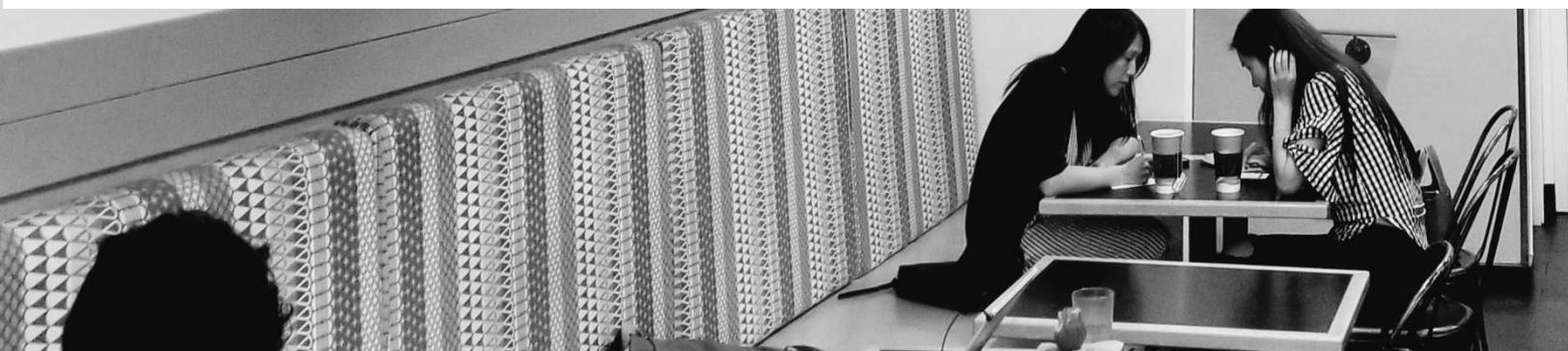




Assessment of an Online Marketplace for Construction and Demolition Materials

Prepared for: Adriana Velázquez, Project Engineer, Zero Waste Implementation, Solid Waste Services, Metro Vancouver

Stephanie Daló, UBC Sustainability Scholar 2019 | Amended January 2020



Sustainability Scholars Disclaimer

This report was produced as part of the UBC Sustainability Scholars Program, a partnership between the University of British Columbia and various local governments and organisations in support of providing graduate students with opportunities to do applied research on projects that advance sustainability across the region.

The project was conducted under the mentorship of Metro Vancouver Staff. The opinions and recommendations in this report and any errors are those of the author and do not necessarily reflect the views of Metro Vancouver or the University of British Columbia.

Executive Summary

The Metro Vancouver Integrated Solid Waste and Resource Management Plan (ISWRMP) has been established with the overriding principle of avoiding waste through an aggressive waste reduction campaign and through the recovery of materials and energy from the waste that remains. To achieve the ambitious target of increasing the regional diversion rate from an average of 55% (as of 2010) to 80% by 2020, the ISWRMP set the goal of maximizing waste reuse, recycling and material recovery from the Construction and Demolition (C&D) sector away from the waste disposal stream and into programs aimed at reuse, recycling and material recovery.

Understanding the current composition of the waste stream enables Metro Vancouver to continue to develop and implement new programs that will increase the diversion of targeted materials into reuse, recycling or energy recovery opportunities and decrease the overall proportion of waste being sent to disposal. Additionally, with current constraints on C&D material recycling capacity in the region and constant changes in the market, having further options to salvage and reuse this material will help to reach the region's diversion goals.

Metro Vancouver municipalities each have their own set of by-laws and procedures that govern construction and demolition activities, including salvage and recycling requirements in some municipalities. While the City of Vancouver developed the Green Demolition By-Law in efforts to increase the diversion of wood waste from landfill and incineration, various other municipalities which are members of Metro Vancouver have also implemented by-laws to help divert waste and increase the local supply of salvaged materials.

Further, while there are currently few deconstruction companies in the Metro Vancouver Region, the challenge lies with encouraging more contractors to choose to deconstruct rather than demolish structures in order to salvage materials, sort them by type, and distribute to transfer stations – diverting waste from landfills.

To provide an opportunity for C&D waste generators to connect with potential buyers and non-profit organizations, Metro Vancouver, is interested in exploring the feasibility of implementing an online marketplace to address the gap between the suppliers of reusable building materials and potential users. However, while online material exchanges provide online channels to repurpose by-products, unused materials and waste, there are some challenges with online material exchanges / marketplaces. First, sellers have access to other disposal options, and as a result, may not fully commit to the exchange. Second, buyers can face high uncertainty about the product exchanges and the transaction being undertaken.

To successfully support the exchange of C&D material in the region, focus on salvage and reuse of wood products, support for further growth and development of the deconstruction industry, development of an actively managed online material exchange platform, and providing a warehouse for storage of salvaged wood products is recommended.

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1. Introduction

The Metro Vancouver ISWRMP has been established with the overall principle of avoiding waste through an aggressive waste reduction campaign and through recovery of materials and energy from the waste that remains. In alignment with this principle, the ISWRMP has set the following four goals:

Goal 1: Minimize waste generation

Goal 2: Maximize reuse, recycling and material recovery

Goal 3: Recover energy from the waste stream after material recycling

Goal 4: Dispose of all remaining waste in landfill, after material recycling and energy recovery

To reach the second goal of waste reuse, recycling and material recovery, as much as possible must be diverted away from the waste disposal stream and into programs aimed at reuse, recycling and material recovery. One of the targets of the ISWRMP is to increase the regional diversion rate from an average of 55% (as of 2010) to 80% by 2020. To achieve this aspirational target, the ISWRMP further outlines that the diversion rate by the C&D sector should reach 80%.

In response to this demand, Metro Vancouver is exploring options to increase opportunities for individuals to reuse materials by developing strategic solutions which increase the convenience and reduce impediments. As such, Metro Vancouver has partnered with the University of British Columbia Sustainability Scholars Program by submitting the *2019-33 Assessment of an Online Marketplace for C&D Materials* Research Project in order to research and identify solutions to overcome barriers to reuse and recycling of C&D materials in the region.

The outcomes of this study will help inform Metro Vancouver on further considering the recommended platform as a tool to engage C&D industry stakeholders in the salvage/reuse of resources and provide an opportunity for demolition/deconstruction contractors to connect with charities, non-profit organizations, developers and manufacturers to avoid materials going to waste.

2. Background

Metro Vancouver works collaboratively with member municipalities to provide waste management services to over 2 million residents and coordinates the long-range planning process for recycling and disposing of solid waste in the region. Waste from the C&D sector is managed primarily at private licensed facilities such as the Ecowaste Landfill and at the City of Vancouver Landfill.

Metro Vancouver has set a goal of increasing the regional waste diversion rate to 80% by 2020. Understanding the current composition of the waste stream enables Metro Vancouver to continue to develop and implement new programs that will increase the diversion of targeted materials into reuse, recycling or energy recovery opportunities and decrease the overall proportion of waste being sent to disposal. In 2015, a C&D waste composition monitoring program was performed at the Vancouver Landfill and the Ecowaste Landfill facilities. The overall regional C&D waste composition values presented in Table 1 are based on the following three components: the results of the C&D waste composition analysis at Ecowaste Landfill; the City of Vancouver's C&D waste composition study at the Vancouver Landfill, and the composition of residual loads delivered to out-of-region or unlicensed disposal facilities.

Table 1: Estimated Total Regional C&D Waste Composition by Material Type

Material Category by Type	Regional Average		VLF		Ecowaste		Out-of-region	
	% by Weight	Annual Weight (Tonnes)	% by Weight	Annual Weight (Tonnes)	% by Weight	Annual Weight (Tonnes)	% by Weight	Annual Weight (Tonnes)
Wood	56.5%	217,739	90.0%	112,292	40.8%	77,726	39.3%	27,720
Composite	20.2%	77,916	24.9%	31,095	17.9%	34,070	18.1%	12,750
Dimensional Lumber (unpainted)	14.2%	54,773	28.7%	35,743	7.2%	13,687	7.6%	5,343
Dimensional Lumber (painted/treated)	13.1%	50,411	18.7%	23,365	10.1%	19,229	11.1%	7,817
Hog Fuel / Shredded Wood	4.8%	18,509	14.0%	17,521	0.5%	989	0.0%	0
Wood Flooring	2.8%	10,781	3.7%	4,569	2.5%	4,757	2.1%	1,454
Wood Shakes and Shingles	0.6%	2,486	0.0%	0	1.3%	2,486	0.0%	0
Pallets (Untreated)	0.4%	1,507	0.0%	0	0.8%	1,507	0.0%	0
Pallets (Treated)	0.3%	1,346	0.0%	0	0.5%	991	0.5%	335
Sawdust	0.0%	10	0.0%	0	0.0%	10	0.0%	0
Asphalt	8.9%	34,314	2.5%	3,128	13.3%	25,319	8.3%	5,867
Misc. Building Materials	7.4%	28,551	1.5%	1,840	9.8%	18,747	11.3%	7,965

Rubble	7.2%	27,947	0.5%	565	9.2%	17,510	14.0%	9,873
Plastic	6.3%	24,465	1.5%	1,892	8.6%	16,305	8.9%	6,268
Metal	2.0%	7,840	1.5%	1,855	2.2%	4,230	2.4%	1,719
Bulky Items	1.9%	7,518	0.1%	168	2.5%	4,684	3.8%	2,665
Textiles	1.8%	7,106	0.1%	174	2.2%	4,129	4.0%	2,804
Misc. / Black Garbage Bags	1.6%	6,256	0.0%	0	2.2%	4,129	2.9%	2,063
Land Clearing	1.6%	6,226	1.2%	1,538	2.4%	4,558	0.2%	130
Paper	1.5%	5,888	0.0%	48	2.3%	4,442	2.0%	1,398
Household Garbage	1.4%	5,441	0.2%	201	1.9%	3,667	2.2%	1,573
Glass and Ceramics	0.7%	2,602	0.0%	62	1.3%	2,466	0.1%	75
Rubber	0.6%	2,261	0.1%	106	0.9%	1,803	0.5%	352
Masonry/Brick	0.3%	1,052	0.4%	506	0.3%	546	0.0%	0
Concrete	0.1%	486	0.3%	332	0.1%	155	0.0%	0
Total	100%	386,000	100%	125,000	100%	190,000	100%	70,000

(Tetra Tech, 2015)

In 2017, over 2.23 M tonnes of municipal solid waste were recycled and diverted from disposal in Metro Vancouver. This amounts to 63% of the waste material generated in the region. Further, 76% of the diverted material was generated by the C&D sector – which amounts to more than 1.26 M tonnes.

However, while there has been significant improvement in the diversion of these materials from landfills, it has largely been due to these materials being recycled instead of salvaged and reused in comparable structural and non-structural applications.

It was estimated that in 2017, Metro Vancouver salvaged roughly 5,400 tonnes of building materials (MV, 2017). Moreover, with current constraints on C&D material recycling capacity in the region and constant changes in the market, having further options to salvage and reuse this material will help to reach the region's diversion goals.

Among the various materials found on Lower Mainland deconstruction sites, several have had the potential to be salvaged. The most common materials include wood, concrete and brick, asphalt shingles, steel, glass and windows, drywall, and various metals (Blois et al., 2019). Table 2 lists examples of salvageable building materials and examples of recyclable demolition materials.

Table 2: Example of Salvageable and Recyclable C&D Material

Examples of Salvageable Building Materials	Examples of Recyclable Demolition Materials
Dimensional lumber	Structural concrete
Heavy timbers	Cinder blocks
Steel beams & studs	Asphalt pavement

Wainscoting	Dimensional lumber
Insulation	Metal piping
Siding	Non-asbestos containing Gypsum wallboard (1990 or later that has been tested)
Heating ducts	Electrical cable
Electrical equipment	Aluminum siding
Brick & block	Metal window frames
Light fixtures	Rebar
Plumbing fittings	Cement based stucco
Faucets	Metal deck railings
Interior doors & frames	

2.1 Transfer Stations & Material Recovery Facilities

There are a number of waste facilities in Metro Vancouver that accept C&D material for recycling or resale. The facilities are listed in *Appendix A*. Moreover, there are companies that salvage building materials in the region such as Habitat for Humanity's ReStore (ReStore) and Surrey New and Used (SNU) in Surrey. Habitat for Humanity has four ReStore locations, one in the City of North Vancouver, one in the City of Langley and two in the City of Burnaby.

Metro Vancouver's waste and recycling collection and processing system is complex. While Metro Vancouver is responsible for the majority of the disposal system, there are many municipal, commercial, and non-for-profit facilities that support the region's high recycling rate. Also, private solid waste management businesses are involved in everything from storage and transfer of waste to material recovery and composting.

3. Municipal By-laws

Metro Vancouver municipalities each have their own set of by-laws and procedures that govern construction and demolition activities, including salvage and recycling requirements in some municipalities.

It is noted that the City of Vancouver Greenest City Action Plan included priority actions of increasing the diversion of wood waste from landfill and incineration by expanding the C&D Waste Diversion Strategy to increase reuse and recycling of C&D Materials. This action included implementing the Green Demolition By-law.

The City of Vancouver introduced the Green Demolition By-law in 2014 to regulate the reuse and recycling of building materials from pre-1940 residential buildings. This by-law has helped increase the waste diversion of demolished homes and increase the supply of salvaged materials within the local market (Blois et al., 2019). One in every four houses sold in the City of Vancouver is demolished (O'Brien, 2018). Since 2012, the City of Vancouver has issued an average of 940 demolition permits per year for single-family homes and duplexes (Howell, 2016).

