



White paper

Construction Materials Exchange Pilot in Ireland 2023

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Executive Summary

The Construction Materials Exchange platform [1] is a sophisticated exchange platform for excess and reclaimed construction materials, ready for scaling. The process so far has demonstrated that the greatest challenge is to increase the awareness in the industry of its potential and the proper use of such infrastructure.

The first section introduces the collaboration between the Irish Green building Council [2] and the Dutch company that created the platform, The Excess Materials Exchange [3]. It describes the user journey on the platform for the uploader and procurer, and the added option of an internal platform.

The context in Ireland and its readiness for the platform is described, in particular the Circular Economy and Miscellaneous Provisions Act 2022 [4], which highlights the need to “Increase use of Construction & Demolition Waste as a secondary construction material”.

For the next phase, the Irish Green Building Council’s impact objectives are to

1. Make the platform operational and increase the supply of materials and number of exchanges
2. Build a critical mass through increased awareness engaging with industry champions
3. Use AI technology to widen the scope of exchanges

The interest in the platform has increased from the CMEx pilot and, despite the lack of quality materials on the platform, 138 users have registered, showing the increased interest for reclaimed materials. In the short term, this requires intensive outreach to ensure that a critical mass of high-quality, high-volume materials are made available on the platform. An equally focused engagement is required to ensure that these materials find a use. The intention is to create stories of reuse that build the profile of the site attracting greater use.

Even though 12 organisations expressed interest in the beginning, only five organisations joined the pilot, and one significant exchange occurred at the end of the pilot, despite the technological features offered on the platform. The problem-solution section sets out the barriers that would impede the scaling of the platform and the solutions that can be implemented in the next six months to address issues such as building a critical mass; uploading sought-after materials; availability of temporary storage; quality assurance; the possibility of uploading cloud surveys before deconstruction; specific guidelines and information required to run the platform smoothly; improving the user experience with better information and navigation and clarity on the term ‘reuse of materials’ under national interpretation of the EU Waste Framework Directive [5]; and clarity on certification use of reused materials under the national building regulations. Key actors and key actions have been considered for IGBC to step into the next phase of implementation.

The current number of users registered on the platform, the increased number of large organisations reaching out and the case studies in the last section show that the construction industry is much closer now to making the next phase of implementation successful.

Early mistakes in the pilot allowed poor quality materials and information onto the platform, which if they had not been swiftly removed could have damaged its reputation as a business-to-business exchange. This demonstrated that it was necessary to be very strategic initially regarding what organisations should participate and what materials should be uploaded. To build credibility and scale, the public marketplace should act as a good showcase and attract the right type of business.

Whilst the technical challenges of adapting a digital platform for Ireland have been overcome, the greatest challenge now is to scale this for use in the construction industry. Despite the technology, scaling the platform requires very human extensive and intensive engagement with industry through manual engagement and matchmaking events. In the small, super-connected and adaptive industry in Ireland, just building a handful of engaging stories of reuse from the early matches will create rapid traction to scale the platform.

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1 Introduction

1.1 Irish Green Building Council and tools for circularity

The Irish Green Building Council (IGBC) is a not-for-profit and membership organisation and a member of the World Green Building Council (WGBC), comprising over 400 organisations from the entire value chain of the built environment. Our mission is to accelerate systemic change in the built environment in Ireland through collaboration, education, advocacy, innovation and measurement. The need for a construction material exchange was identified by IGBC by engagement with members through the [BuildingLife](#) [6] and [CIRCULARlife](#) [7] projects, related to whole life carbon and circularity. Through BuildingLife, funded by the Laudes and IKEA foundations, IGBC engaged extensively and intensively with organisations to create the national whole life carbon [roadmap](#) [8] spotlighting circularity and the Level(s) framework [9] as vital to achieving Ireland's national climate targets. The EPA-funded [10] CIRCULARlife project investigated circularity tools and the level of awareness about circular economy in the built environment, working directly with design teams on real life projects. This identified key gaps in knowledge and infrastructure. One piece of missing infrastructure identified was a platform to enable reuse of high-quality products from the disassembly of buildings and infrastructure.

1.2 Excess Materials Exchange

After investigating various tools, IGBC chose to collaborate with the [Excess Materials Exchange](#) (EME), a company from the Netherlands that created a digital matching platform to find new high-value reuse options for materials or waste products. EME had developed four key technological features that IGBC considered significant:

- material passports: provide materials with an identity
- tracking and tracing: enable the material to be followed throughout its lifecycles
- valuation: quantifies the financial, environmental and societal impact of materials, enabling data-driven decision-making between several reuse options
- matchmaking: using AI technology, enabling matches for the materials to be found across Europe

EME had created a successful [platform](#) for Enfield Council a local authority in the UK [11]; our aim was to create something similar.

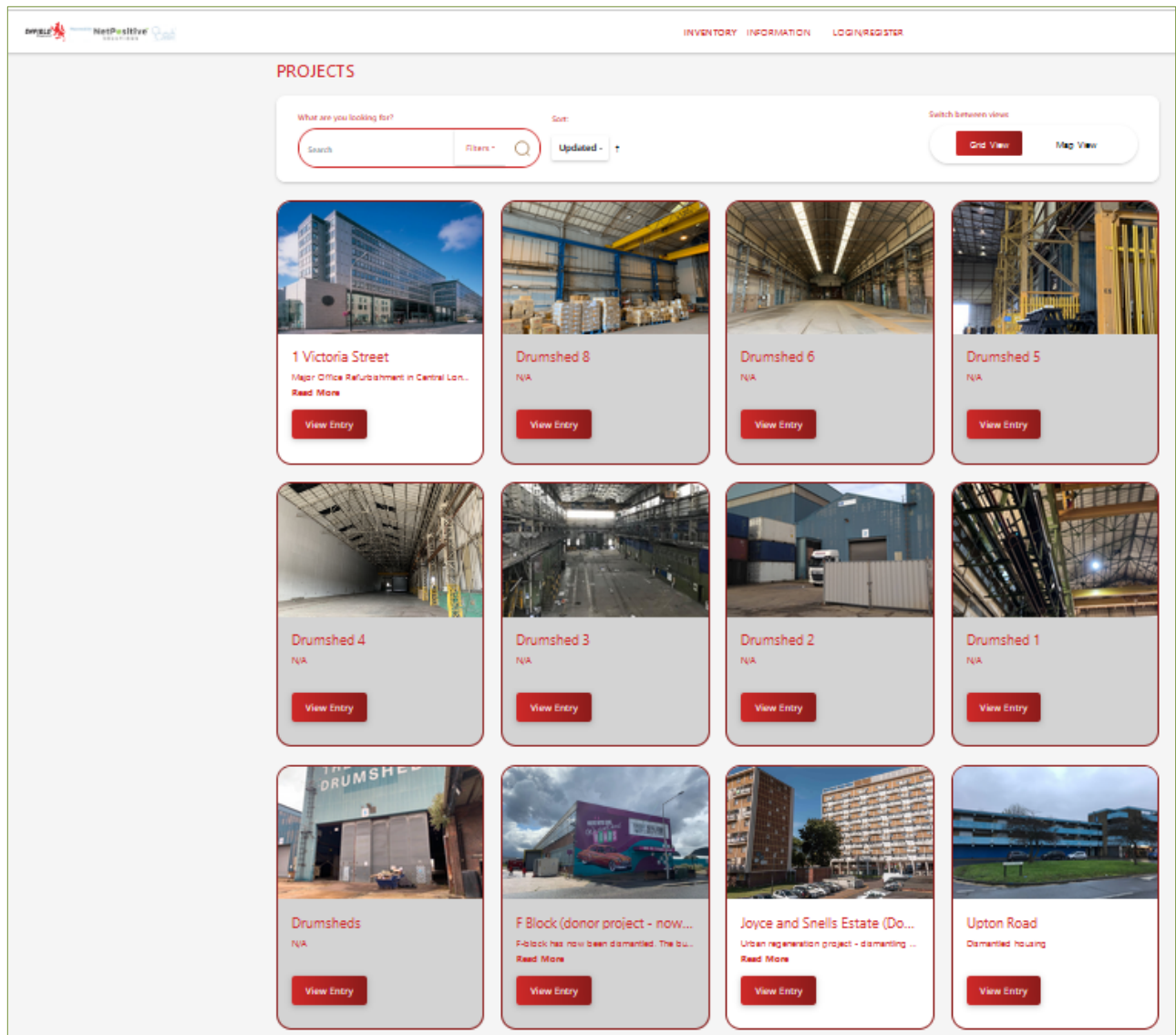


Figure 1 - Enfield Council Excess Materials Exchange (source: Enfield Council)

1.3 Ireland's Construction Materials Exchange Platform

The Department of Environment, Climate and Communications [12] in Ireland provided a small amount of funding for the pilot, and the first digital Irish excess material exchange platform was developed, renamed for Ireland as Construction Materials Exchange (CMEx).

