

Urban Mining of buildings

Creating value by closing material flows



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Executive summary



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Urban Mining is an essential part of a circular construction economy

From the 'legacy' of existing buildings, we see opportunities to **create as much economic, ecological and social value as possible** by carrying out selective demolition of buildings, recovering as many valuable materials and products as possible from the demolition site or via a sorting centre and preparing them for recycling and reuse. This is called '**Urban Mining**'. Urban Mining is about much more than buildings: nowadays, materials are recovered from electrical appliances, vehicles and scrap too. But when it comes to quantities of materials (in terms of both weight and volume), the construction sector stands head and shoulders above the rest. Given that 35% of the total amount of waste generated in Flanders comes from construction and demolition activities, the construction sector offers great potential for the recovery and processing of materials and products.

Flanders has already set an exemplary trend. But what do the figures actually mean?

In 2015, Flanders produced approximately **15 million tons or 8.3 million m³ of construction and demolition waste**. Based on weight, more than **90% of that waste consists of stony materials** (concrete, bricks, roof tiles, etc.) and a maximum of 10% of non-stony materials (insulation, plasterboard, wood, etc.). Currently, as much as **95% of that stony fraction is recycled**, primarily in (sub)foundations for roads and buildings. At the same time, research and real-life experiments conducted at demolition sites indicate that there are significant obstacles preventing the full potential for Urban Mining to create added value from being unlocked. We give an overview of these below.

If we take a close look at the current demolition, processing and valorisation processes, we can see **3 main practical obstacles** preventing the potential of Urban Mining in Flanders from being strengthened:

1. Certainly in the case of **small projects**, there are still untapped opportunities for reuse and recycling because **demolition is not always selective enough**;
2. for **most non-stony materials** (with the exception of metals), the path from demolition to new application is often complicated by **technical and logistical obstacles** such as the lack of economically viable recycling technology or a shortage of local collection points;
3. The **demand for used construction products and recycled materials** in new buildings or other structures is **too limited**. The **difference in price between primary and secondary raw materials** is still too small for many non-stony flows to stimulate (very) selective demolition and separate treatment.

However, behind these obstacles there are more deep-seated and systemic barriers:

4. There is a **strong focus on the lowest price in the market** which leaves little room for quality improvement. There is also a lot of fair and unfair competition;
5. In the case of both the practical players and policy, there is **insufficient knowledge and data available**: there is limited insight into what happens with specific material flows; demolition companies and experts are not aware of all the recycling options available and the quality of the demolition traceability plan (*sloopopvolgingsplan*) differs significantly according to the expert in each case;

6. There is **little trust or transparency throughout the chain**: each party works for itself and tries to optimise its own costs/benefits;
7. In construction projects, demolition is **regarded as an afterthought**. The customer or main contractor wants to get rid of waste as quickly as possible and is not prepared to spend more time or resources optimising the closed-loop cycle;
8. There is **relatively little innovation within the demolition sector**: there are few innovative business models, support tools and partnerships and very little marketing. And the little innovation that there is, is initiated by major players who may hold a monopoly position.

From barriers to action-oriented strategies

Because the above observations are both of practical nature as they are systemic, the following action-oriented strategies have been determined:

1. To increase the offering of valuable materials and products from demolition via **very selective demolition** since a source-oriented approach is the best way to guarantee the most pure and uniform material flows.
2. To increase **the capacity** – both in terms of volumes processed and knowledge and experience – **for more reuse and recycling** in order to tackle technological and logistical thresholds.
3. To increase **the use of reclaimed and reused construction products and recycled materials** in the construction and other sectors while taking account of possible competition from new construction materials and products.
4. To include the **external impact of demolition and recycling works** in tenders and other decision-making mechanisms.
5. To share **knowledge and reliable data** relating to material and product flows generated via construction and demolition activities.
6. To create **engagement throughout the value network**, with costs and benefits being fairly distributed among all stakeholders.

7. To create a **demand by certain decision-makers** to actively participate in Urban Mining by highlighting the individual and social benefits.
8. To support an **innovative ecosystem** via new forms of collaboration and by setting long-term objectives



As shown in [the figure](#) above, some strategies have greater leverage to change the current system than others.

We have also defined an additional strategy that should enhance the potential for Urban Mining of our future building stock:

9. To design, produce and install construction products in buildings in such a way that they (1) can be used for longer, (2) can be removed and selectively dismantled/demolished easily and (3) can be recovered easily for reuse.

From strategies to packages of measures

The strategies will enable a coordinated set of actions to be determined which interact with each other and preferably support multiple strategies. We see the prioritisation of such sets of actions happening in co-creation with all stakeholders from the social pentagon (the market, policy, the world of finance, citizens & civil society and research centres). That should lead to a substantiated choice where not only the desired consequences but also possible compromises are mapped out. From the research group, we will take the initiative to present an initial set of priority policy actions and measures.