These home demolitions coupled with other commercial and industrial building demolitions accounted for roughly 40 percent of Vancouver's waste until the Green Demolition by-law was passed in 2014, helping to mitigate this issue. The by-law covered roughly 20,000 homes built before 1940, capturing around 40 percent of home demolitions each year, which is approximately 275 homes (Blois et al., 2019). The Green Demolition by-law requires 75 percent of materials from demolition to be recycled or salvaged, diverting about 10,000 tonnes of waste from landfills each year (Blois et al., 2019).

In general, the rate of compliance with the Green Demolition By-law has been high, with almost 98% of demolition permit applications meeting the diversion rate. However, one particular issue with the Green Demolition By-law was that it was not resulting in the highest and best use of the demolition materials, particularly for older homes. The vast majority of the demolition materials were being recycled instead of reused. Most wood, in particular, was being recycled as biomass or as landscape mulch. While diverting materials from disposal is advancing the City towards their zero waste goal, achieving a higher and better use of these materials aligns with their zero waste objective. (Green Demolition By-law, 2019). To respond to this challenge, the by-law was updated and came into effect on January 1, 2019, expanding the scope of the program to apply reuse and recycling requirements to pre-1950s one- and two-family homes in order to meet the 75 percent materials diversion requirement. The update also requires deconstruction for pre-1910 and heritage-registered one- and two-family homes.

The by-law indicates that there has been a growing demand from local makers for salvaged wood from older homes. The deconstruction for pre-1910 and heritage-listed homes (built before 1950) will be quantified by the salvage of at least three metric tonnes of wood in reusable form, per home. The requirement would apply to approximately 10-12 homes a year, out of the roughly 1,000 demolitions annually. (Green Demolition By-law, 2019). Furthermore, the updated by-law will increase the amount of home demolitions captured to roughly 70 percent, which is forecasted to increase the amount of diverted materials from landfills to 18,000 tonnes per year, just under 15 percent of the city's total waste per year (Blois et al., 2019).

Various other municipalities which are members of Metro Vancouver have also implemented by-laws to help divert waste and increase the local supply of salvaged materials. For example, the City of Surrey requires 70 percent of materials recovered from all home demolitions to be recycled or salvaged, collecting a \$5,000 deposit (in comparison with the \$15,000 collected as part of the Green Demolition By-law) which is refunded based on a sliding scale of how successful the material diversion is. Other municipalities in the Lower Mainland who have adopted similar rules include City of Richmond, City of New Westminster, City of North Vancouver, District of West Vancouver, City of Port Moody and City of Coquitlam. **Appendix B** includes a summary of municipal demolition recycling requirements.

Deconstruction Hub

To address the significant barrier to increased salvage, the City of Vancouver has also supported the creation of an independently operated Deconstruction Hub. The objective of the hub is to

jumpstart the local market for restoring, upcycling and selling salvaged materials, including architectural details and salvaged old-growth wood. The updated Green Demolition By-law included approval of up to \$250,000 in funding to support the Deconstruction Hub. Furthermore, City staff is exploring opportunities to offer training and other resources to support deconstruction. Specifically, staff will offer, through a third-party organization, introductory workshops for contractors. City staff is also exploring the opportunities to develop case studies of deconstruction projects, to document and demonstrate the benefits to other contractors, builders and homeowners.

4. Deconstruction vs. Demolition

Deconstruction is the process of removing structural and non-structural building components by selective disassembly. Compared to traditional demolition, deconstruction generates less toxic dust, reduces waste sent to landfills, and reduces consumption of virgin materials by introducing a reclaimed alternative to the market (Delta Institute, 2019). In addition to diverting waste materials from landfills, deconstruction also contributes to the reduction of greenhouse gas emissions and pollution. Moreover, reusing wood preserves forests and their air filtering capacity (Delta Institute, 2019).

After removing hazardous materials and salvaging certain materials, the typical demolition process uses heavy machinery to knock down a building, completely destroying it during the process. What remains is collected and likely hauled to landfill. However, with deconstruction, buildings are systematically taken apart so building materials are kept intact and separated, making them easier to reuse and recycle (MV C&D Waste, 2019). If a building is not to be deconstructed, valuable non-structural building components can still be salvaged prior to demolition.

Deconstruction is a more labour-intensive process than demolition. Since deconstruction requires more time and labour hours of work, it can be more costly than traditional demolition. However, in some situations these costs can be reduced or even eliminated through revenue generated from the resale of building materials, as well as tax incentives (Delta Institute, 2019). Increased labour required to remove a structure and revenues generated from reclaimed material are noted as positive economic outcomes that result from choosing deconstruction over demolition.

In 2008, Metro Vancouver created the *C&D Waste Management Tool Kit*, addressing that demolishing existing buildings by knocking them down and sending waste to landfills was no longer the most cost-effective and environmentally responsible option. The toolkit recommends that existing structures slated for demolition consider deconstructing the building. Furthermore, the *C&D Waste Management Tool Kit* recommends steps to successfully reuse, salvage and recycle materials. The Metro Vancouver Solid Waste Services Department has plans to release an updated C&D Waste Management Toolkit in 2020.

Experience in Metro Vancouver and other regions is that at least 80% of materials can be kept out of landfill with deconstruction (MV C&D Waste, 2019). Thus, choosing deconstruction over demolition will yield a significant amount of valuable, reusable building materials.

Currently there are very few deconstruction companies in the Metro Vancouver region. The challenge lies with encouraging more contractors to choose to deconstruct rather than demolish structures, in order to salvage materials, sort them by type, and distribute to market, hence diverting waste from landfills (Emerald Group, 2010). It is likely that Metro Vancouver will see new deconstruction companies and salvage brokers / consultants emerge in the region if deconstruction and salvaging of C&D materials becomes enforced through more stringent by-laws and permitting requirements.

5. Construction & Demolition Material Exchange

To provide an opportunity for C&D waste generators to connect with potential buyers and non-profit organizations, Metro Vancouver is interested in exploring the viability of an online marketplace. The marketplace may address the gap between the suppliers of reusable building materials and potential users. Furthermore, an online marketplace has the potential to become a central source of information on facilities that receive C&D material in the region for reuse.

A list of the existing online marketplaces that have been reviewed as part of the literature review of this study are included in *Appendix C*. Marketplaces such as the *Austin Material Marketplace*, *PlanetReuse*, *Second Use*, and *ReUse Consultants*, are examples of online marketplaces that include a vast amount of information, extending beyond facilitating a transaction between buyer and seller of the C&D material. These platforms also include information about how material can be reused, showcase projects that have been built with salvaged materials, put people in touch with brokers, consultants, etc. Furthermore, these platforms help inform people of workshops or training seminars to learn deconstruction methods.

It was observed that the online material exchange platforms that exist (or that did once exist and are no longer running) facilitated the exchange of all types of material – not limited to C&D material. Additionally, the online material exchange platforms which no longer exist are ones that were passively managed.

The Austin Material Marketplace was observed to be one of the more successful platforms throughout this study. In a meeting with Emily Roberson McCoy, Director of Circular Economy Programs with the United States Business Council for Sustainable Development, she explained that the Austin Material Marketplace operates on a Nation-Wide Scale. The marketplace has grown into other states in the US, including Tennessee, Ohio, and Michigan. The different sites are set up based on the different variances in the markets, as well as the different stakeholders and project types.

Exposure of the marketplace is imperative to its success, thus it is important to work with general contractors (GCs) and demolition companies so that there is a focused effort to invite them to the platform. The process involves sending invitations out to these stakeholders as well as educating them on how to use the marketplace. Furthermore, efforts are made to map out where materials can be claimed from, and when they will likely be available.

It is noted that the Austin Material Marketplace facilitates the sale of a variety of C&D material,

not limited to wood. Further, the marketplace has four categories of wood that is sold: treated painted wood, untreated, crates, and pallets. Buyers are made aware of the condition that the material is in and are also enabled to ask questions before making a purchase on the marketplace. Concerns regarding the reselling of any treated/contaminated materials are common, thereby providers and recipients of the material are responsible for gathering information needed to adhere to standards and specifications related to environmental and human health and safety.

A critical success factor for an online C&D materials marketplace is having sufficient staff working to help facilitate the transactions between the buyers and sellers. A lot of success is being seen in the City of Ohio and with the Ohio EPA as they have staff to help facilitate matches on the online marketplace. Employing staff which have some level expertise and understanding of the different material reuse purposes, the landscape of the city, and the provincial needs are conducive to success.

5.1 Active and Passive Material Exchanges

Historically, materials exchanges have taken two primary forms loosely defined as “active” and “passive” exchanges. Passive exchanges normally function as a stand-alone service providing listing of materials available or wanted. However, they are not supported by personal contact or follow-up by exchange staff.

“Actively managed” exchanges, function as an active broker between material generators and consumers. They differential themselves from passive exchanges, through personal contact and follow-up by exchange staff and the generator and potential consumers of the materials.

In 1985, the Recycling Council of British Columbia (RCBC) introduced the Material Exchange Program (MEX) as an actively managed system. Staff time was allocated to contacting companies, facilitating sign-ups and posting listings, finding matches, making referrals and connecting companies that are suitable to make an exchange. Record-keeping was not automated but was kept manually on a quarterly basis. Table 3 is a summary of activity from the original Material Exchange Program.

Table 3: Summary of Activity from Original MEX

	Total Exchanges	Ongoing	On-time	Weight Diverted (Tonnes)
2002	299	246	53	2,986
2003	337	259	78	3,257
2004	316	267	52	3,180
2005	67	66	1	836

*2005 Figures are only for the period of April 1 – June 30, 2005

In January 2006, the Material Exchange program was modified into a passively managed system, in the form of an online exchange network – and renamed the BC Industrial Material Exchange Program (BCIMEX). In this revised system, companies contacted RCBC to create a new account and the system automatically sent new users a username and password. The members were able to search for specific items on the exchange, browse listings in categories of interest and instantly

update information about their own listings, without having to contact RCBC staff. Additionally, the BCIMEX site also enabled RCBC to create a separate site for residential and commercial users.

The material exchange coordinator's day to day duties with regards to the BCIMEX were significantly reduced in comparison to when the exchange was actively managed, and included the following:

- Activating new companies and user accounts
- Posting initial listings
- Responding to general inquiries regarding the program
- Drafting monthly reports

This excludes other special tasks and projects to do with promotions and education. Table 4 is a summary of the activity from the online BCIMEX program in 2006 to 2008.

Table 4: Summary of Activity from BCIMEX Program

	New Listings	New Members	Successful Exchanges	Weight of Diverted Materials (Tonnes)	Site Visits
2006	344	214	3	2.5	5,720
2007	115	42	9	3.4	18,175
2008	46	38	0	0	11,205

*2008 Figures are only for the period of January – July 2008.

This summary was provided by Harvinder Aujala, Director of Policy & Communications at Recycling Council of British Columbia. The summary only provided information until 2008, however, the BC IMEX ran until 2017, until it was taken offline. Harvinder also noted that despite the fact that the program ran successfully for several years, the annual diversion rates appeared to drop once the system was passively managed (Director at RCBC 2019, pers. Commun.). This can be seen when comparing the diversion rates from 2005 to 2006. Even though the total diverted waste in 2005 was only shown for the months of April to end of June, i.e., only three months in the year, RCBC was able to divert more than 330 times more material when the system was actively managed compared to how much waste was diverted in 2006 when the system was passively managed.

The BC IMEX listing form is included in **Appendix D**. Also included in the appendix is the Austin Online Marketplace Guide.

5.2 Challenges with Online Material Exchanges

While online material exchanges provide online channels to repurpose by-products, unused materials and waste, there are some challenges with online material exchanges / marketplaces. First, sellers have access to other disposal options, and as a result, may not fully commit to the exchange. Second, buyers can face high uncertainty about the product exchanges and the transaction being undertaken (Dhanorkar et al., 2015).

In a study conducted by Suvrat Dhanorkar (Pennsylvania State University – Department of Supply Chain and Information Systems) et al., it was found that regional repurposing policies and alternatives have had a complementary effect on sellers' commitment towards online material exchanges, resulting in increased exchanges using an online marketplace. However, it was also noted that regional disposal policies and alternatives have a substitution effect on the sellers' commitment, resulting in reduced exchange success (Dhanorkar et al., 2015). Further, the greater product and transaction information reduced the buyer's uncertainty and increased exchange success. The analysis provided by Dhanorkar et al. also concluded that users (buyers and sellers) heavily rely on their prior experience with online material exchanges. Specifically, higher familiarity between the buyer-seller pair, and familiarity with the online material exchange system lead to higher likelihood of exchange success.

Seller's Commitment:

Sellers often have a lack of commitment to online marketplaces for C&D material due to having access to more convenient disposal options, i.e. recycling facilities / transfer stations and landfills. The commitment dilemma is affected by the level of disposal and repurposing alternatives within the seller's vicinity.

Moreover, seller's transaction decisions in online material exchanges are often influenced by multiple factors other than price and product attributes. Some challenges include:

- Transaction cost of searching for buyers and engaging in contractual negotiations.
- Economic cost of carrying materials/waste until they are exchange with potential buyers. (this can result in the seller avoiding an online exchange when the transaction cost (e.g., searching, contracting) and carrying costs outweigh the economic, reputation and environmental benefits (Dhanorkar et al., 2015).

Buyer's Uncertainty:

Buyer faces uncertainty dilemma about the product and its transaction. The buyer may find it difficult to assess the quality or usability of the product. Uncertainty dilemma includes:

- type of information provided on the listing;
- consistency in quality of material;
- consistency in availability of material; and
- geographic proximity between buyer and seller.