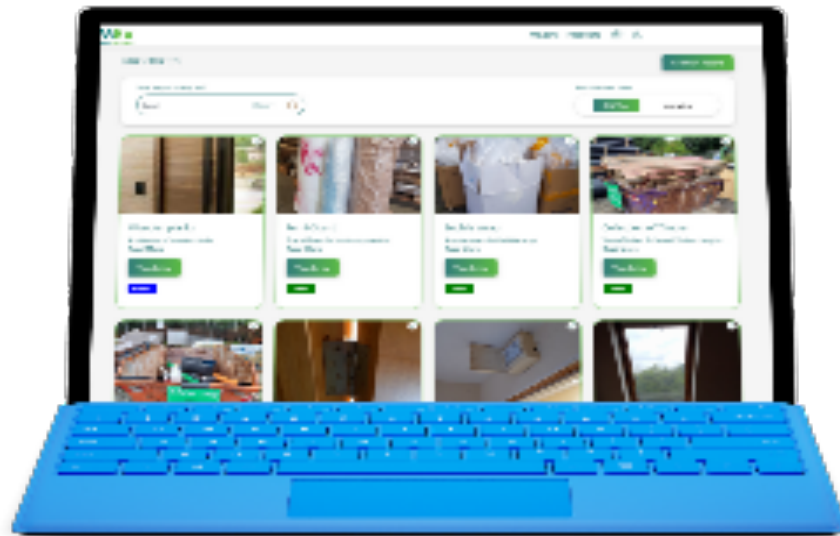


Figure 2 - Ireland's Construction Materials Exchange platform

CMEx is an online platform for the reuse of construction materials at their highest value. It is different from the eBay business model, because it has key features to create a circular system that is transparent and traceable: material passports, tracking and tracing, valuation, and matchmaking.

1.4 User journey - the procurer, uploader and internal platform

There are two main types of users: the procurer who is searching for materials to use in their projects, and the uploader who has reclaimed or excess materials and is looking to upload the information onto the platform.



Figure 3 - User journey for the procurer and the uploader

In Ireland, public bodies spend an estimated €18.5 billion a year on goods, services and works [13] and Level(s) macro-objective 2 (resource efficient and circular material) is now acknowledged as a framework to be used in green public procurement. Although public bodies did express interest in the platform during our engagement with them, they indicated that they would prefer a platform that was exclusive to their organisation, with private access. There was a need to procure and upload materials within their projects and organisation. Users in the organisation would access the same landing page of CMEx and log in to a dedicated, tailor-made section specific to their organisation.

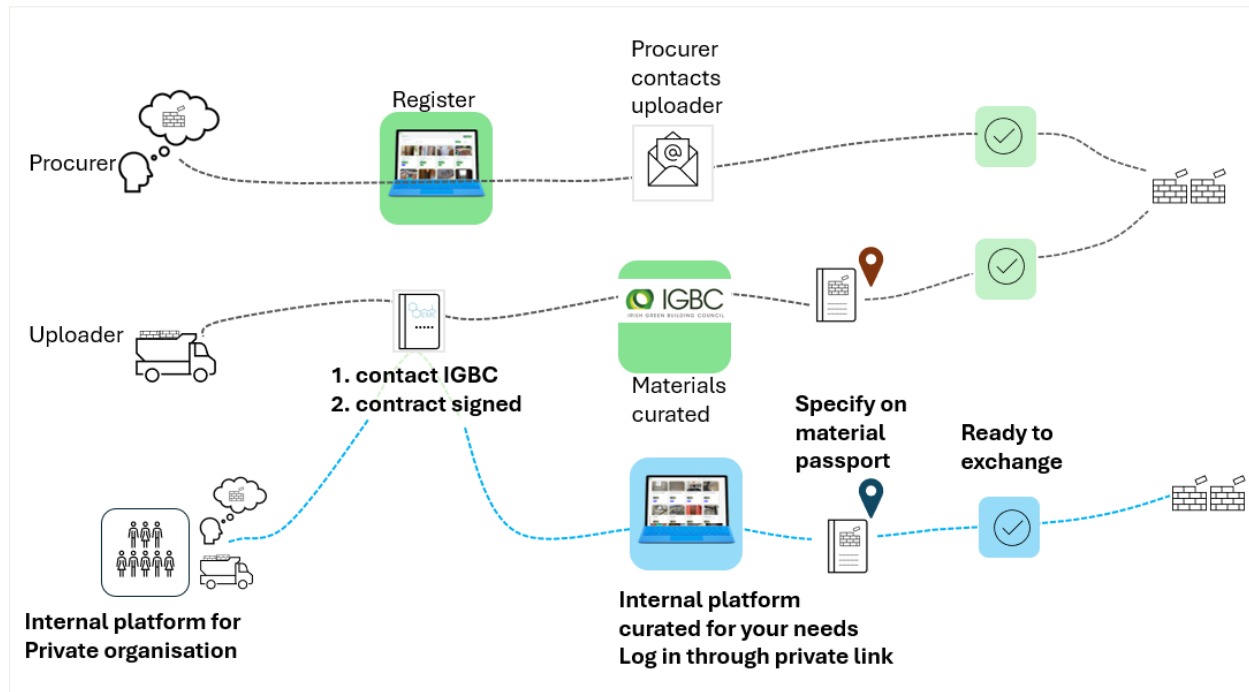


Figure 4 - Different user journey through CMEx for the user of an internal platform

2 Context in Ireland

Ireland has one of the lowest rates of circular material use in Europe, with the largest waste stream resulting from construction [14]. With a circularity rate of 1.8%, Ireland lags well behind the EU average of 12.8% [15]. The level of interest for reclaimed materials is high, which indicates that demand would be high if supply were available [16]. Only 1% of building elements are reused after their initial use [17]. Although a large proportion of materials are technically reusable, most end up being crushed or used as backfill [18]. **The Irish Construction Industry is responsible for over 50% of all the waste generated nationally.** As part of IGBC's trialling of circular tools, EME were invited to adapt their white label excess materials exchange platform as a pilot for Ireland. The online platform, Construction Materials Exchange (CMEx) was launched at the end of 2022 to test the feasibility of the system for the reuse of construction materials that would otherwise enter the waste stream.

1.5 Policy context

The national climate action plan (2024) highlights the role of the circular economy in reducing Ireland's greenhouse gas (GHG) emissions and mentions that it will "make a significant contribution to achieving our climate objectives". This role is key in the construction industry, as embodied carbon emissions associated with our sector currently account for 14% of Ireland's national emissions [19].

In addition to ambitious climate targets, other national and EU policies are driving demand for a platform such as CMEx, both directly and indirectly. At national level, the latest climate action plan highlights the need to "prioritise prevention in construction waste" and "to encourage circular economy behaviours". The Circular Economy and Miscellaneous Provisions Act 2022 [4] places the Whole-of-Government Circular Economy Strategy [20] on a statutory footing. Although the Strategy will be updated in 2024, the previous version (released in 2022) already highlighted the need to "Increase use of Construction & Demolition Waste as a secondary construction material". The current national building regulations do not promote reuse of construction materials. This is an issue and needs to be addressed as a long-term action. However, section 1.1 (c) of Technical Guidance Document D: Materials and Workmanship [21] does currently enable materials to be reused under specific conditions:

While the primary route for establishing the fitness of a material for its intended use is through the recognised standardisation procedures referred to in paragraphs (a), (b) or (c) of Requirement D3, other methods may also be considered in establishing fitness including:- (c) Performance in use, i.e. that the material can be shown by experience, such as its use in a substantially similar way in an existing building, to be capable of enabling the building to satisfy the relevant functional requirements of the Building Regulations.

