sand site .
- **Bodø - Intermediate storage and sorting area for soil and masses:** Bodø needed an area for this to enable reuse in project and between projects. They found an area close to Bodø city centre that can be used for four to five years before it will be regulated for industrial use, and they applied for concession to manage and store masses without heavy contamination. The storage will be used for several construction projects.
Read about [Bodø's experience here](#).
- **Mikkeli - Digital marketplace:** In Mikkeli, the databank stores information on materials. This data about material stocks is then fed into the digital marketplace. In the marketplace, currently available materials are listed. Relevant construction value chain stakeholders were involved in determining the functional characteristics needed. Read about [Mikkeli's experience here](#).
- **Roskilde - Reusing materials locally and exchanging them with neighbouring municipalities:** Roskilde has established temporary material banks locally to reuse

and recycle resources on-site in the urban development project in the Musicon area. They have now moved on to use a commercial digital marketplace, Upcycling Forum, and have meetings with neighbouring municipalities and the Roskilde Festival about exchanging materials. The platform has a public area for sale and a restricted area with materials to be exchanged. Procurement and risk management is addressed. Read about [Roskilde's experience here](#).