Furthermore, buyer uncertainty comes from both product uncertainty and transaction uncertainty. In online markets, product uncertainty comes from hidden or asymmetric information which prevents the buyer from accurately evaluating product characteristics, whereas transaction uncertainty comes from concerns about hidden actions and contractual shirking by the seller.

6. Recommendations and Alternative Strategies

Adoption rate of the online material exchange is difficult to predict. Customers may need time to appreciate the value of the platform as well as become comfortable with the overall reliability of the salvaged material. Additionally, suppliers may need to work down a cost or experience curve to deliver at a reasonable price and consistently partake in the online material exchange platform.

An online material exchange is considered a viable mechanism to support Metro Vancouver's goals in diverting C&D material from landfills, and increase the material salvaged and reused instead of recycled, based on research and discussion with key informants who have implemented online marketplaces in their own jurisdictions. However, in response to the existing challenges and opportunities discussed in this report, to ensure viability of the marketplace, simultaneous development of other infrastructure is required – which will be mentioned below. *Appendix E* provides a list of all the people consulted during this project.

A number of recommended next steps are identified below for consideration by interested stakeholders.

Recommendation No. 1 – Focus on Salvaged Wood Products

- a. To address some of the concerns mentioned above about buyer's uncertainty, the public or private agency in charge of the platform will be able to better manage the quality of material that is sold on the online marketplace if they focus attention on wood products as opposed to accepting all C&D material.

Findings have shown that a number of jurisdictions have spent a lot of time and money developing online material exchanges which facilitate the exchange of a variety of materials, not specifically C&D materials. Having a passively managed system that allowed for any type of material to be sold on the online material exchange had often led to these platforms being shut down.

Additionally, key findings from literature review and meetings with experts from Portland, Seattle, King County, Vancouver, and other jurisdictions concluded that there is significant interest in improving the rate of salvaging wood, as currently wood from C&D activity is largely recycled.

Further, similar research on the reuse of salvaged materials reported that there has been increased interest from restaurants and other business organizations who aim to improve purchase decisions by choosing to sustainably source material such as salvaged wood for furniture, trimmings, light fixtures and other finishes. Similarly, the film industry has been known to show interest in using salvaged wood for buildings sets since it is a more feasible option when compared to purchasing new materials.

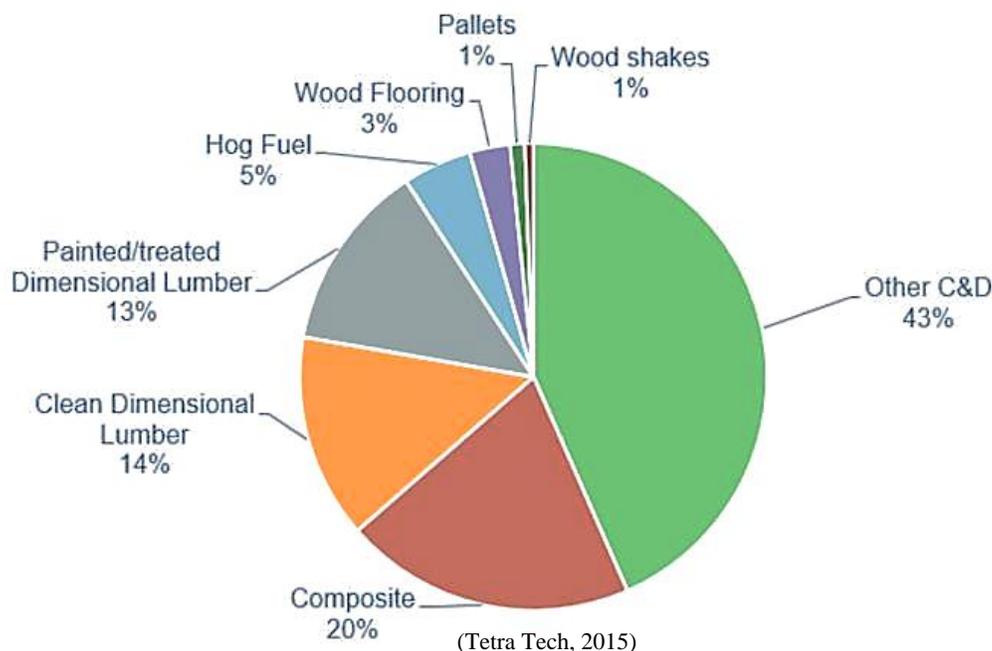


Figure 1: Estimated Total C&D Waste Demolition (Wood)

Moreover, Figure 1 shows that in 2015, 14% of wood that was disposed of in the region was clean dimensional lumber. This amounts for 54,773 tonnes, as shown in Table 1, included earlier in this report. Though it is uncertain how much of this material could have been reused, even if only 25% was salvageable, that could have led to more than an additional 13,000 tonnes of wood being diverted from landfills.

Furthermore, since the main material used in residential buildings is wood, the amount of wood that could be salvaged from the residential sector is significant. In a meeting with Dave Bennink, owner of Re-Use Consulting, in the last 26 years in which he sold re-used building materials, his top selling items were wood products. Those wood products include framing (i.e. dimensional lumber), old growth wood, engineered wood flooring, staircases, etc.

- b. A public or private agency (e.g. Deconstruction Hub) should consider collaborating with Build Reuse, formerly Building Material Reuse Association (BMRA), and the Canadian Wood Council (CWC) to obtain funding for online material exchange and a public-facing warehouse to store salvaged wood. Furthermore, Build Reuse and CWC may be a good resource in connecting public or private agencies with experts who can provide suggestions on how material can be reused, as well as set minimum standards for quality of salvaged wood and set appropriate / reasonable pricing.
- c. Partnership with Habitat for Humanity in potentially developing an online material exchange would be beneficial. Habitat for Humanity ReStore has access to a vast range of salvaged C&D materials, including fixtures, furniture, appliances, etc. and a partnership that can provide warehouse space would increase material supply.

Recommendation No. 2 – Support Growth of Deconstruction Industry

One or more levels of governments and industry associations are encouraged to continue to support the deconstruction industry. As indicated in this report, one of the challenges with online material exchanges is buyer uncertainty with consistency of available material. Increased deconstruction activity in the region will result in increased quantities of salvaged material that would be available for reuse. Some suggestions for promoting and supporting deconstruction in the region are:

- a. Continue to encourage similar policies to the City of Vancouver Green Demolition By-Law, as this can alter the institutional environments in which the supplier's (seller's) organization operates, which can make the salvaging alternative (such as an online material exchange) more favourable.

Moreover, supportive repurposing policies in the region such as the City of Vancouver's Green Demolition By-law can foster pro-environmental beliefs and attitudes which affect the seller's use of the online material exchange. Research shows that companies undertake pro-environmental actions when embedded in regions that experience higher environmental compliance (Dhanorkar et al., 2015).

According to Transaction Cost Economics (TCE), such adherence to regional policies lowers the seller's overall transaction cost of conducting business, thereby increasing the seller's commitment to salvaging alternatives, such as using an online material exchange (Dhanorkar et al., 2015). This is important since the salvaging to disposal ratio in the region will be positively associated with the likelihood of a successful exchange between supplier and buyer.

- b. Development of deconstruction apprenticeship programs with high schools and colleges in the region. As there is currently a lack of expertise in this area, the development deconstruction workshops and training programs can create entry-level job opportunities and support growth of the deconstruction industry. Training programs can also be developed for people currently working in demolition, or looking to enter the deconstruction industry. These training programs and workshops can be funded by initiatives like the Deconstruction Hub. Also, once training is completed, individuals will receive deconstruction certification. Interested parties are encouraged to reach out to the following people to provide deconstruction training:

Dave Bennink
 Director, Building
 Deconstruction Institute
 (Owner of ReUse-
 Consulting)
 360 201 6977
Building.decon@gmail.com

Adam Corneil
 CEO & Founder
 Unbuilders
 1-833-UNBUILT
info@unbuilders.com

Jordan Jordan
 Senior Consultant, Safe +
 Sustainable Site Certification
 503-968-7160 ext. 22
jjordan@earthadvantage.org

Further, a salvaged material consultant can provide pre-deconstruction or pre-demolition walkthroughs to identify building materials that can be salvaged. Since contractors are often under time constraints for demolition and rebuilding, local government should allow additional time for ‘salvaging inspection’ prior to start of deconstruction or demolition without creating significant inconvenience to the contractor. This will have the potential to increase diversion by capturing clean dimensional lumber earlier in the process.

- c. Further instruction and guidance specific to deconstruction methods and salvaging options for C&D material can be included in the updated Metro Vancouver C&D Toolkit or other C&D resources being developed in the region. The updated toolkit can include a refreshed list of all the material transfer stations as well as list the companies that accept salvage material (e.g., Habitat for Humanity Restore in North Vancouver, Burnaby, and Vancouver, Surrey New and Used Building Materials, Tony’s New and Used Building Materials in New Westminister, Urban Repurpose in North Vancouver). Oregon Metro has released a very detailed Construction Salvage and Recycling Toolkit in 2018-19, which can be found here - [Oregon Metro 2018- 19 Construction Salvage and Recycling Toolkit](#)
- d. Consider including a requirement to have an inventory system such as Material Passport as part of the building permit application package. The electronic Material Passports developed in BAMB (Buildings as Material Banks) aim to be a one stop shop for material information. Further, Material Passports developed in BAMB are sets of data prescribing defined characteristics of materials in products that give them value for recovery and reuse. BAMB Material Passport aims to:
 - Increase the value or keep the value of materials, products and components over time;
 - Create incentives for suppliers to produce healthy, sustainable and circular materials/building products;
 - Support material choices in Reversible Building Design projects;
 - Make it easier for developers, managers and renovators to choose healthy, sustainable and circular building materials; and
 - Facilitate reversed logistics and take back of products, materials and components.

Recommendation No. 3 – Begin Development of Online Material Marketplace

- a. At the early stages of development of the online material exchange, determining the demand of the variety of potential salvaged wood products is recommended. This can be achieved by including a ‘wish list’ which will allow users request specific type of reused material they would be willing to buy. Further, this will allow both regional and local government to have a better idea of whether a warehouse would be necessary to support the online material exchange through providing the sellers of the used material a place to store the material until it is sold.

- b. Product and transaction information richness will reduce the buyer's uncertainty and increase the likelihood of a successful exchange. Since these problems are amplified in online markets for secondary/used materials (i.e. salvage materials), it is recommended that the online material exchange is actively managed to reduce product and transaction uncertainty.
- c. It is strongly recommended that the public or private agency in charge of the platform ensures that a salvage material consultant vets the material that is listed on the online material exchange (and/or delivered to the warehouse) since buyer uncertainty is largely due to the fact that products listed on online marketplaces tend to be non-standardized and non-branded. If the region establishes a standard for the salvaged material, this will improve the consistency in material quality, which will reduce product uncertainty and improve the likelihood of exchanges through the online marketplace.

It is important for the salvaged material to have a reliable pricing since studies show that lack of 'asking prices' for reused materials has contributed to product uncertainty in online material exchanges.

- d. Since there are typically small trade volumes and infrequent exchanges in online material exchanges, the reputation mechanisms and seller ratings have less effect on lowering transaction uncertainty (Dhanorkar et al., 2015). Because of this challenge, it is recommended that the public or private agency in charge of the platform acts as the retailer (i.e. consignee) for the salvaged material and the supplier of the salvaged material acts as a vendor (i.e. consignor). That way the supplier/consignor will still own the material, and the consignee will pay for the materials once they are sold.
- e. To ensure the online material exchange is functional and reliable, it is recommended that the public or private agency in charge of the platform considers partnering with the Recycling Council of British Columbia (RCBC) to conduct ongoing search for contractors who would be interested in selling salvaged wood, finding building owners interested in having buildings deconstructed, encourage people to use reclaimed wood through different programs, e.g., examples of projects completed with reused wood. Additionally, the online material exchange platform can provide quick access to all the information that is needed by a contractor to ensure the deconstruction and salvaging of material is as convenient as possible. For example, the online material exchange can include links to find a hauler for the material (i.e. transportation), direct the contractor to companies and non-profit organizations that accept other C&D material, include the updated Metro Vancouver C&D Toolkit, list the different transfer stations for the material that will be recycled, etc.
- f. Further research is required to understand what performance metrics (aside from exchange success) should be used to evaluate the online material exchange. Moreover, these metrics can help overcome the hurdles that online material exchanges often face, such as attracting new users, achieving faster exchange diffusion among users, and generating more items

listings (Dhanorkar et al., 2015). A way to integrate the quantities of reused material into the regional diversion rate should also be considered.

Secondly, the public or private agency in charge of the platform must determine the appropriate scale (i.e., geography reach) and scope (i.e., diversity of materials) for the online material exchange. To answer this question, it might be necessary for different levels of government to further investigate the actual (vs. implied) economic costs of different disposal and repurposing alternatives. Future reach needs to also explore more complex models for understanding contingencies between different kinds of regional policy actions (Dhanorkar et al., 2015). Third, regional government should work with public and private agencies in the C&D sector to determine the level of interventions from the region or member municipalities that are appropriate for the success of the online marketplace. In addition to engaging in reuse market development and educational / awareness programs, regional government is encouraged to work with local government to examine the effectiveness of such initiatives from a policy standpoint.