At European level, the Circular Economy Action Plan (COM/2020/98 final) [22] includes a full section on construction and buildings. Furthermore, the proposed revision of the Energy Performance of Buildings Directive (EPBD) [23] through the introduction of whole life carbon measurements from 2028 and targets from 2030 should drive demand for a greater reuse of construction materials. Resource-efficient and circular materials are also key indicators under the EU Framework for Sustainable Buildings, Level(s). Level(s) indicators are used increasingly often as part of green public procurement [24] in Ireland. Other regulations, such as the EU taxonomy [25] for sustainable activities and the Corporate Sustainability Reporting Directive [26], are also indirectly driving demand for tools such as CMEx, as they drive demand for greater reuse and sustainability.

1.6 CMEx pilot

In the CMEx pilot, IGBC wanted to answer questions about the readiness of the construction industry for reclaimed and excess materials:

- Was there traction in the market for circular reclaimed materials, and would organisations use a platform for construction material exchanges?

- Which organisations would be interested to test the process out and in what capacity (uploaders, procurers, internal platform users, or all three)?
- What type of materials would be sought after and feasible for successful exchanges?

The first part of the pilot involved months of onboarding. Five organisations expressed interest to trial the platform and participate in the CMEx pilot. The organisations were diverse:

- two construction companies (Tier 2)
- a social housing body
- a plastic packaging company
- a government agency

1.7 Current situation

Since then, demand for the exchange platform has grown from the initial five users in the pilot phase in 2022 to a total of 138 users registered to browse for reclaimed and excess materials as of January 2024. All 20 participants in the semi-structured interviews conducted for the white paper and in the stakeholder workshop in April 2023 stated their interest in a Materials Exchange Platform and agreed that platforms such as CMEx are a vital part of the circular infrastructure and need to be developed. CMEx lessens the workload of companies searching for reclaimed materials, resulting in financial and environmental savings.

Current situation	Total of 138 registered users interested to find excess and reclaimed materials and include the organisations listed below Including 4 new organisations: 2 interested in an internal platform: 1 public body, 1 tier-one contractor 2 interested in joining the external platform: 1 private developer, 1 semi-state developer Reclaimed material now on the platform: 500m² Italian polished granite cladding thickness of 40mm, weight of 2 tonnes Over 70 matches made and one interested organisation negotiating exchange
Initial situation	Total of 5 organisations interested to join the platform 4 on external platform, 2 tier-two contractors, 1 supplier, 1 social housing body 1 on internal platform, 1 public body As there were no strict guidelines as to what should be uploaded, uploaders did not provide sufficient detail of quantities of products, and did not photograph materials individually, so materials did not appear as discrete products on the platform. The list below shows a sample of the materials and products: Wooden door (8); standard electrical socket (30); fire blanket (18); fire extinguisher (5); door hinge (60); floor boards (large quantity); fire safety and information signage (30); fuse box (18); Velux windows (10); light fixtures and bulbs (20); door handle (25); composite windows (10); emergency escape signs with background light (10); CCTV Cameras (10); Plastic piping (large amount); door closer (10); plastic insulation piping (large quantity); metal numbers (18); air vent (18); metal plaster angle bead (large amount); hot water copper tank (5); apartment block letter boxes (15)

Table 1 - Showing the change in situation

1.8 Impact objectives for CMEx now

1. Make the platform operational and increase both the supply of materials and number of exchanges on the CMEx
2. Build a critical mass of organisations willing to use it for consideration at design stage and upload excess and reclaimed materials through industry champions
3. Develop the matching to expand the ability for materials to be used internationally

2 Status of the solution – Problems, Solutions, Key Actors, Key Actions

The following section identifies the problems encountered, insights gained, solutions that are within IGBC's control to resolve within a period of six months, key actors, key actions and KPIs for the next phase of CMEx.

2.1 Problem 1 – Lack of a critical mass of organisations participating

In the pilot, CMEx was a technologically advanced material exchange platform, and IGBC allowed any organisation to be part of it, meaning that the type of materials on it made it look less like a business-to-business platform.

Solution 1 – Build a critical mass of the right type of organisations so it looks like the type of platform organisations can trust

It is not enough to have a technologically advanced platform. The right type of organisation that has streams of sought-after reclaimed materials at scale need to be sold the benefits of joining the platform. More work needs to be done at the engagement level to ensure the platform comprises the right mix of stakeholders, consisting of suppliers, users and innovators.

IGBC will have dedicated staff to work on stakeholder engagement, identifying their needs. One of the weaknesses of the pilot was a lack of a steady stream of sought-after materials. Therefore, a focused and targeted plan to engage demolition contractors, state bodies, developers, fit-out contractors, interior designers, architects, engineers and large regeneration development companies will be created and followed through.

Key Actors Demolition contractors, large developers, state bodies, developers, interior designers, architects working on large-scale development with a sustainability agenda, design receptive specifiers, and circularity champions in the industry.

Key Actions and KPI Engagement with ten circularity champions plus ten sought-after material uploads at scale. For CMEx to work, specific sectors across the construction industry are needed, and IGBC has identified ten circularity champions in the construction industry which we will engage within the next six months. We will work with these champions to create ten uploads of materials ready for exchange, of sufficient scale and quality to attract procurers (external and internal). Time will be spent on engaging in person, manual matchmaking, showing organisations how to search for matches, providing Irish case studies for the reuse of reclaimed materials, and allowing only materials at a sufficient quantity as sought after by the industry. To promote the right types of transition involvement in CMEx, the costs of the collection of the material and the responsibility for testing it (if needed) will fall to the procurer.

2.2 Problem 2 – Insufficient materials at scale to be useful for construction companies

Materials which were uploaded to the pilot platform were not suitable for the needs of the construction industry. Items were random, in small quantities, more useful for home renovation projects and, even then, sometimes unsuited for direct reuse. For example, materials uploaded were electrical sockets, roof lights, radiators and random timber lengths. They did not reflect what a business-to-business exchange platform in the construction industry should look like, with very poor presentations and often shown in skips.

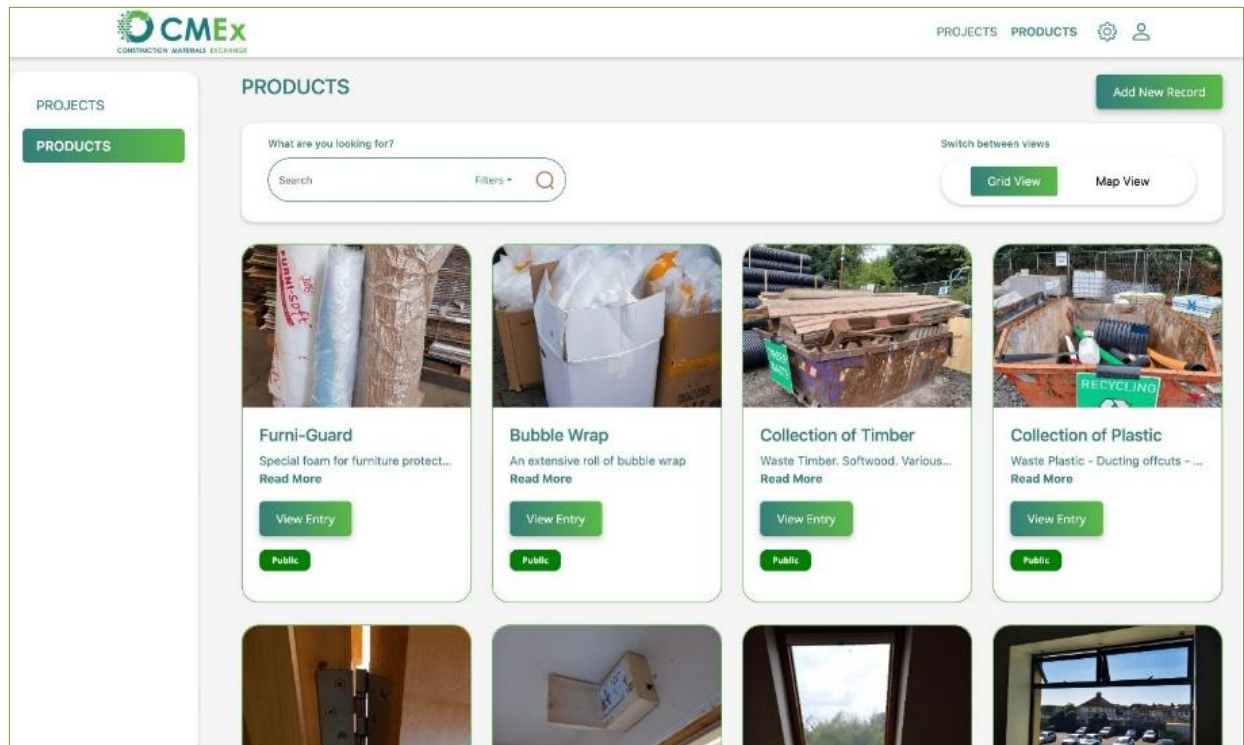


Figure 5 -Screenshot from first iteration of CMEx pilot showing poor presentation and unsuitable materials