Implement the demolition inventory and the Demolition Traceability Plan as instruments for Urban Mining

If we want to upgrade the demolition inventory to a fully-fledged source of information for the Urban Mining of our buildings, then the integration of these instruments will have to be improved for (small) demolition companies and customers. The best way to do this is by providing such parties with better information on the potential benefits that they stand to gain. In order to gain an insight into the current residual value of materials and products, we recommend focusing on the digitisation of large existing buildings and their components. Digital building and material data can be linked to other databases quickly and easily in such a way that the offering of materials and used construction products is made more visible to requesting parties. Since the demolition inventory are already being used to collect material data in their current form, the data structure for these will have to be changed if we want to use them to determine the reuse potential of demolition projects too.

Focus on the environmental performances of (re)construction and demolition projects

Using clear criteria for material-related building environmental performances for construction permits can promote the use of recovered construction products and recycled materials provided that: (1) these materials and products score better in building elements in terms of environmental impact; and (2) the net environmental impact or profit relating to recycling and reuse processes is correctly integrated in LCA tools such as TOTEM.

Share the responsibilities between the chain partners

Chain responsibility provides a valuable framework for increasing the Urban Mining potential of certain valuable material flows, by distributing the costs and benefits of setting up a local network of collection points fairly, for example: (1) where within a sector, a party takes the initiative themselves in order to increase their capacity for recycling or reuse, the government can facilitate the process to spread the initiative across the whole sector and, if necessary, make it generally binding for the whole sector; (2) for sectors where no initiative is taken, the government can assume a regulating role via the Materials Decree which may involve imposing the obligation to accept or take back specific flows or jointly drawing up a collective plan.

Stimulate the setting up of communities of practice

Creating societal support throughout the construction and demolition sector is a long-term process. However, by specifically informing large public and private owners, demolition companies, architects, manufacturers and merchants about the known financial, ecological and social benefits that Urban Mining has to offer, they will become eager to be involved.

The best way to provide specific information is via *communities of practice*. These are focused consultation groups in which both lessons from practice are shared directly as well as practical tools such as technical sheets containing good and bad examples from practice, standard specifications and user-friendly information for purchasers.

As large public customers, authorities can take a pioneering role in this and – as policy-makers – formulate challenging long-term ambitions.

The afore-mentioned strategies will also provide a practical guide for formulating mutually reinforcing measures for increasing the Urban Mining potential in Flanders.

Professionalise companies and processes within networks

Various steps can be taken in order to professionalise operation within companies and chain processes:

- **Digitisation and sharing information.** Using digital techniques to draw up inventories, material passports and mass balances will enable information to be shared more easily and effectively between the various parties involved in the process and will enable certain steps to be accelerated and/or automated.
- **Training and knowledge enhancement.** Better access to knowledge via databases and informative websites and above all increasing the knowledge of the parties carrying out the work on site will enable the right choices to be made in practice.
- **Making pioneers and frontrunners more visible.** Acknowledging pioneers and reliable companies can help with the organisation and regulation of the sector.
- **Install an open innovation culture.** By challenging itself and actively seeking research, development and innovation budgets, the sector can evolve further and respond to new challenges and trends such as the increasing degree of composite materials, glued materials and sprayed products in demolition works.

Work together and exchange information

There are also major benefits to be gained within the ecosystem of demolition, processing and recycling companies and experts, and better organisation and collaboration can lead to better performances and positive impact.

- **More consultation and platforms** for exchanging information are required in order to understand the viewpoints and current practices of the various parties. Those platforms can also provide an opportunity to exchange *best practices* and learn lessons from projects and experiments in order to then strive for improvement.
- **Focus on standardisation, harmonisation and better arrangements.** The demolition, recycling and reuse sector is typically made up of SMEs. Companies of this type are not as well represented within bodies and working groups which draw up standards, type specifications and certification regulations. Given that barriers are often perceived within these, it is recommended for resources to be made available in order to enable the active participation of such companies and federations.
- Following on from the above point, **type documents** drawn up by the sector itself or in concertation with the government are a good way of boosting the general level of quality within the sector. These include type specifications and model documents but also codes of good practice, inspiration documents and technical information notes. Documents of this type enable customers to direct their focus and ask the right questions in projects.
- Finally, the sector itself can actively search for **new business models** and methods for **better mutual collaboration**. Here, we are thinking of vertical integration where the whole chain from demolition to a new application is brought together within a single business group. In addition, more cluster-based forms of collaboration in which each company retains some of its individuality and specialisation but where there are very active exchanges and a joint approach is adopted, can also provide a solution.



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