- g. It is recommended that the online material exchange platform is mobile friendly. This will allow the marketplace to be more accessible to stakeholders. This is especially noteworthy since Contractors will be one of the key stakeholders of the online marketplace, and as such, it is important to make the platform convenient for them to use since their job requires them to be on site instead of working at a desk with a computer.
- h. A shortlist of potential partners to consult for the development of an online marketplace is listed below:

Dave Bennink
 Director, Building
 Deconstruction Institute
 (Owner of ReUse-
 Consulting)
 360-201-6977
Building.decon@gmail.com

Larry LaMotte
 Founder and CEO
 ReCapturit®
www.ReCapturit.com
 206-619-8901
larrylamotte@recapturit.com

Norm Ruttan,
 Owner
 iWasteNot Systems Inc.
 613-923-5291
normruttan@iwastenotsystems.com

Recommendation No. 4 – Secure Warehouse for Salvaged Wood Products

- a. To ensure control of inventory, it is recommended that a warehouse is available to store and catalogue salvaged wood products from deconstruction. A public facing warehouse where salvaged wood products can be readily available for purchase will further support the facilitation of exchange between seller and buyer and alleviate the burden on both parties. While an online material exchange in theory sounds like it will improve the rate of salvaged material, through consultation with Adam Corneil of Unbuilders, it was emphasized that a strategically located warehouse would significantly improve the salvage rates as contractors often face the challenges of finding a place to store salvaged material until they are sold. Due to high cost of land in the City of Vancouver, it is recommended

that a warehouse be located in the City of Burnaby or the City of Coquitlam, which are centrally located within the region and are easily accessible via Highway 1. A potential partnership with Ecowaste, located in City of Richmond, can be explored so that material stored in the warehouse that is not sold in a reasonable time frame can be transferred to Ecowaste to be recycled.

- b. The region may look to other jurisdiction, such as King County, who has experienced challenges limiting lumber reuse in their region. The general consensus from their past research had shown that a Salvage Lumber Warehouse (SLW) that establishes networks to connect supply and demand for salvaged lumber, and processes to recover lumber to market specification, could profitably increase the recovery and reuse of salvaged lumber regionally. The primary focus of the SLW would be utility grade reuse and remanufacturing, however architectural grade would be included to offset the higher processing costs/lower retail value of utility lumber and basic raw wood materials. The King County Salvage Lumber Warehouse Business Prospectus is included in *Appendix F*.
- c. Salvaged material could be obtained as consignment inventory from suppliers within the region. Consignment inventory may be a way to create a win-win partnership between the supplier of the material and the warehouse management, as long as both parties are willing to share the risks and rewards.

The longer the inventory is held in the warehouse, the less the supplier will profit from its sale. Consensus must be reached to determine the appropriate amount of time that the material will be held in the warehouse. To successfully track inventory, it must be electronically managed (i.e. to ensure real-time data).

Another option that may be considered is implementing a deposit system, in which a fee is collected from the supplier of the salvaged wood that would cover the cost of transporting the material to a transfer station and tipping fee if the material is not sold within a particular time frame. If the material is sold, the supplier would be refunded their deposit, in addition to receiving a portion of the revenue from selling the material.

Material that is stored in the public facing warehouse should be electronically managed. For example, once material is reviewed and deemed as satisfactory (i.e. meeting minimum standards) a barcode should be assigned to the material. The barcode will be scanned and the material will be added to an electronic inventory. Once material is sold (or removed from warehouse if it is not sold within a specific time frame) the barcode will be scanned so that the material is removed (i.e. no longer listed as available) in the inventory. This is very important as it has been noted that real-time data will help reduce buyer uncertainty, thereby improving the likelihood of a successful exchange. A partnership with Habitat for Humanity should be explored as it is possible that they are currently managing their inventory by using this method. Further investigation is required.

7. Conclusion

With current constraints on C&D material recycling capacity in the region, having further options to salvage and reuse this material will help the region's diversion goals. To avoid this material going to waste, one or more levels of government are encouraged to further develop the infrastructure that would support the exchange of C&D material.

In review of the different by-laws for the Metro Vancouver Member Municipalities, this study concludes that the City of Vancouver Green Demolition By-law was the most stringent. Moreover, there is potential for other member municipalities to be influenced by the City of Vancouver's Green Demolition by-law, which may result in the adoption of similar requirements. This will be a significant driver for more deconstruction in Metro Vancouver, which will create more supply of salvaged wood material to be sold on a future online marketplace for C&D material.

Furthermore, in efforts to catalyze and grow the salvage and deconstruction industry in Vancouver and the Lower Mainland, the City of Vancouver has proposed to engage an organization to establish and operate a Deconstruction Hub that is independent of the city that will store, upcycle, and market salvaged materials, particularly salvaged wood.

As per the advice offered by Dave Bennink of Re-Use Consulting, it was strongly advised that regional and local government first concentrate on demand of materials, rather than the supply (Owner Re-Use Consultants 2019, pers. Commun.). Moreover, it was stressed that the viability of the online marketplace will depend on the availability of storage infrastructure and educational programs to be developed and offered simultaneously.

Finally, for the online marketplace to successfully operate, the platform must be actively managed to resolve issues around buyer uncertainty and seller's commitment. Following up after transactions is important to ensuring that the platform is running efficiently and that obstacles are identified and resolved in real time, in order to provide optimal user experience. This will be vital to the ongoing growth and success of the platform as it will ensure that existing users will become returning / reoccurring users, which can also result in users promoting the platform to others.

7.1 Next Steps

In order to provide further support for the development of an online marketplace, the next steps which can be taken are listed below:

- i. One or more levels of government, through collaboration with the Deconstruction Hub, can further identify local and regional stakeholders in the deconstruction market.
- ii. Work with Deconstruction Hub to develop a deconstruction advisory group. Members should include both demolition and deconstruction contractors, architects and designers, citizen representatives and government representatives. The advisory group will bring these different groups of people together to discuss challenges and solutions to incentivize

reuse of building materials.

- iii. The deconstruction advisory group is encouraged to create surveys and conduct special one-on-one interviews to collect more information from builders / contractors, homeowners, civilians, etc. to identify current challenges and opportunities for salvaging C&D material. The survey can be distributed to the Greater Vancouver Home Builders Association to obtain feedback from a larger number of builders.
- iv. Explore ways in which collaborating with Canada's National Industrial Symbiosis Program (NISP) can help build business-to-business connections that will identify opportunities for waste re-purposing and other forms of resource collaboration.
- v. Conduct more thorough data analytics to determine the amount of residential buildings built before 1970s (per census-block) to estimate future supply of salvaged material.
- vi. Begin developing case studies that can be featured on online marketplace that showcase different ways material has been reused. This can be an incentive for companies as it will market company and show how they are contributing to a circular economy and helping Metro Vancouver meet Zero Waste goals.
- vii. Begin connecting with salvage consultants and potential online platform developers (listed in recommendations) to begin working together to develop an online material exchange and set up training programs.

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APPENDIX A

C&D Waste Facilities

Appendix A – C&D Waste Facilities

	Facility Name & Location	Material
1	<p>726223 B.C. Ltd. (Waste-Away Disposal Service) 11560 Twigg Place Richmond, BC</p> <p>P: 604-322-5114</p>	<p>Construction Waste Demolition Waste Land Clearing Waste Other Materials specifically authorized in writing by the Solid Waste Manager.</p>
2	<p>Eagle Disposal Inc. 11611 Twigg Place Richmond, BC</p> <p>P: 604-322-9191 http://eagledisposalinc.com/</p>	<p>Construction Waste Demolition Waste Land Clearing Waste Mattresses Soft Furnishings Furniture Carpet Other materials specifically authorized in writing by the Solid Waste Manager</p>
3	<p>Inner-City Demolition 11640 Twigg Place Richmond, BC</p> <p>P: 604-327-0957 http://www.innercitydemo.com/</p>	<p>Construction Waste Demolition Waste Municipal Solid Waste from other sources which have the same characteristics and components as Construction Waste and Demolition Waste Land Clearing Waste Other materials specifically authorized in writing by the Solid Waste Manager</p>
4	<p>AWS Transport Ltd. 11 Braid Street New Westminster, BC</p> <p>P: 604-520-5669 http://www.nsddisposal.com/aws.html</p>	<p>Demolition Waste Land Clearing Waste Municipal Solid Waste from other sources which have the same characteristics and components as Construction Waste and Demolition Waste</p>

Appendix A – C&D Waste Facilities

5	<p>Bright Sky Disposal Ltd. 12863-116 Avenue Surrey, BC</p> <p>P: 778-395-8800 http://www.brightskydisposal.com/</p>	<p>Construction Waste Demolition Waste Municipal Solid Waste from other sources which have the same characteristics and components as Construction Waste and Demolition Waste Other materials specifically authorized in writing by the Solid Waste Manager</p>
6	<p>Great West Disposal Inc. 7800 Anvil Way (129A Street) Surrey, BC</p> <p>P: 604-597-9161 http://greatwestdisposal.com/</p>	<p>Construction Waste Demolition Waste Yard Waste Furniture Municipal Solid Waste from other sources which have the same characteristics and components as Construction Waste and Demolition Waste Land Clearing Waste Other materials specifically authorized in writing by the Solid Waste Manager</p>
7	<p>EcoWaste 100-3031 Viking Way Richmond, BC</p> <p>P: 604-276-9511 https://ecowaste.com</p> <p>*EcoWaste Industries Ltd. Purchased Urban Wood Waste and Smithers Enterprises)</p>	<p>Wood Asphalt Concrete Yard Waste</p>
8	<p>Enviro-Corp Recycling 30 2 Ave Abbotsford, BC</p> <p>P: 604-557-9901 http://www.unitedconcreteandgravel.com/</p>	<p>Glass Concrete Gravel</p>

Appendix A – C&D Waste Facilities

9	<p>New West Gypsum Recycling (BC) Inc. 38 Vulcan St. New Westminster, BC</p> <p>P: 604-534-9925 https://www.nwgypsum.com/</p>	Gypsum/Plaster/Drywall
10	<p>Lock-Block Ltd. 13171 Mitchell Rd. Richmond, BC</p> <p>P:604-325-9161 http://www.lockblock.com/</p>	Concrete
11	<p>ABC Recycling 8081 Meadow Ave Burnaby, BC</p> <p>P: 604-522-9727 https://www.abcrecycling.com</p>	Metals
12	<p>Allied Salvage and Metals Ltd. 11651 Twigg Pl Richmond, BC</p> <p>P: 604-322-6629 https://www.alliedsalvagedmetals.ca</p>	Metals
13	<p>Capital Salvage Company 1919 Triumph St Vancouver, BC</p> <p>P: 604-253-8481 https://www.capitalsalvage.ca/</p>	Metals
14	<p>West Coast Metal Recycling 5771 Production Way Langley City, BC</p>	Metals

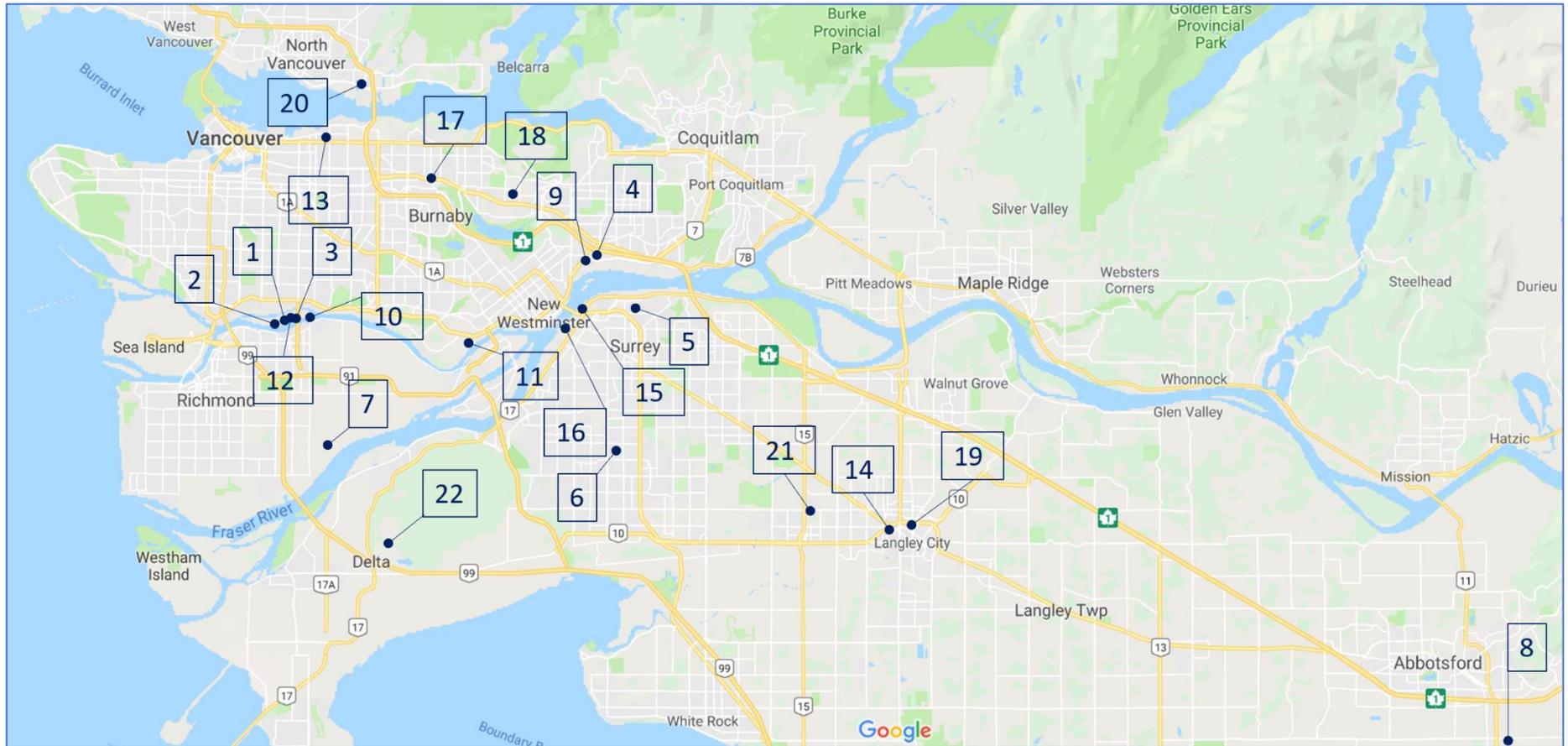
Appendix A – C&D Waste Facilities

	<p>P: 604-534-3531 https://www.westcoastmetalrecycling.com/</p>	
15	<p>A-1 Metal Recycling 12235 Industrial Rd Surrey, BC</p> <p>P: 604-313-1887 https://a1metalrecycling.ca/</p>	Metals
16	<p>Rypac Aluminum Recycling Ltd. 11849 Tannery Rd Surrey, BC</p> <p>P: 604-580-7471 http://rypacmetalrecycling.com/</p>	Metals
17	<p>Burnaby Douglas ReStore 2457 Douglas Rd Burnaby, BC</p> <p>P: 604-293-1989 https://www.habitatgv.ca/</p>	Salvaged C&D Material Building Material
18	<p>Burnaby Enterprise ReStore 7977 Enterprise Street Burnaby, BC</p> <p>P: 604-420-1618 https://www.habitatgv.ca/</p>	Salvaged C&D Material Building Material
19	<p>Langley ReStore 20104 Logan Avenue Langley City, BC</p> <p>P: 604-514-1223 https://www.habitatgv.ca/</p>	Salvaged C&D Material Building Material
20	<p>North Vancouver ReStore 344 Lynne Ave #340</p>	Salvaged C&D Material Building Material