Solution 2 – Materials need to be suitable and at scale for integration by designers

IGBC conducted interviews with key stakeholders within the construction industry between September 2023 and January 2024. A stakeholder engagement workshop was held in April 2023 with representatives of 20 organisations in the construction industry value chain, to find out what type of reclaimed materials would be most sought after. The stakeholder group recommended the following conditions for effective engagement:

- Materials should be those most sought after, namely bricks, steel, raised floors, stone, façade materials and tiles.
- The materials should be to a certain scale (on a case-by-case basis depending on material).
- Options should be provided so the materials can be procured in parts or as a whole. This would be decided between the uploader (material owner) and the procurer (person taking the materials).
- A deposit should form part of the contract, based on a percentage of the value of the construction material (calculated using the CMEx economic valuation model) and paid in advance. This deposit would be returned after the procurer has collected the material. This will ensure the procurer is serious about securing the material and save associated costs for the uploader.
- An onsite auditor such as a building certifier should inspect the materials before they are uploaded to CMEx.



Figure 6 - Stakeholder engagement workshop with 20 participants - April 2023

Key Actors Two large scale fit-out companies and their related designers, interior contractors and contractors

Key Actions and KPI

Five successful manual matchmaking of materials delivered to procurers.

With the realisation that technology on the platform on its own is not enough to gain traction in the industry, IGBC will create demand by identifying five companies interested in circular design, asking them what specific materials they are looking for, and identifying which organisations are positioned to deliver these materials. We will conduct manual matchmaking using our existing member networks. The intent is to create five good stories of exchange that can be used to promote the platform further for social media and throughout the industry.

2.3 Problem 3 – Inadequate data provided and poor presentation of materials

Data about uploaded material was insufficient to establish a comprehensive material passport. The material passport feature of the platform requires the uploading organisation to fill in specific fields of information about the material. However, in the pilot, this was not complete, and therefore procurers were not able to accurately assess the suitability of materials for projects, which hindered the reuse opportunities. The presentation of the materials by uploaders was so poor that it risked permanent damage to the reputation of the platform as a business-to-business exchange, and most had to be removed shortly after the platform went live. Many showed the materials in skips with no attempt to show clearly what was available.

Solution 3 – Guidelines are required for material to be uploaded, and IGBC is to curate the images of the materials

The stakeholder workshop in April 2023 recommended that IGBC should produce guidelines for robust documentation of the materials to be uploaded and to ensure all fields of the digital material passport on the platform are filled in correctly before they are uploaded. The recommendations further included that guidance was required on how images should be presented, including specific examples, and pixel sizes for high resolution images. IGBC will follow the example from images on RotorDC's [27] successful reclaimed materials platform. This will initially require maintaining strict control over quality of presentation and data.

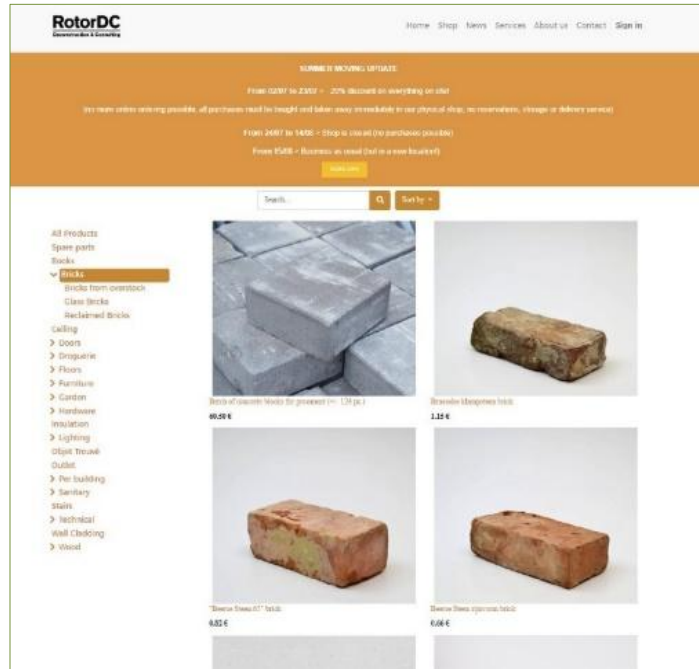


Figure 7 - Images from [RotorDC platform](https://rotordc.com) showing clear photographs of reclaimed materials (source: RotorDC)

[Rotor Deconstruction – Reuse of building materials made easy \(rotordc.com\)](https://rotordc.com)

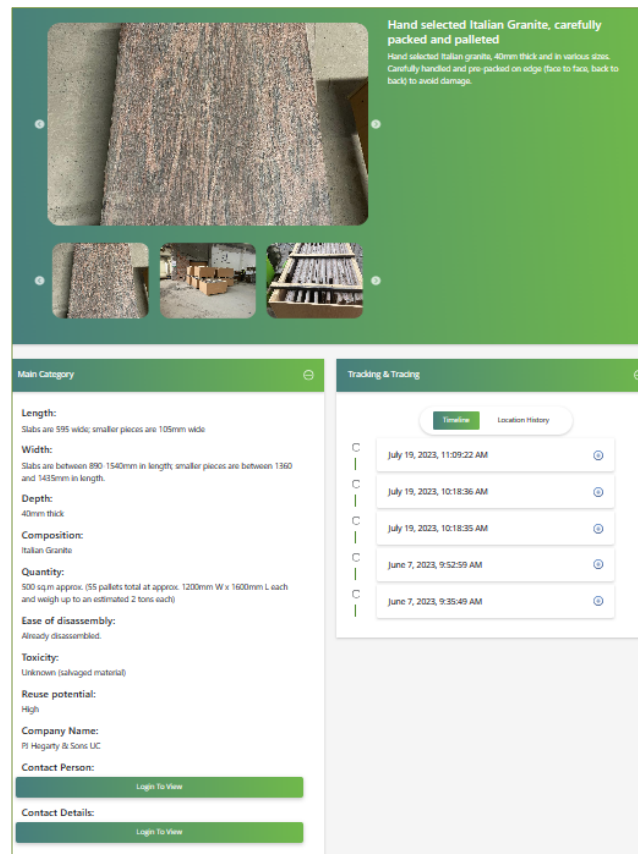


Figure 8 - Good example of current data on the CMEx pilot platform

Key Actors IGBC, Graphic designer, photographer, EME, copy writer

Key Actions and KPI

Ten uploads with accurate data and high resolution images showing well-presented materials. IGBC will devise a demonstration video and online workshops such as ‘create a successful match’ and ‘how to fill in a material passport’.

2.4 Problem 4 – Availability of materials in the design-demolition-construction timeline

The planning and procurement of buildings takes some years, so the specifier needs to be aware of what reused materials will be available at the construction stage. This could be some years away, and it is not practical to store materials for this long. The system would more efficient if procurers could see what materials will be available at the construction stage before the disassembly or deconstruction of a building. This would also allow them to see what the materials look like in situ. It may be beneficial to focus initially on fit-out materials and fit-out designers whose projects have much shorter duration from design to construction.