Appendix A – C&D Waste Facilities

	<p>North Vancouver, BC</p> <p>P: 604-985-5618</p> <p>https://www.habitatgv.ca/</p>	
21	<p>Surrey New & Used Building Materials</p> <p>17861 64 Ave Surrey, BC</p> <p>P: 604-576-8488</p> <p>http://www.surreynewandused.com/</p>	<p>Salvaged C&D Material Building Material</p>
22	<p>Vancouver Landfill and Recycling Depot</p> <p>5400 72 St Delta, BC</p> <p>P:604-873-7000</p> <p>https://vancouver.ca/home-property-development/landfill.aspx</p>	<p>Construction and Demolition Waste Wood Waste (finished) Clean, unfinished wood waste Residential Drywall (Gypsum)</p>

Appendix A – C&D Waste Facilities



For more information visit the Metro Vancouver webpage for C&D Waste Management

<http://www.metrovancouver.org/services/solid-waste/business-institutions/construction-waste/Pages/default.aspx>

APPENDIX B

Summary of Municipal Demolition Recycling Requirements

Summary of Municipal Demolition Recycling Requirements

Municipality	Year¹	Regulatory measures	Applies to	Requirements
<u>Vancouver</u>	2014	Green Demolition Bylaw Demolition permit with recycling requirements	Minimum recycling rate: 75% for pre-1950 single family homes and 90% for single family homes deemed character homes Deconstruction requirement: pre-1910 and heritage listed homes	<ul style="list-style-type: none"> • Green Demolition Deposit- Refundable based on level of compliance • Non-refundable Demolition Waste Compliance Fee • Recycling and Reuse Plan for Green Demolition & Wood Salvage • Recycling and Reuse Compliance Report for Green Demolition • Hazardous Materials Report Form
<u>City of North Vancouver</u>	2007	Demolition permit with recycling requirements	All demolition permits	<ul style="list-style-type: none"> • Demolition Waste Recycling Checklist • Hazardous Materials Report • Hazardous Materials Clearance Letter
<u>West Vancouver</u>	2014	Demolition permit with recycling requirements	All demolition and new construction permits	<ul style="list-style-type: none"> • Demolition Material Recycling and Disposal Report – Stamped by Notary Public
<u>Port Moody</u>	2011	Waste Management Bylaw Demolition permit with recycling requirements	All demolition and new construction permits	<ul style="list-style-type: none"> • Waste Management Fee- Refundable based on level of compliance • Non-refundable administration fee • Waste Management Plan • Compliance Report • Hazardous Materials Report

<u>Richmond</u>	2016	Demolition Waste and Recyclable Materials Bylaw Demolition permit with recycling requirements	Single family homes	<ul style="list-style-type: none"> • Waste Disposal and Recycling Services Fee- Refundable based on level of compliance • Non-refundable administration fee • Waste Disposal and Recycling Services Plan • Compliance Report
<u>New Westminster</u>	2016 (Pilot-2014)	Management of Waste and Recyclable Materials from Demolition Work Bylaw Demolition permit with recycling requirements	Single family homes	<ul style="list-style-type: none"> • Waste Disposal and Recycling Services Fee – Refundable based on level of compliance • Non-refundable administration fee • Waste Disposal and Recycling Services Plan • Compliance Report • Hazardous Materials Report
<u>Surrey</u>	2018	Demolition and New Construction Waste Management Bylaw Demolition permit with recycling requirements	All demolition and new construction permits	<ul style="list-style-type: none"> • Waste Diversion Deposit – Refundable based on level of compliance • Non-refundable program administration fee • Waste Disposal and Recycling Services Plan • Waste Diversion Compliance Report
<u>Coquitlam</u>	2018	Demolition permit with recycling requirements	Single family homes	<ul style="list-style-type: none"> • Waste Management Declaration Form • Hazardous Materials Report for pre-1990 residential buildings

¹ Year in which regulatory measure was introduced.

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APPENDIX C

Sample Online Material Exchanges

Austin Material Marketplace

Planet Reuse

Second Use

Harvest Map

Reuse Consulting

Other

Austin Materials Marketplace

<https://austinmaterialsmarketplace.org/>

Join the Circular Economy in Austin

Join the Austin Materials Marketplace and divert waste from landfills, generate significant cost savings, energy savings, and create new jobs and business opportunities in the Austin community.

GET INVOLVED →



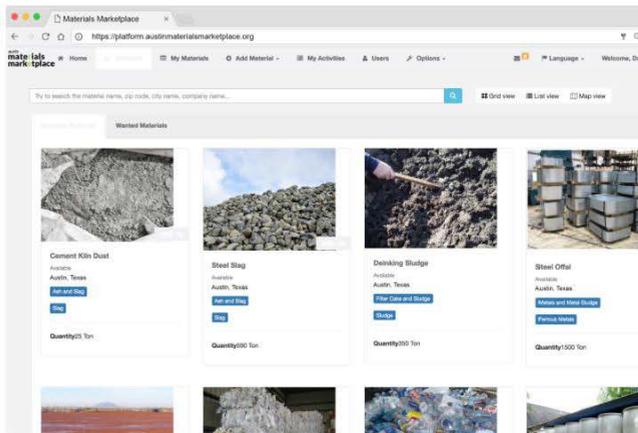
The Austin Materials Marketplace is an online platform allowing businesses and organizations to connect and find reuse and recycling solutions for waste and by-product materials.

The program aims to create a closed-loop, collaborative network of businesses, organizations and entrepreneurs where one organization's hard-to-recycle waste and by-products becomes another organization's raw material. In addition to diverting waste from landfills, these recovery activities generate significant cost savings, energy savings, and create new jobs and business opportunities.



Business Led

The platform provides a safe, secure and controllable tool for your business. Solutions in the marketplace have true triple-bottom-line benefits; creating economic value that's also good for the environment and the community.



Technology Enabled

The program's growth and scale is enabled by the Materials Marketplace platform, a cloud-based marketplace for posting, finding and exchanging underutilized materials.



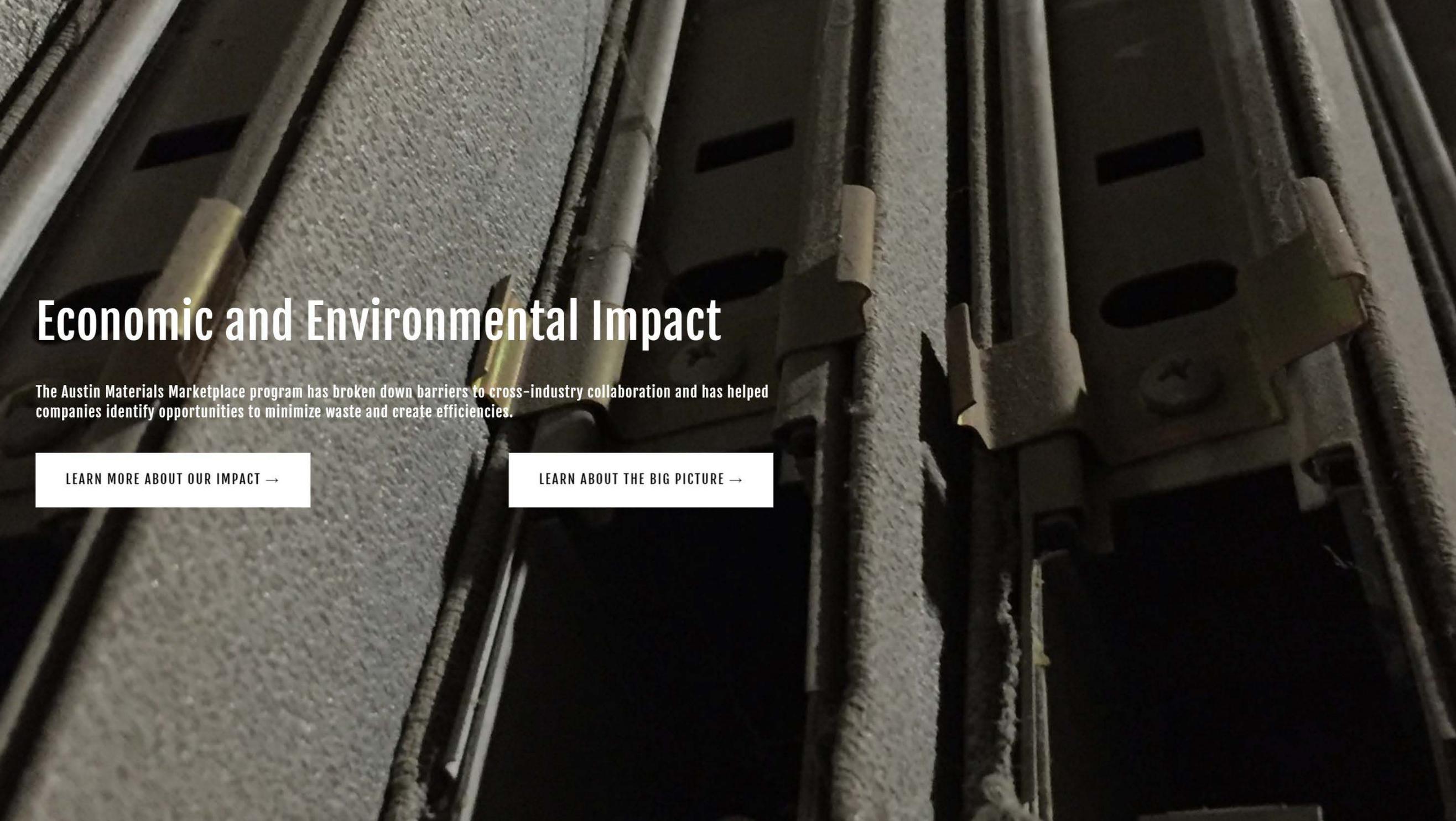
Award-winning

The Materials Marketplace has won awards from the World Economic Forum, Environmental Leader, and the International Economic Development Council.



Community Driven

Over 420 local businesses - small and large, non-profits, educational institutions and community organizations share resources through the program.



Economic and Environmental Impact

The Austin Materials Marketplace program has broken down barriers to cross-industry collaboration and has helped companies identify opportunities to minimize waste and create efficiencies.

[LEARN MORE ABOUT OUR IMPACT →](#)

[LEARN ABOUT THE BIG PICTURE →](#)

Since the launch of the program in 2014, the Austin Materials Marketplace has created some fantastic success stories and impressive impact metrics.