Solution 4 – Explore a cloud survey solution for the platform so that materials are shown in situ before they are dismantled

IGBC will explore the potential for materials to be photographed in situ in their building structures, with dimensions and quantity provided, and data uploaded before dismantling. Users would be able to see the materials in use and reserve them before disassembly. In the case of one successful match made on the platform, the contractor agreed to store the material at their own costs for only three months. The circularity champion on the design team John Casey stated at a [presentation at the RIAI Architects conference](#) that in future they would put the material on the platform as far in advance of disassembly as possible.

This process could shorten time in storage and help architects design with those materials in mind rather than retrospectively fit in reuse after a project is designed. The aim is to replicate the [Enfield Council Material Exchange](#) platform, which shows in its inventory existing buildings planned for dismantling and the materials that will be ready for reuse. It will also explore collaborating with the government funded digital centre of excellence [Build Digital](#) to create pre-demolition cloud surveys as part of the sustainability and circularity pillar for the platform.

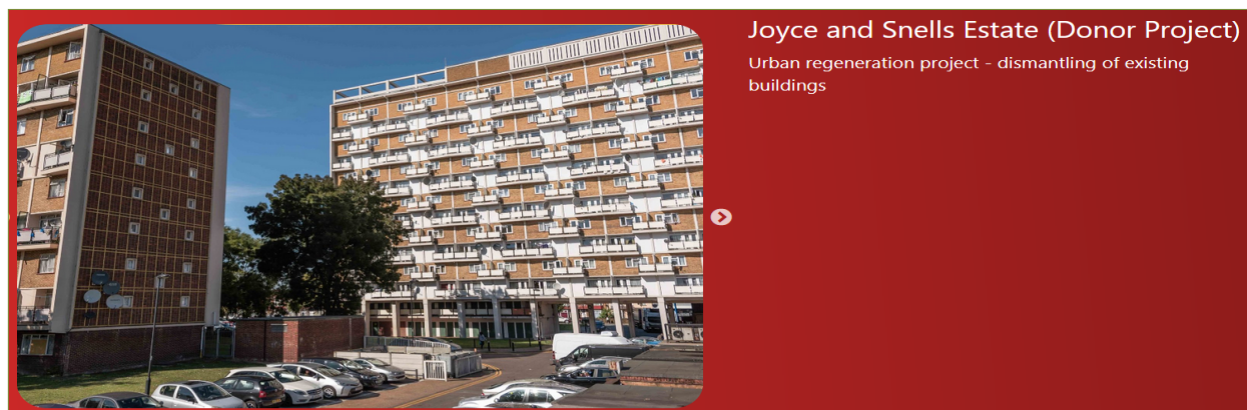


Figure 9 - Enfield Council Materials Exchange showing materials in situ before dismantling

<https://app.excessmaterialsexchange.com/mqUFWBvNwawg/7dlcKxtDyIiQ/entry/b8a73a70-ddb5-44a0-8261-2684abae35f8>

Key Actors [Build Digital](#), digital cloud survey companies with the capacity to create digital twins of buildings, and agencies or developers with buildings due for demolition.

Key Actions and KPI

Short report (two to three pages) on the potential cost, benefits, resources and time frame required.

2.5 Problem 5 – Lack of clarity on products versus waste

At the start of the project, more than 25 organisations expressed interest in the platform. However, many of them voiced concerns over the possibility of having to reclassify their products from ‘waste’ back to ‘products’ in advance of uploading onto CMEx. This process is arduous and can take weeks or years to resolve. The lack of clarity in defining reuse of construction materials at the time of the launch of CMEx led to the majority of organisations withdrawing. This resulted in only five organisations uploading materials.

Solution 5 – Deliver clarification during manual matchmaking workshops and on the CMEx platform

IGBC has since consulted with industry experts and confirmed that all products on the CMEx platform would be considered to be reused directly and not transformed from their original use, and therefore would not be classified as ‘waste’. This will be made clear on the CMEx platform and communicated to interested organisations. The case study of the Opera Square Project, Limerick, Ireland [28] in the appendix (see case study 3) illustrates how construction materials can be reused directly as they are.

Key actors: IGBC, Public bodies responsible for clarification, EPA, Building Standards division, Department of housing, five key organisations looking to reuse construction materials in their designs.

Key Actions and KPI

CMEx platform will provide and communicate clarification on this issue through the platform.

2.6 Problem 6 – Key information needed on CMEx platform

Feedback from the stakeholder engagement (April 2023), interviews for the whitepaper and a review of ten online reclaimed construction material platforms indicate that the pilot platform should include tiles that navigate to more information on the subject of excess and reclaimed materials.

Solution 6 – IGBC will review changes that can be made to upgrade the platform and work with both a UX consultant and EME to enhance the user experience of the CMEx platform with new and useful information such as a construction material testing directory, and About and FAQ pages. A full list derived from feedback from interviews and stakeholder engagement is provided in the ‘key action’ section below.

Key actors: IGBC, EME, UX designer, Graphic designer.

Key Actions and KPI

Test the new interface with five key stakeholders in the construction industry and make improvements to the CMEx platform. IGBC will make these eight improvements to enhance the platform:

- ‘About’ page with the classification of waste materials, product, reuse and information from building regulations focused on using existing materials
- Home page that shows the products
- Storage directory
- Construction material testing services directory
- Pre-demolition audit consultants
- Demolition Contractor directory with expertise in disassembly and deconstruction
- FAQ with Pricing structure and information on the creation of an internal platform
- Resources such as:
 - Guidance on how to upload materials and what details and images are needed;
 - Information on collaborators involved in CMEx;
 - Information about upcoming workshops.

2.7 Problem 7 – Lack of storage facilities

“That is the biggest challenge that a lot of people face: where do we put this stuff while we’re waiting for someone to take it?” – Interview with PJ Hegarty [29]

In the stakeholder engagement and interviews, the most frequently stated barrier for organisations eager to upload materials to the CMEx platform was a lack of storage space. Most organisations do not have storage facilities for reclaimed materials.

Solution 7 – Short term solution for organisations to find their own storage and long-term solutions to be explored further

Part of the solution is ensuring that the length of storage is reduced by making the materials available on the platform before disassembly. On CMEx so far, organisations use their own storage facilities, and this is fine for the short term. Longer-term storage facilities will be explored and may include salvage yards, municipal storage yards or private organisations that have under-used land. An example of a private company providing immediate storage rental for construction materials is OMBYGG [30] in Norway. However, it is important to note this adds a cost barrier to organisations and can deter companies from signing up to CMEx. Another longer-term solution outside of the six-month timeline is the exploration of the ‘Urban Mining Hub’ [31], a precedent by Concular, which focused on providing storage for reclaimed materials. The units were funded and run by the municipalities. For more information see Case Study 4.

Key actors: IGBC, storage companies, municipalities

Key Actions and KPI

IGBC will provide a list of private storage rental facilities online on the CMEx platform. IGBC will contact municipalities to start a conversation on the feasibility of municipalities providing temporary storage facilities for materials on CMEx and resources to run the storage units.

2.8 Problem 8 – Quality assurance of reclaimed materials

The feedback from the stakeholder engagement workshop was that a few organisations were unsure if materials uploaded onto CMEx were fit for purpose. The question arose as to whether the materials are fit for the use for which they are intended and for the conditions in which they are to be used. Participants felt that excess or reclaimed materials may be second rate to virgin materials.

Solution 8 – Building certifier to undertake visual inspection and information about construction testing organisations to be published on CMEx

For quality assurance, both the uploading organisation and procurer must conduct a visual inspection with the building certifier and builder. This will be communicated on the platform to all users. IGBC will provide a directory of construction material testing services in Ireland for testing and recertification procedures for reclaimed:

- bricks
- steel
- raised access floors
- stone
- façade materials
- tiles

In addition, if filled in correctly, the material passport and tracking and tracing features on CMEx allow the procurer to find the characteristics and source of the material, and information on tests that have occurred.

Key Actors: Construction material testing services

Key Actions and KPI: CMEx will have three construction material testers listed on CMEx. See the list in the appendix.