Current Program Metrics:

50k
Cubic Feet
Diverted from
Landfill

335
Active
Participants

\$465k
Cost Savings
and Value
Creation

842
MTCO2E
Avoided

527
Completed
Transactions



From Trash to a New Home - Austin Eastciders supports local farm with materials instead of sending them to the landfill

Generator: Austin Eastciders
Receivers: Taylor Farm
Material Diverted: lumber
Amount of Materials: 1,000lbs
Total Savings and Value Creation: \$2,000



Build A Sign and Austin Creative Reuse reframe waste as a resource - helping their business, the environment, and the community

Generator: Build A Sign
Receivers: Austin Creative Reuse
Material Diverted: flag fabric, canvas, vinyl, sticker, gator board, and mesh scrap.
Amount of Materials: 443lbs as of December '17



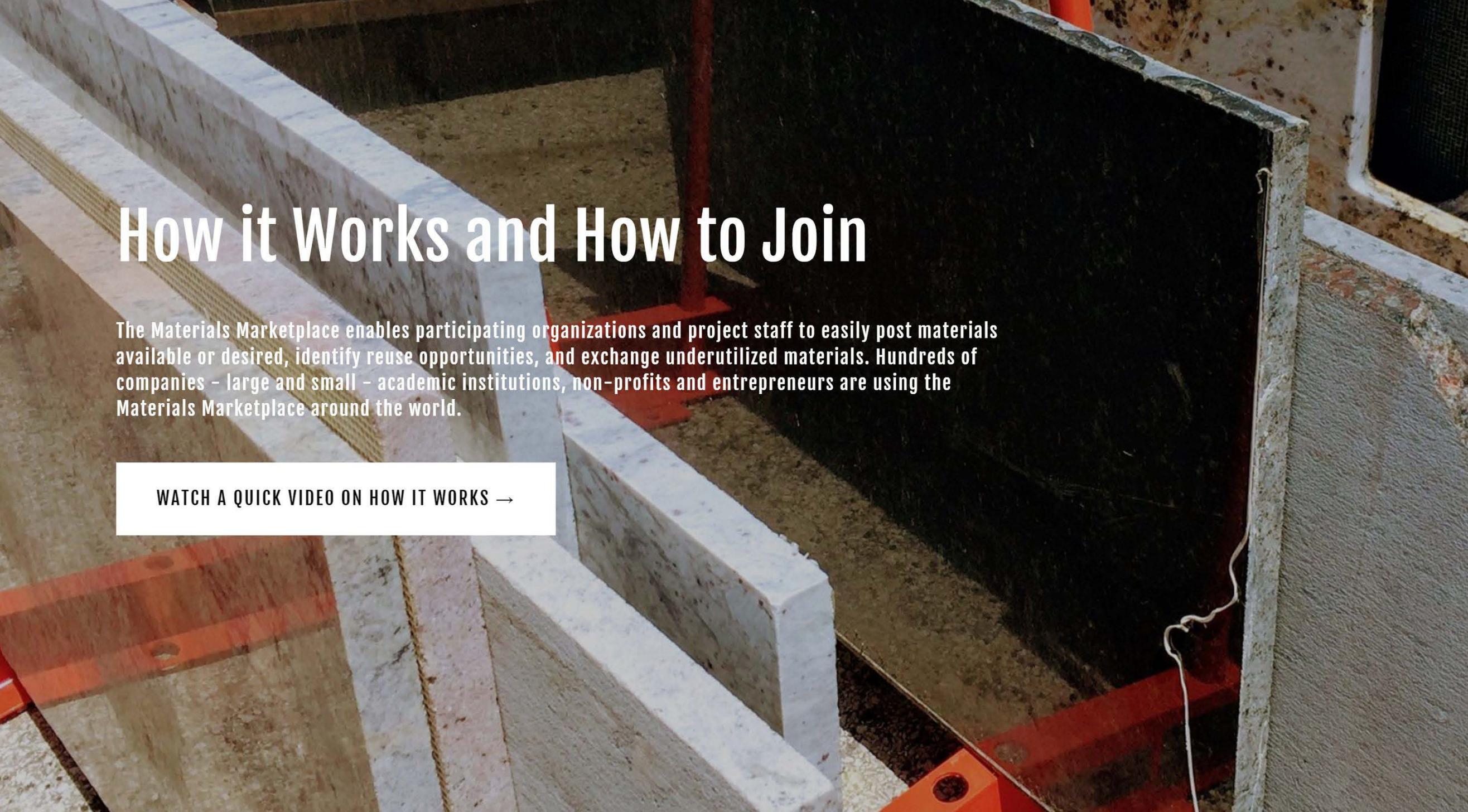
Production Glue receives national recognition for their material recovery efforts during SXSW 2017

Generator: Production Glue
Receivers: Ian's Giving Garden & Frutas Frescas, Open Arms, The Museum of Human Achievement, Eden's Cove Farm, Farm-1-1, Green Gate Farms/New Farm Institute, Austin Creative Reuse, Austin Community College
Material Diverted: picnic tables, rugs, outdoor furniture, shade sails, canopies, retail counters, baskets, bar stools, serving cart, clothes rack, towel rack, equipment, and more!
Amount of Materials: 1,371 cubic feet
Total Savings and Value Creation to date: \$10,613



As parking pay stations get upgrades, old technology finds new life

Generator: Austin Transportation Department
Receiver: Hackstarz and R2 Corp
Material Diverted: Parking Pay Stations
Amount of Materials: 2,645lbs
Total Savings and Value Creation to date: \$4,311

A close-up photograph of a construction site. In the foreground, several long, rectangular concrete beams are stacked. A red metal rebar is visible, extending from the top of the beams down into a dark, recessed area. The background shows more of the construction structure, including a concrete wall and a window frame. The lighting is bright, highlighting the textures of the concrete and metal.

How it Works and How to Join

The Materials Marketplace enables participating organizations and project staff to easily post materials available or desired, identify reuse opportunities, and exchange underutilized materials. Hundreds of companies – large and small – academic institutions, non-profits and entrepreneurs are using the Materials Marketplace around the world.

[WATCH A QUICK VIDEO ON HOW IT WORKS →](#)

Get in touch with someone on our project team using the button below.

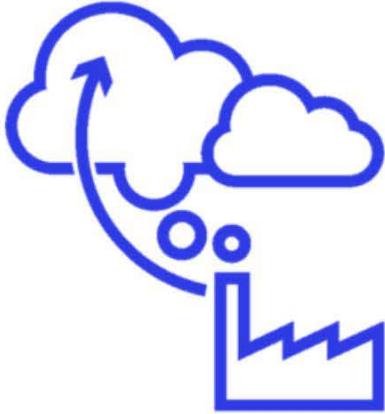
Participation is open to any company or organization that wants to explore new opportunities to transform waste materials into new products, or secure recycled material streams to reduce use of virgin feedstocks. Alternatively, feel free to email us at info@austinmaterialsmarketplace.org.

GET INVOLVED

Our Team (click for bios)



Create Value



Reduce CO2



Do Good for the Environment



Stimulate & Inspire Local Jobs

The Austin Materials Marketplace was fully-funded by Austin Resource Recovery for the first two contract years, August 2014 to August 2016, with the intention to gradually transition to a network-supported, self-funding model starting in Fall 2017. Monetary donations from participating businesses and organizations will help sustain the long-term success of the program. Learn more at the links below or contact us to donate.

Small Orgs

SUGGESTED DONATION

YEARLY - \$200 | MONTHLY - \$20

Medium Orgs

SUGGESTED DONATION

YEARLY - \$500 | MONTHLY - \$45

Large Orgs

SUGGESTED DONATION

YEARLY - \$1,000 | MONTHLY - \$85

Contact Us

Phone: 512.981.5417 | Email: info@austinmaterialsmarketplace.org | Office Address: 411 W. Monroe Street, Austin, Texas 78704



CONNECT
FACEBOOK
TWITTER

TAKE ACTION
SIGN UP
LOGIN
MAKE A DONATION
AISD TEACHERS & STAFF
TRANSACTION CONFIRMATION

PROJECT ACTIVITIES
BLOG
EVENTS
WHO'S INVOLVED

A project from:



United States Business Council
for Sustainable Development



PlanetReuse

<https://planetreuse.com/>



Need reused building materials for your project? Have material to sell or donate?

PlanetReuse makes the connection.



BLOG



Reclaiming "MECCA: The Floor That Made Milwaukee Famous" on ESPN's "30 for 30"

June 10, 2014



On June 11th, look for PlanetReuse on ESPN's award-winning "30 for 30" documentary series that will tell the story of the "MECCA: The Floor That Made Milwaukee Famous". Our marketplace and social media connections helped connect the buyer and seller to save this amazing piece of art and history.

[Continue Reading](#) ➔

Looking for Reused Materials for Your Project?

March 20, 2014



PlanetReuse's network allows those that want to incorporate reused materials on their project to rely on a central set of tools. Simply fill out our Material Request form to tell us what type of materials you're looking for and we'll connect you to options locally or nationally, based off your timeline and project goals. LEED and LBC projects will benefit from our extensive database of materials and partners to meet your projects certification standards.

[Continue Reading](#) ➔

Tweets by @PlanetReuse

PlanetReuse @PlanetReuse
Antarctica's Sea Ice Shrinks to New Record Low - National Geographic apple.news/A0pgi7RcY56VXC...

Feb 15, 2017

PlanetReuse @PlanetReuse
Reused Building Materials: Building the Future with Materials of the Past via @BurnsMcDonnell bit.ly/1LRJQCK #solutionsteddesignbuild

Feb 27, 2015

PlanetReuse @PlanetReuse
Big thanks to @InteriorsSource and @MillikenCarpet for hosting a great chat #DesignRecycled

Nov 14, 2014

Embed

[View on Twitter](#)

marketplace

Connecting buyers and sellers of reclaimed materials. Browse the categories below to find reused materials in your area.

MATERIALS REQUEST 

Can't find what you need or needing larger quantities?

SEARCH BY ZIP

zip code 100 miles

Sort By: Date New-Old

CATEGORY

-  Appliances (2)
-  Architectural (4)
-  Bath (5)
-  Building Materials (53)
-  Commercial By-Products (3)
-  Doors (5)
-  Flooring (9)
-  Furniture (27)
-  Heating & Cooling (3)
-  Home Decor (4)
-  Kitchen (5)
-  Lawn & Garden (2)
-  Lighting & Ceiling Fans (14)
-  Reclaimed Wood Flooring (26)
-  Sustainable Products (3)
-  Windows (8)
-  Wood (112)



Reclaimed Warehouse Douglas Fir



Reclaimed Red/White Oak Thresher Flooring



Reclaimed Exotic Japanese & Euro Beech Wood



Oak Beam



DANVILLE BRICK Pavers



Reclaimed Heart Pine



Reclaimed African Ironwood



Reclaimed Chicago Common Brick



Slate Roof Shingles



1.5" x 14" Antique Hemlock planks



2x8 Antique Hemlock joists circa 1825



Antique Original Barn Staircase





marketplace

Connecting buyers and sellers of reclaimed materials. Browse below to find reused materials in your area.

brokering

consulting

deconstruction

reuse coordination

material request

MATERIALS REQUEST



*Can't find what you need or
needing larger quantities?*



Search Entire Site



SEARCH

BLOG



marketplace

services ▾

about ▾

who we help ▾

projects

marketplace

Connecting buyers and sellers of reclaimed materials. Browse the categories below to find reused materials in your area.

architect

contractor

homeowner

reseller

needing larger quantities?



Second Use

<https://www.seconduse.com>

Salvaging Seattle + Tacoma

[BROWSE BY CATEGORY](#)

Newest Inventory

[SEE THE LATEST →](#)

July 17, 2019

Call for Vendors: The 2019 Handmade & Reclaimed Market

Our Handmade & Reclaimed Market is now accepting applications from vendors! Save the date and spread the word to the makers and upcyclers in your life!

[READ FULL POST →](#)

May 30, 2019

The Near Instant Accent Wall

Accent walls are supposed to be an easy way to incorporate warmth and depth into a room- but if you've ever tried to DIY it, you know that all that **demolishing** and **junk pile scouring** can be far from "easy." Check out this almost instant solution, as well as some other milled wood products from **Salvage Works**.

[READ FULL POST →](#)



SEARCH INVENTORY



[Advanced Search](#)

[INVENTORY](#)

[SALVAGE](#)

[BLOG](#)



Second Use diverts over 3,000 tons of community-sourced used building materials from landfills each year throughout Seattle and Tacoma.

I'm a Contractor

[TELL ME MORE →](#)

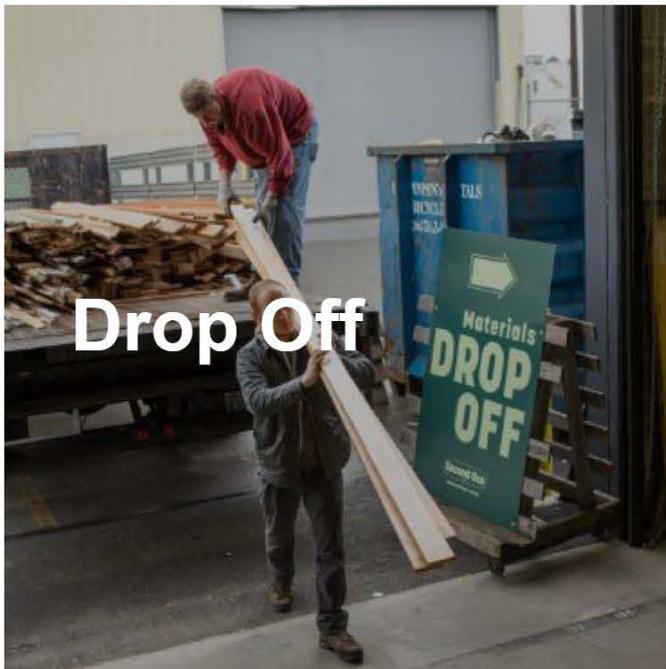
I'm a Homeowner

[TELL ME MORE →](#)

What type of materials do you accept?