3 Conclusions & Findings

When the CMEx pilot began, more than 50 organisations in the construction industry showed a high level of interest for the concept by engaging with IGBC through emails and phone calls. IGBC's social media posts about the platform saw more engagement than on any other topic. However, during the implementation phase, when organisations were invited to join and trial the process, it appeared that they saw too many barriers to get involved. Initially, 12 organisations expressed an interest in joining the pilot, but this decreased to five. IGBC lowered the bar for participation, allowing any organisation to take part instead of only those with a regular supply of large-scale, high-quality material streams. This was a key strategic mistake. It created the wrong impression for a serious business-to-business exchange platform, and for the types of organisations we needed to engage. It would have been better to have a smaller number of high-quality, high-volume materials with good resource passports showcasing the potential and power of the platform initially rather than a larger number of poorly presented, low-quality, low-volume, poorly documented materials creating a poor shop window for reuse.

Even though the level of interest in reclaimed material is high, it is challenging to encourage organisations to upload reclaimed materials of value and at scale. Translating interest into action takes considerably more time and requires a much deeper level of in-person engagement and hands-on guidance. It requires strategic curation and presentation of materials to attract the right audience in the early days, followed by intensive manual matchmaking. At an early stage, this would generate engaging stories of success, showing how materials had been reused through the platform. An example of this is the first exchange of pink Italian granite from a high-profile Dublin building, chosen personally from the quarry 35 years ago by a well-known, very colourful Irish developer. This creates engaging stories for the future user, adding value beyond just the material itself.

It was not enough only to have a strong platform with excellent artificial intelligence technological features; it was more important to initially upload only sought-after, high value materials and to spend time engaging with larger organisations. Information about the materials needs to be of a high quality, and step-by-step guidance is needed for participants to fill in the fields in the material passport. If the necessary information is not uploaded properly, it is better not to have the materials on the platform.

Storage of materials was also a factor preventing organisations from participating, and the white paper has proposed solutions to ensure potential materials are identified well in advance of disassembly, supplying a directory of short-term storage space.

Despite the problems, however, the pilot also produced positive outcomes. The level of awareness and interest has increased among people in the construction industry. We now know who the circularity champions are, exactly what kind of materials should be on the platform initially and what specific conditions would work for successful exchanges. Moreover, we know what policy, clarification and guidance is required from the industry for CMEx to gain more traction.

The number of registered users looking for reclaimed materials has risen from the initial five to 138 as of January 2024. Through stakeholder engagement, campaigns, interviews and workshops, IGBC has created awareness for excess and reclaimed materials. Demand has increased and through the experience of the pilot, IGBC has built capacity. However, it will take considerable work to take the next step and create a critical mass of stories and exchanges to allow the platform to prosper.

IGBC has shown through its own development that getting the right organisations on board early is critical to success, as success attracts success. Ireland has a small, connected construction industry and building critical mass is often a case of having just a small number of success stories to tell involving the right industry players. After learning from early mistakes and making considerable effort, CMEx has now created these first stories of reuse, it is now a case of building on them through intensive, time-consuming engagement and careful strategic

curation and quality control over the coming months to build and reflect a story of a successful, thriving marketplace for high-quality materials. Even a small number of additional successful exchanges should be sufficient to create a compelling narrative for the reuse of materials in Ireland and build a critical mass for the platform.

IGBC is in a good position to continue with CMEx, due to our influence on environmental and climate policies and over 400 committed IGBC members willing to engage and collaborate in implementing solutions and moving the circular economy agenda forward.

4 Case Studies

4.1 Case study 1 – CMEx External Marketplace, PJ Hegarty & Sons Building Contractors, Ireland

PJ Hegarty & Sons Building Contractors joined [32] CMEx in December 2022.

PJ Hegarty took several actions to implement CMEx in a large-scale project in Dublin:

- PJ Hegarty set up an onboarding meeting with EME and IGBC to learn more about CMEx.
- The company signed the CMEx contract.
- PJ Hegarty showcased the platform to the full design team and client on site.
- The client approved the use of the CMEx platform on the project.
- A site auditor chose the materials to be saved. It was decided that the granite façade materials would be saved due to their high value, high quality and ease of reuse and storage.
- The materials' details were uploaded to the CMEx platform.
- IGBC had to request the upload of additional information to enable the creation of a comprehensive material passport. This comprised essential information including dimensions, origin and quantities, which were vital in quantifying and assessing the environmental implications associated with this resource.
- PJ Hegarty transported the material in packaging to their own storage site in Kill, County Kildare, Ireland.
- An architecture practice has stated that they will procure the material and have it collected from the storage unit and integrate it into a new building.

Environmental Impact

The EME team calculated the environmental impact of the 'Hand-selected Italian granite, carefully packed and palletised'. This example serves as a demonstration of how integrating environmental evaluation can provide valuable insights into the sustainability and environmental aspects of the materials and components used in the project. Based on the Material Passport analysis, and impact data from literature [33], EME calculated the environmental impact of 500 square metres of Italian granite slabs with a thickness of 40mm and a total weight of 2 tonnes.

This calculation demonstrates a carbon footprint for the granite of 107 kg CO₂eq/tonne, on a cradle-to-site basis for UK destinations.

$$\text{Total Carbon Emission} = \text{Carbon Footprint (tonne)} \times \text{Total Weight of Material (tonne)}$$

The Total Carbon Emissions value of **214 kg CO₂-eq** represents the emissions avoided by reusing the material in comparison to producing or acquiring new material, and thus demonstrates a substantial environmental advantage. The approach not only minimises the carbon footprint, but also offers financial benefits, as the cost of the reused materials is lower than that of new materials.

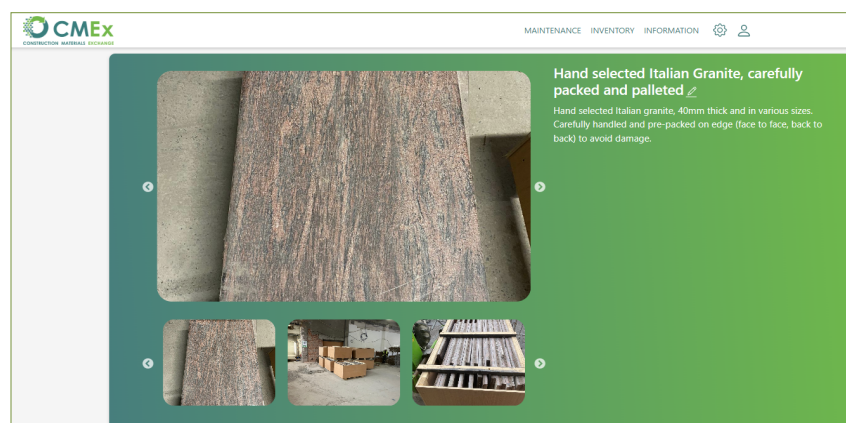


Figure 10 - External CMEx platform showcasing details and tracing of "hand selected Italian granite"

4.2 Case study 2 - CMEx internal platform for a public body, Ireland

An internal CMEx platform was set up for a public body in December 2022. The following steps were taken to implement this:

- The public body set up a meeting with EME and IGBC to learn more about CMEx.
- EME showcased the internal platform to management within the public body.
- Management approved the use of the CMEx platform as a pilot on one refurbishment project in the organisation.
- They public body signed the contract prepared by EME.
- EMEs development team designed a platform to the requirements specified by the public body.
- The materials to be saved were chosen, on the basis of their high value, high quality and ease of reuse and storage.
- Details of the materials were sent to IGBC.
- IGBC requested the upload of additional information to enable the creation of a comprehensive material passport. This passport captured essential information including dimensions, origin, and quantities, which were vital in quantifying and assessing the environmental implications associated with this resource.
- The materials were uploaded to CMEx.

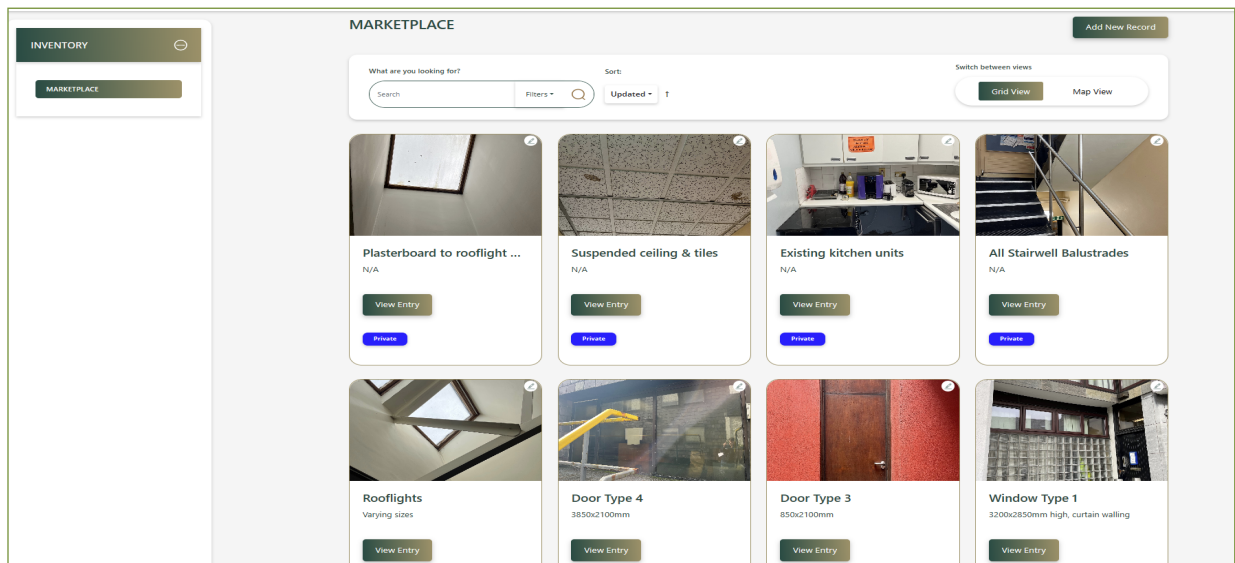


Figure 11 - Internal CMEx platform showcasing materials uploaded by a public body

4.3 Case study 3 – Opera Square project, Limerick, Ireland

The Southern Waste Region, in conjunction with the developer, Limerick 2030, and contractor, John Sisk & Son, put in place a reuse and repurpose sustainability programme in which brick, stone and other materials were reused from the Opera Square project site to other sites in Limerick. A vital part of this programme was the process of conducting a pre-demolition audit, which provided an understanding of key products and construction materials that could be reused on/off site, and a list of materials that could be repurposed and remanufactured. This was the first known pre-demolition audit create in Ireland.

Along with brick and stone, reused materials included palisade fence panels, metal gates, stone pillars, and items such as historic limestone door cases and cobble stone, which were retained on site for future use. Other materials have also been segregated for reuse on the development, including carpet and ceiling tiles, timber, and glass. Just by salvaging the bricks and stones, the team saved over 1,000 tonnes of material from the Opera Square project site from going to landfill.



Figure 12 - Reclaimed bricks (source: Authentic Reclamation)

[Reclaimed Bricks for Worthing, Sussex - Authentic Reclamation \(authentic-reclamation.co.uk\)](http://authentic-reclamation.co.uk)

4.4 Case study 4 – Urban Mining Hub, Berlin, Germany

The focus of the Urban Mining Hub was on the creation of a physical place for the storage of reclaimed materials.

The project result was a 1,000m² storage space in Berlin, where recovered materials were stored, processed and returned to the construction industry to be reused. The Urban Mining Hub in Berlin is a crucial building block in the value chain for professional reuse. It bridges the periods that arise after dismantling and before subsequent use and prevents components from becoming waste prematurely. Thousands of luminaires, sanitary facilities, wood, brickwork, doors and much more have already been temporarily stored and incorporated into construction projects in Berlin. These storage units were provided by the municipality in Berlin free of charge. In some cases, the municipality hires the employees who operate the storage unit. Inspired by the success of the Urban Mining Hub in Berlin, other municipalities now have ambitions to open such hubs in their jurisdictions.

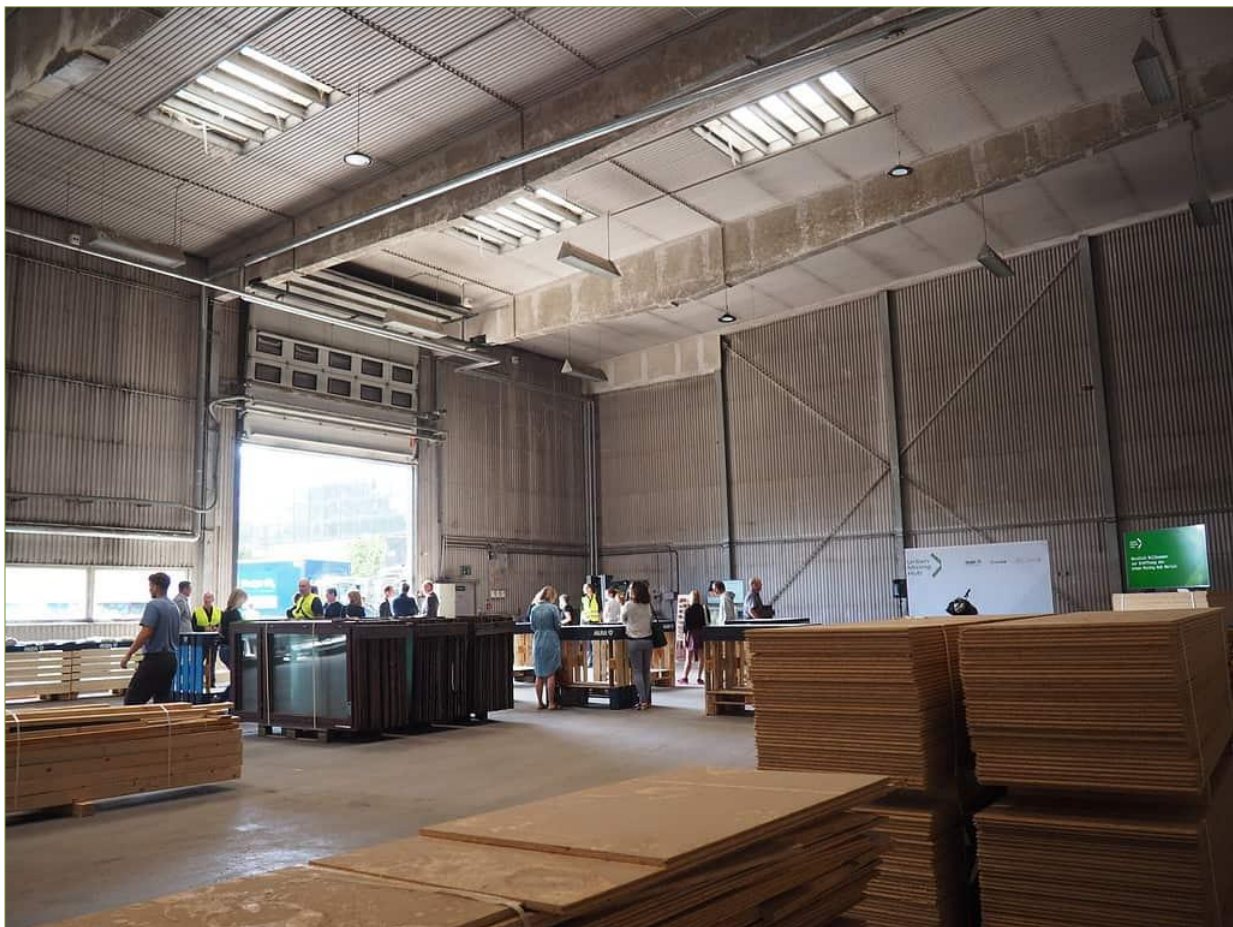


Figure 13 - The Urban Mining Hub, a crucial building block in the value chain for professional reuse (source: Concular)

[Urban Mining Hub - Concular - Circular Building](#)

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6 Appendix 1 - Glossary and Abbreviations

Artificial Intelligence (AI) Technology

Artificial intelligence (AI) is a wide-ranging branch of computer science concerned with building smart machines capable of performing tasks that typically require human intelligence. While AI is an interdisciplinary science with multiple approaches, advancements in machine learning and deep learning, in particular, are creating a paradigm shift in virtually every sector of the tech industry.