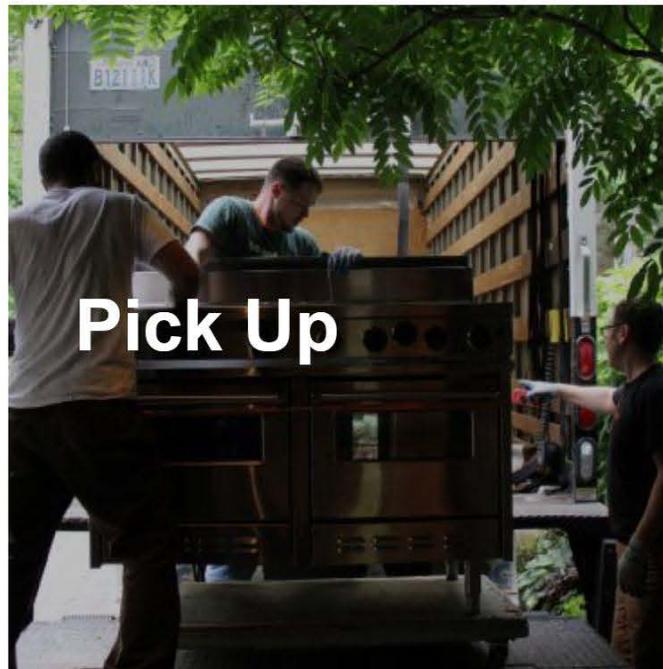
[View our acceptance policies →](#)

Get Rid of Your Reusable Materials



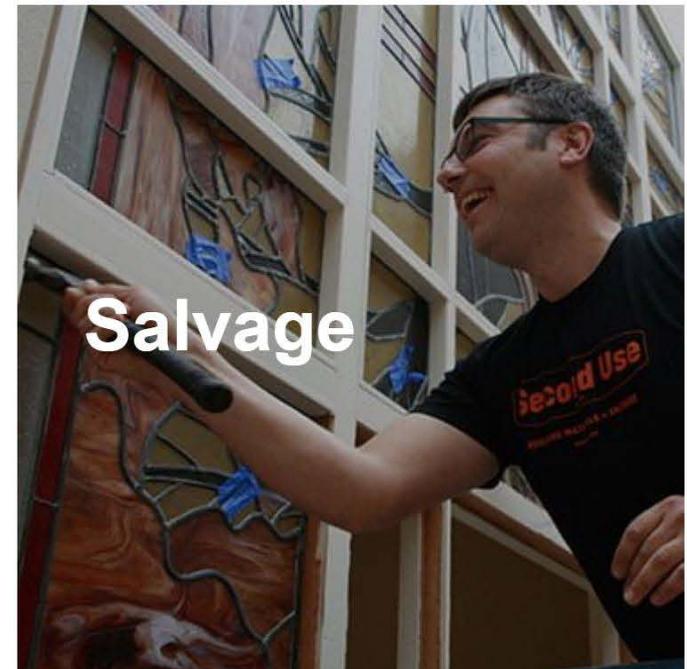
Drop off is the fastest, most efficient way to get rid of your materials and maximize your potential for compensation. Both our Seattle and Tacoma locations' Receiving Departments are open daily and no appointments are necessary.

[DROP OFF YOUR MATERIAL →](#)



Can't bring your materials to us? We are pleased to offer free pick up within the Greater Seattle and Tacoma Areas for qualifying materials. Contact our crew to determine if your materials qualify and schedule a pick up at your home or job site.

[SCHEDULE A PICK UP →](#)



Need removal? Our team of licensed and bonded salvage experts offers free removal of non-structural, reusable materials from your home or job site. Contact our crew to schedule a preview and determine if your project qualifies.

[SCHEDULE A PREVIEW →](#)

Looking for a City of Seattle Salvage Assessment?

As of July 1, 2014, a new City of Seattle requirement mandates that before the demolition or remodel of a space greater than 750 square feet, homeowners must have a verified agent, such as Second Use, complete a Deconstruction & Salvage Assessment. The assessment indicates which of the materials identified in the plan are potentially salvageable, and can be completed by one of our estimators free of charge.

[GET THE DETAILS →](#)

INVENTORY

Newest Inventory
Advanced Search
Search Hints
FAQ's
Recycled Paint
Register
Login

SERVICES

Shipping & Delivery
Acceptance Policies
Lighting Services
Free Pick Up

RESOURCES

About Second Use
Employment
Material Compensation
Salvage Services Survey
Send Us Website
Feedback

GET FRESH IDEAS & STAFF PICKS

[Subscribe](#)

STAY IN TOUCH



Second Use Seattle

3223 6th Ave S
Seattle, WA 98134
(206) 763-6929

Seattle Daily Hours:

9am - 6pm (Store)
9am - 5pm (Drop Off)

Second Use Tacoma

2328 Fawcett Ave,
Tacoma WA 98402
253-267-0820

Tacoma Daily Hours:

9am - 6pm (Store)
9am - 5pm (Drop Off)



Second Use & Habitat For Humanity

[FIND OUT HOW YOU CAN GET INVOLVED →](#)



SEARCH INVENTORY



INVENTORY

SALVAGE

BLOG

[Advanced Search](#)

Lumber (423 Items)

Inventory database updated 8/6/2019 6:55:05 PM

Location

Seattle Tacoma

Newest Stuff

Themes

Sale

Apparel & More

Appliances

Architectural

Cabinets

Electrical

Exterior Doors

Flooring

Furniture

Hardware

Heating & Cooling

Interior Doors

Lumber

Masonry, Tile & Stone

Miscellaneous

Plumbing

Tools

Windows

Beams

Hardwood

Other

Sheetgoods

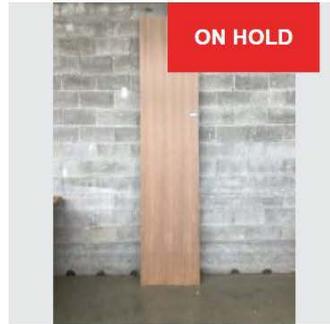
Siding

Softwood



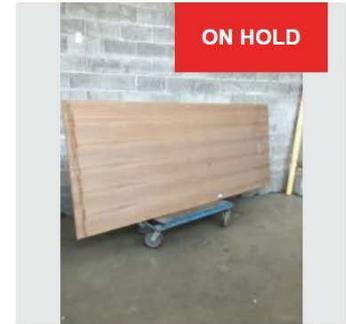
~200 Sq. Ft. T & G Mahogany

SEATTLE: 723241-S \$ 400.00



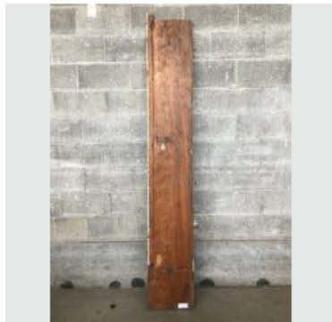
Finish Grade Walnut Plywood

SEATTLE: 723143-S \$ 50.00



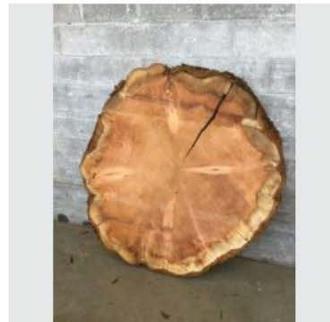
Finish Grade Walnut Plywood

SEATTLE: 723135-S \$ 125.00



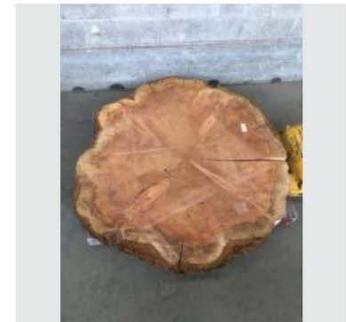
Fir Lumber

SEATTLE: 722785-S \$ 30.00



California Coast Redwood Cookie

SEATTLE: 722745-S \$ 210.00

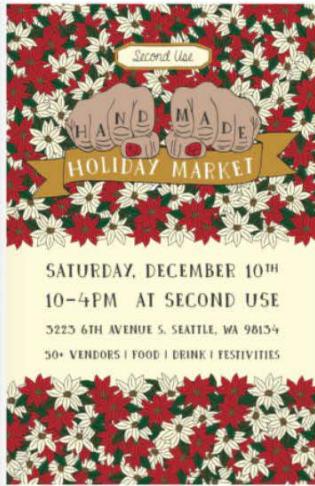


California Coast Redwood Cookie

SEATTLE: 722743-S \$ 210.00

Search Hints →

SEARCH ...



Published January 3, 2019

#2019 / #events

2019 Event Calendar

Don't miss your chance to take a free workshop, shop a Handmade Market, or devour one of our famous free hot dogs in 2019!

[READ FULL POST →](#)



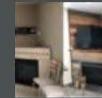
Published July 17, 2019

#DIY / #events / #handmadereclaimed / #handmadereclaimedmarket

Call for Vendors: The 2019 Handmade & Reclaimed Market

Our Handmade & Reclaimed Market is now accepting applications from vendors! Save the date and spread the word to the makers and upcyclers in your life!

RECENTLY POSTED CUSTOMER PROJECTS



RECENT POSTS

July 17, 2019

Call for Vendors: The 2019 Handmade & Reclaimed Market

June 7, 2019

Artisan Pop Up #6: Scott Connell of Salvage & Spruce

May 30, 2019

The Near Instant Accent Wall

May 10, 2019

Artisan Pop Up #5: Marisol Ricardo

April 24, 2019

Take 15% Off All Inventory This Saturday 4-27-19

TAGS

#throwback
#DIY

Harvest Map

<https://harvestmap.org/>

Materials Suppliers

View: [Location Icon] [Grid Icon]

Search



Material

- Wood
- Plastic
- Textile
- Metal
- Glass
- Electronic
- Stone
- Chemical
- Organic
- Paper & Cardboard

Location Radius (km)

Category

Publication date

Availability date

Availability

Frequency

Apply



ReUse Consulting

<http://www.reuseconsulting.com/>

[Home Page](#)

[Materials For Sale](#)

[Deconstruction](#)

[About us / Contact us](#)

[Case Studies](#)

[Services](#)

[Green Jobs](#)

[Post-Fab Panels/ReBuilds](#)

[RE-USE In The News](#)

[Reclaimed Products](#)



[Home Page](#)



RE-USE Consulting

Sustainable Alternatives to Demolition

Green-Collar Jobs - Hybrid Deconstruction Training - Reuse Operations

www.reuseconsulting.com



Materials For Sale

We help our clients sell their materials, mainly using platforms other than this website. We sell an array of reclaimed building materials from sites around the Country, but mainly in the Northwest. If you are looking for building materials or mature plants and other landscaping materials, fill out our [contact us](#) form and we will add you to our 'Wishlist'

Wishlist: We never know exactly what building materials we will get in, but we have created a 'wishlist' so you can record what you are after and we can keep an eye out for it. No promises, but we do our best. Go to the [Contact us page](#)



If you hear about a project coming up and don't want to see the materials wasted, please feel free to [contact us](#) via phone 360-201-6977 or email from our [contact us](#) page.

Do you have materials that you would like to sell / donate / get rid of? Please contact us at 360-201-6977 so we can discuss your options.

Additional Online Platforms Reviewed for Project Research

Minnesota Material Exchange – <https://mnexchange.org/>

Rebuilding Exchange – <https://www.rebuildingexchange.org/>

Enviromate – <https://www.enviromate.co.uk/>

2 Good 2 Toss – <https://2good2toss.com/>

Quupe – <https://quupe.com/>

Foodmesh - <https://foodmesh.ca/engage@foodmesh.ca>

Donate NYC- <https://www1.nyc.gov/assets/donate/site>

APPENDIX D

BC IMEX Listing Form Austin Material Online Marketplace Guide

BC IMEX
Listing Form

RCBC



**RECYCLING
COUNCIL OF
BRITISH
COLUMBIA**

10, 119 West Pender St
Vancouver, BC
V6B 1S5
Canada

phone:
(604) 732-9253

fax:
(604) 683-7255

e-mail:
mex@rcbc.bc.ca

web:
<http://www.rcbc.bc.ca>

BC IMEX Listing Form

Thank you for your interest in the BC Industrial Materials Exchange (BC IMEX) Program, available online at www.bcimex.ca. To list material on the site, please complete this listing form. Copy as many forms as needed and submit one form per listing. Please return the completed form by email to mex@rcbc.bc.ca.

Date: _____ Is this listing for: Company Individual

Contact Information

Company Name: _____

Company Email: _____ Company Website: _____

Your Name: _____ Your Email: _____

Position: _____

Street Address: _____

City, Province: _____ Postal Code: _____

Phone: _____ (ext.) _____ Fax: _____

Username: _____ (Username must be at least 5 characters)

Check only one: Material Wanted Material Available

Material Category

Please select the category that best describes the material you are listing:

[Click Here for Options](#)

Name of Material: _____

Quantity: _____ Measured in: Units Kilograms Tonnes

Price: Free or \$ _____ Price is negotiable

Frequency of availability: One Time Reoccurring

If reoccurring, how frequently and in what amounts? _____

Location of Material (City and Province): _____

Check only one:

Confidential (your name and contact information will not be visible, members may contact you through the private Exchange Contact Form)

Non-Confidential (the following information will be visible to other members of the Bentall Reuses program)

Check the information you wish to be visible:

Show Name Show Address Show Company Show Email Show Phone

Description – Write the information, as you want it to appear in the listing. Include information that an interested party would want to know (location, condition, composition, packaging, sample availability, contaminants, potential uses etc.)

Disclaimer: The listing company or individual supplies information provided through the RCBC Materials Exchange (MEX) and its catalogue. Neither the MEX, its sponsors, nor any advisor or employee thereof is liable for any information, error, representation, or makes any warranty, expressed or implied, as to the accuracy of the materials, service, or product/equipment offered through the MEX. The MEX does not make judgment with respect to any legal requirements, particularly for the storage, treatment, transportation, or disposal of what may be a hazardous substance. The MEX reserves the right not to list a material, unlist a material, or edit information provided by the listing company.

Privacy Policy: RCBC does not sell its mailing list. By becoming a Hotline/MEX listee, you are expressing consent to be included in our internal database and on our online catalogue. In addition, you agree to receive regular communications, event invitations and RCBC publications from RCBC. If you wish to opt-out of any of these features, please advise **Ben Ramos, Privacy Policy Officer** at ben@rcbc.bc.ca. For more information about RCBC's Privacy Policy, please refer to our website at www.rcbc.bc.ca.