Building Regulations

The aim of the building regulations is to provide for the safety and welfare of people in and about buildings. The building regulations apply to the design and construction of a new building (including a dwelling) or an extension to an existing building.

Backfilling

According to the Commission Decision 2011/753/EU, backfilling is defined as follows: “a recovery operation where suitable waste is used for reclamation purposes in excavated areas or for engineering purposes in landscaping and where the waste is a substitute for non-waste materials”.

More information can be found at: [Backfilling \(europa.eu\)](https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:32011D0753)

Circularity Rate

Circularity rate is defined as the ratio of the circular use of materials to the overall material use.

Climate Action Plan (Ireland)

In the Programme for Government and the Climate Act 2021, Ireland has committed to halving its greenhouse gas emissions by 2030 and reaching net zero by 2050 at the latest. The Climate Action Plan sets out how this is to be achieved.

Carbon Dioxide Emissions

The carbon dioxide (CO₂) emitted by the burning of fossil fuels.

Circular Economy and Miscellaneous Provisions Act 2022 (Ireland)

The Circular Economy and Miscellaneous Provisions Act 2022, which was signed by the President and has become law, underpins Ireland’s shift from a ‘take-make-waste’ linear model to a more sustainable pattern of production and consumption that will retain the value of resources in our economy for as long as possible and thus significantly reduce our greenhouse gas emissions.

Corporate Sustainability Reporting Directive (CSRD)

The Corporate Sustainability Reporting Directive (CSRD) arises from the European Green Deal’s climate change action objectives, to further enhance the disclosure by companies on climate and environmental data.

Circular Economy

The circular economy is a system in which materials never become waste and nature is regenerated. In a circular economy, products and materials are kept in circulation through processes like maintenance, reuse, refurbishment, remanufacture, recycling and composting. The circular economy tackles climate change and other global challenges, like biodiversity loss, waste and pollution, by decoupling economic activity from the consumption of finite resources.

Circular Design

This form of design advocates rethinking the process of creating a product or building from the beginning, with designers adopting sustainability and respect for the environment as a starting point. The ultimate aim of circular design is to protect the environment.

CPR

The Construction Products Regulation (CPR) lays down harmonised rules for the marketing of construction products in the EU. The Regulation provides a common technical language to assess the performance of construction products. It ensures that reliable information is available to professionals, public authorities, and consumers, so they can compare the performance of products from different manufacturers in different countries. More information can be found at: [Construction Products Regulation \(CPR\) - European Commission \(europa.eu\)](https://ec.europa.eu/eurobarometer/surveys/trends/construction-products-regulation-cpr)

CIRCULARlife

As part of the CIRCULARlife project, IGBC trialled circularity tools with designers to help drive greater uptake and to identify the most useful approaches. The application of tools and indicators is a good way of identifying where infrastructure is lacking to build a truly circular economy for construction, as it immediately identifies what is difficult to apply in the Irish context and why. As part of this project, funded by EPA Green Enterprise, IGBC created learning materials, delivered webinars, and carried out training workshops with members and others in the sector to assist designers and developers to incorporate circularity into their projects.

Design for Deconstruction or Disassembly (DfD)

DfD is a building design process that allows for the easy recovery of products, parts and materials when a building is disassembled or renovated.

DIY Market

The DIY (Do-It-Yourself) industry aims to help customers improve their homes without the need for any extra professional help. The market is driven in part by the growth of the residential real estate industry and by change in people's lifestyles.

Digital Twin

A digital twin is a digital representation of a physical object, person or process, contextualised in a digital version of its environment.

EU Waste Framework Directive

The Waste Framework Directive sets the basic concepts and definitions related to waste management, including definitions of waste, recycling and recovery. Preventing waste is the preferred option, and sending waste to landfill should be the last resort.

Energy Performance of Buildings Directive (EPBD)

The Energy Performance of Buildings Directive is the European Union's main legislative instrument aiming to promote the improvement of the energy performance of buildings within the European Union.

EU Taxonomy

The EU taxonomy for sustainable activities is a classification system established to clarify which economic activities are environmentally sustainable, in the context of the European Green Deal. The aim of the taxonomy is to prevent greenwashing and to help investors make informed sustainable investment decisions.

External CMEx platform

Public platform.

EPA

The Environmental Protection Agency (EPA) is responsible for protecting and improving the environment as a valuable asset for the people of Ireland. It operates independently under the Department of the Environment, Climate and Communications.

EME

The Excess Materials Exchange (EME) is a digital marketplace where companies can exchange excess materials with each other.

Greenhouse gas

Greenhouse gas (GHG) refers to any gases released into the atmosphere that have a warming effect. The most significant are CO₂, methane, nitrous oxide and some fluorocarbons.

More information can be found at: <https://www.readingma.gov/climateadvisory-committee/faq/what-are-the-greenhouse-effect-and-greenhouse-gases>.

Green Public Procurement

Green Public Procurement (GPP) is a process in which public authorities seek to source goods, services or works with a reduced environmental impact.

Internal CMEx Platform

A private CMEx platform for an organisation, accessed through a ‘magic link’, which enables authentication without a password.

IGBC

Irish Green Building Council (IGBC) is an independent not-for-profit and membership organisation providing leadership to accelerate the transformation to a sustainable built environment. Registered Charity Number (RCN): 20155568.

Level(s)

Level(s) is the EU initiative that joins up sustainable building thinking across the EU by offering guidance on the key areas of sustainability in the built environment and how to measure them during design and after completion.

Point Cloud Survey

Point Cloud Surveys gather all the necessary geometry information and accurate colour information of a building and its systems, including any ornamental features (no matter how intricate or small). As a result they dramatically reduce the amount time spent surveying properties, eliminate errors and improve accuracy.

Part D

Technical Guidance Document D – Materials and Workmanship typically referred to simply as ‘Part D’ Technical guidance documents (TGDs) are published to accompany each part of the Building Regulations, indicating how the requirements of that part can be achieved in practice.

Pre-demolition audit

A pre-demolition audit involves identifying, before construction work starts, all elements that could be reused, and ensuring they receive distinct treatment to preserve their potential for reuse (careful dismantling, storage, etc.).

More information can be found at:

- [DIN SPEC 91484 - 2023-09 - Beuth.de](#)
- [vb.nweurope.eu/media/10132/en-fcrbe_wpt2_d12_a_guide_for_identifying_the_reuse_potential_of_construction_products.pdf](#)

White Label

White label refers to the practice whereby one company purchases a product from another company and then rebrands it as its own.

Whole of Government Circular Economy Strategy 2022 – 2023 (Ireland)

This Strategy aims to set out what the circular economy is and what it means for Ireland.

Sought-after

Something that is sought-after is in great demand, usually because it is rare or of very good quality.

Abbreviations

CMEx	Construction Materials Exchange
DIY	Do it yourself
EPA	Environmental Protection Agency (Ireland)
EME	Excess Materials Exchange
EPBD	Energy Performance of Buildings Directive
GHG	Greenhouse gas
IGBC	Irish Green Building Council
KPI	Key performance indicators
RotorDC	Rotor Deconstruction & Consulting
WGBC	World Green Building Council

7 Appendix 2 - List of Construction Material Testers

Professional and technical services to all concerned with the quality and performance of construction materials		
Sandberg	Sandberg - Materials Testing and Consultancy	England
Arc Management Systems	Pressure Equipment Directive - ARC Management Systems (arcms.ie)	Ireland
Mattest	Construction materials testing service in Ireland Mattest	Ireland
Mts Limited	MTS Limited Materials Testing Services (mtsltd.ie)	Ireland
CMTL	About CMTL CMTL Ireland (cmtlabs.co.uk)	Ireland
Metlab	Construction Material Testing Metlab Dublin Cork	Ireland
SGS	Building Materials Testing SGS Ireland	Ireland
SEAM	Materials Testing – SEAM	Ireland
Smart Test Audit	About Us (smarttestaudit.ie)	Ireland