Austin Materials Online Marketplace Guide

Materials Marketplace Software

Quick Start Guide

Source:

https://www.youtube.com/watch?v=6p6l6pe_6Ys

Login

The Materials Marketplace project is hosted on the cloud-based Materials Marketplace software (or Marketplace). This award-winning online tool enables participating companies and project staff to easily post materials available or desired, identify reuse opportunities, exchange underutilized materials and convening discussion groups on certain topics or materials. Let's get started by logging into your account!

Log in to your account ×

Enter your username

Your password

Log in

Remember me [Forgot password?](#)



skd
TÜRKİYE

Module 1: Browsing Materials

Try to search the material name, zip code, city name, company name...

[Grid view](#)[List view](#)[Map view](#)

Available Materials

Wanted Materials



Lira 50

Monitors

Available
34040 Bayrampaşa/Istanbul

Electronics

Electronics (functional)

Quantity 500 Unit



Lira 250

Office desks

Available
34040 Bayrampaşa/Istanbul

Business Furniture, Fixture and Equipment

Business Furniture

Quantity 100 Unit



Bauxite residual (red mud)

Available
34040 Bayrampaşa/Istanbul

Filter Cake and Sludge

Sludge

Quantity 1000000 ton (t)



Waste paper

Available
34040 Bayrampaşa/Istanbul

Paper and Cardboard

Quantity 20000 ton (t)

Try to search the material name, zip code, city name, company name...



Grid view

List view

Map view

Browsing Materials

Under the “Materials” tab, you will be able to view all the available materials and wanted materials in the marketplace in three viewing mode: grid view, list view and map view. In the grid view mode, materials are presented in a visually appealing way, with the key information displayed for each material, including material name, material type, address, price, quantity, and the picture of the material. This viewing option is especially attractive when you are just browsing to see what materials are available.



Lira 250



Bauxite residual (red mud)

Available

34040 Bayrampaşa/Istanbul

Filter Cake and Sludge

Sludge

Quantity 1000000 ton (t)

Waste paper

Available

34040 Bayrampaşa/Istanbul

Paper and Cardboard

Quantity 20000 ton (t)


 Grid view

 List view

 Map view

Material Category

- Electronics
- Business Furniture, Fixture and Equipment
- Filter Cake and Sludge
- Metals and Metal Sludge
- Paper and Cardboard
- Plastics
- Inorganic Chemicals
- Ash and Slag
- Oils and Waxes
- Organic Residual
- Textiles and Leather

Hazardous

- Yes
- No

Location

- Austin, TX
- Houston, TX
- Pasadena, TX
- Y State, Y State
- Zip code, Zip code
- TX, TX
- Levent, Istanbul

Price

- Free
- \$0 - \$100

Material Category ↑↓ ⇅

Name ↑↓ ⇅

Address ↑↓ ⇅

Electronics/Electronics (functional)	Monitors	3	500
Business Furniture, Fixture and Equipment/Business Furniture	Office desks	4	100
Filter Cake and Sludge/Sludge	Bauxite residual (red mud)	5	1000000
Paper and Cardboard/	Waste paper	7	20000
Plastics/	PET water bottles	8	5000
Inorganic Chemicals/	Spent Caustic	9	500
Filter Cake and Sludge/Sludge	Deinking sludge	10	2000
Ash and Slag/Coal Ash	Fly Ash	12	1000
Organic Residual/	Food Scrap	14	1
Textiles and Leather/	Used bed sheets	15	4
Ash and Slag/Slag	Steel Slag	16	1000000
Business Furniture, Fixture and Equipment/Office Appliances	2012 MacBook Pro	17	1
Ash and Slag/Slag	Steel Slag	18	1000000
/	Suni Deri	19	100

skd Home Materials My Materials Add Material My Activities Users Settings Language Welcome, Rui Log out

Try to search the material name, zip code, city name, company name...

Grid view List view Map view

Browsing Materials

The second viewing option is the “list view”. In this view, materials are presented with greater information density. This view allows you to scroll through all the listed materials with ease and enables quick sorting of all the materials by material name, material type, address, and quantity. Filters on the left will help you narrow down the list.

Material Category	Name	Address	Quantity
Electronics/Electronics (functional)	Monitors	3	500
Business Furniture, Fixture and Equipment/Business Furniture	Office desks	4	100
Filter Cake and Sludge/Sludge	Bauxite residual (red mud)	5	1000000
Paper and Cardboard/Paper and Cardboard	Waste paper	7	20000
Plastics/Plastics	PET water bottles	8	5000
Inorganic Chemicals/Inorganic Chemicals	Spent Caustic	9	500
Filter Cake and Sludge/Sludge	Deinking sludge	10	2000
Ash and Slag/Coal Ash	Fly Ash	12	1000
Organic Residual/Organic Residual	Food Scrap	14	1
Textiles and Leather/Textiles and Leather	Used bed sheets	15	4
Ash and Slag/Slag	Steel Slag	16	1000000
Business Furniture, Fixture and Equipment/Office Appliances	2012 MacBook Pro	17	1
Ash and Slag/Slag	Steel Slag	18	1000000
/	Suni Deri	19	100

Material Category

- Electronics
- Business Furniture, Fixture and Equipment
- Filter Cake and Sludge
- Paper and Cardboard
- Plastics
- Inorganic Chemicals
- Filter Cake and Sludge
- Ash and Slag
- Organic Residual
- Textiles and Leather
- Ash and Slag
- Business Furniture, Fixture and Equipment
- Ash and Slag
- /

Location

- Austin, TX
- Houston, TX
- Pasadena, TX
- Y State, Y State
- Zip code, Zip code
- TX, TX

Try to search the material name, zip code, city name, company name...



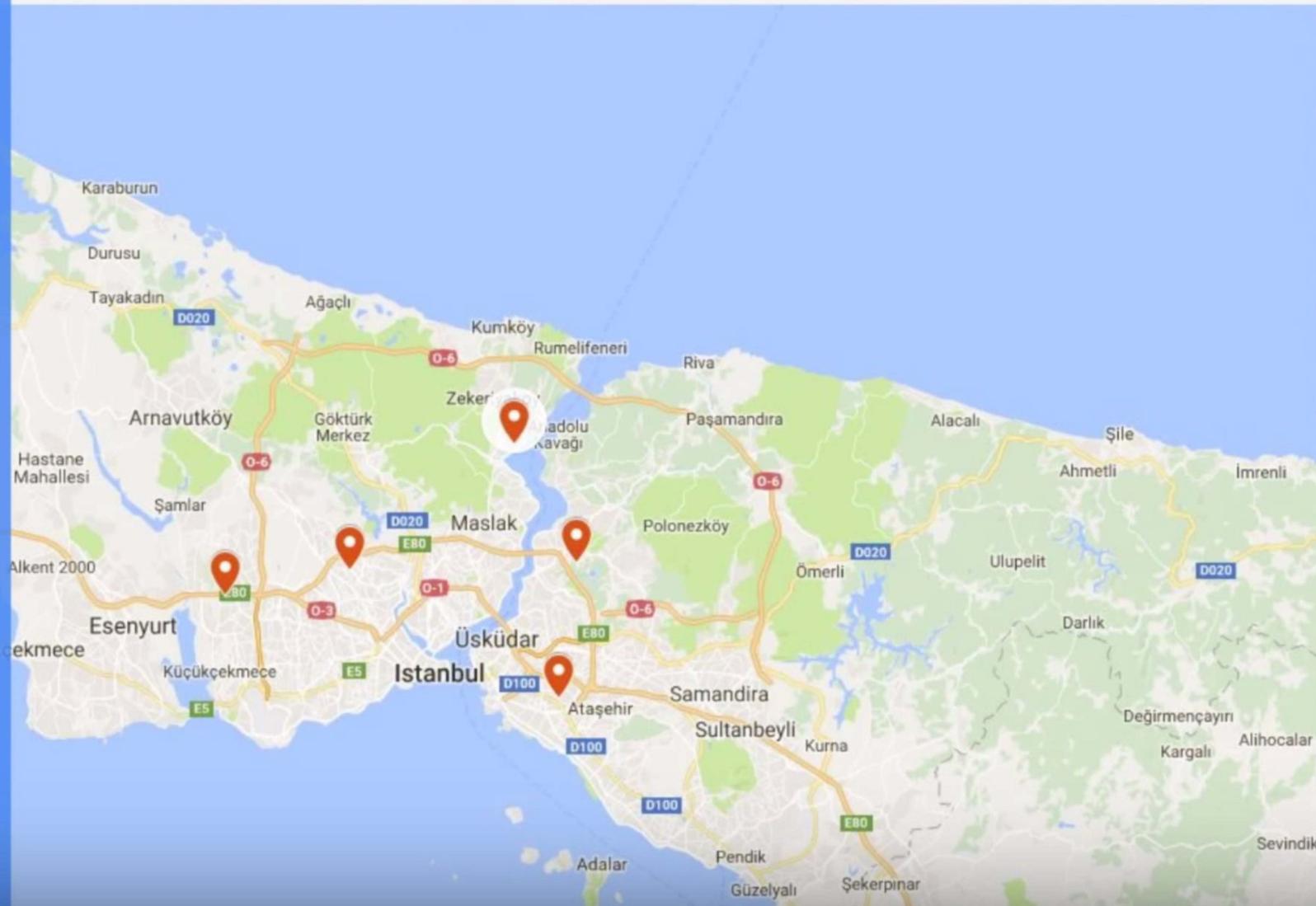
Grid view List view Map view

Browsing Materials

The third viewing option is the “map view”. In this view, materials are presented on an interactive map. This view shows all the participants locations and allows you to quickly locate all the listed materials with ease. You will likely to use this view to identify reuse opportunities when transportation cost is a major factor.

- Austin, TX
- Houston, TX
- Pasadena, TX
- Y State, Y State
- Zip code, Zip code
- TX, TX
- Levent, Istanbul

Price



Try to search the material name, zip code, city name, company name...

[Grid view](#)[List view](#)[Map view](#)[Available Materials](#)[Wanted Materials](#)

Wanted

Aluminum Cans (wanted material)

Post-consumer aluminum cans that can be recycled to make new aluminum.

[Info](#)

Wanted

Waste paper (wanted material)

Post-consumer paper wastes that can be recycled to make new paper products

[Info](#)

Wanted

Waste oil (wanted material)

Waste oil that has a calorific value of over 6000 btu/lb to be reused as alternative fuel in the cement kiln

[Info](#)

Try to search the material name, zip code, city name, company name...



Grid view List view Map view

Browsing Materials

Similarly, you can also view all the "Wanted Materials" by simply clicking on the "Wanted Materials" tab on the top of the page.

Wanted

Waste paper (wanted material)

Post-consumer paper wastes that can be recycled to make new paper products

Info

Wanted

Waste oil (wanted material)

Waste oil that has a calorific value of over 6000 btu/lb to be reused as alternative fuel in the cement kiln

Info

sludge

[Grid view](#)[List view](#)[Map view](#)[Available Materials](#)[Wanted Materials](#)

Deinking sludge

Available

34040 Bayrampaşa/İstanbul

[Filter Cake and Sludge](#)[Sludge](#)**Quantity** 2000 ton (t)

Bauxite residual (red mud)

Available

34040 Bayrampaşa/İstanbul

[Filter Cake and Sludge](#)[Sludge](#)**Quantity** 1000000 ton (t)

Showing 1 - 3 of 3 items.

[Previous](#)

1

[Next](#)

sludge

Search and Filter

If you already have interested material(s) in mind, using the search (available on every page) or filter function (available on the list view and map view) might be a good way to go! Keywords for search include material name (and any attributes of the material), company name, location, zip code, etc. The software will list all the matched results with the best match on the top of list.

Quantity 2000 ton (t)



Bauxite residual (red mud)

Available

34040 Bayrampaşa/Istanbul

Filter Cake and Sludge

Sludge

Quantity 100000 ton (t)



Grid view

List view

Map view

Showing 1 - 3 of 3 items.

Previous

1

Next



Bauxite residual (red mud)

Qty: 1000000 ton (t)

Filter Cake and Sludge

Sludge

Company

USBCSD

Location

Başak, 34306 Başakşehir/İstanbul, Turkey

Description of the Resource:

Bauxite residue is a by-product in the production of alumina. The resulting residue is high in alkalinity, but can be neutralized.

Frequency

Yearly

Size Description

Components Description

Sodalite: 4-40%, Alumino-geothite: 10-30%, Hematite: 10-30%

Disposal Method

Disposed in red mud pond

Conditions Info

Attachments

← Back

Add to watchlist

Contact

Materials Details

In any viewing mode, you can click on the material to check out all the details posted by the owner. If you are interested, you can click on “Contact” button at the bottom to start a conversation with the owner immediately, or add it to your “Watchlist” to explore the opportunity at a later time.

Bauxite residual (red mud)

Qty: 1000000 ton (t)

Filter Cake and Sludge

Sludge

Company

USBCSD

Location

Başak, 34306 Başakşehir/İstanbul, Turkey

Description of the Resource:

Bauxite residue is a by-product in the production of alumina. The resulting residue is high in alkalinity, but can be neutralized.

Frequency

Yearly

Size Description

Components Description

Sodalite: 4-40%, Alumino-geothite: 10-30%, Hematite: 10-30%

Disposal Method

Disposed in red mud pond

Conditions Info

Attachments

← Back

Add to watchlist

Contact

Module 2: Uploading Materials

[Available material](#)[Wanted material](#)[Upload materials from file](#)

Add available material

[Basic Info](#)[Specific](#)[Attachments](#)[Price](#)[Audience](#)

Name

This field is required.

Hazardous

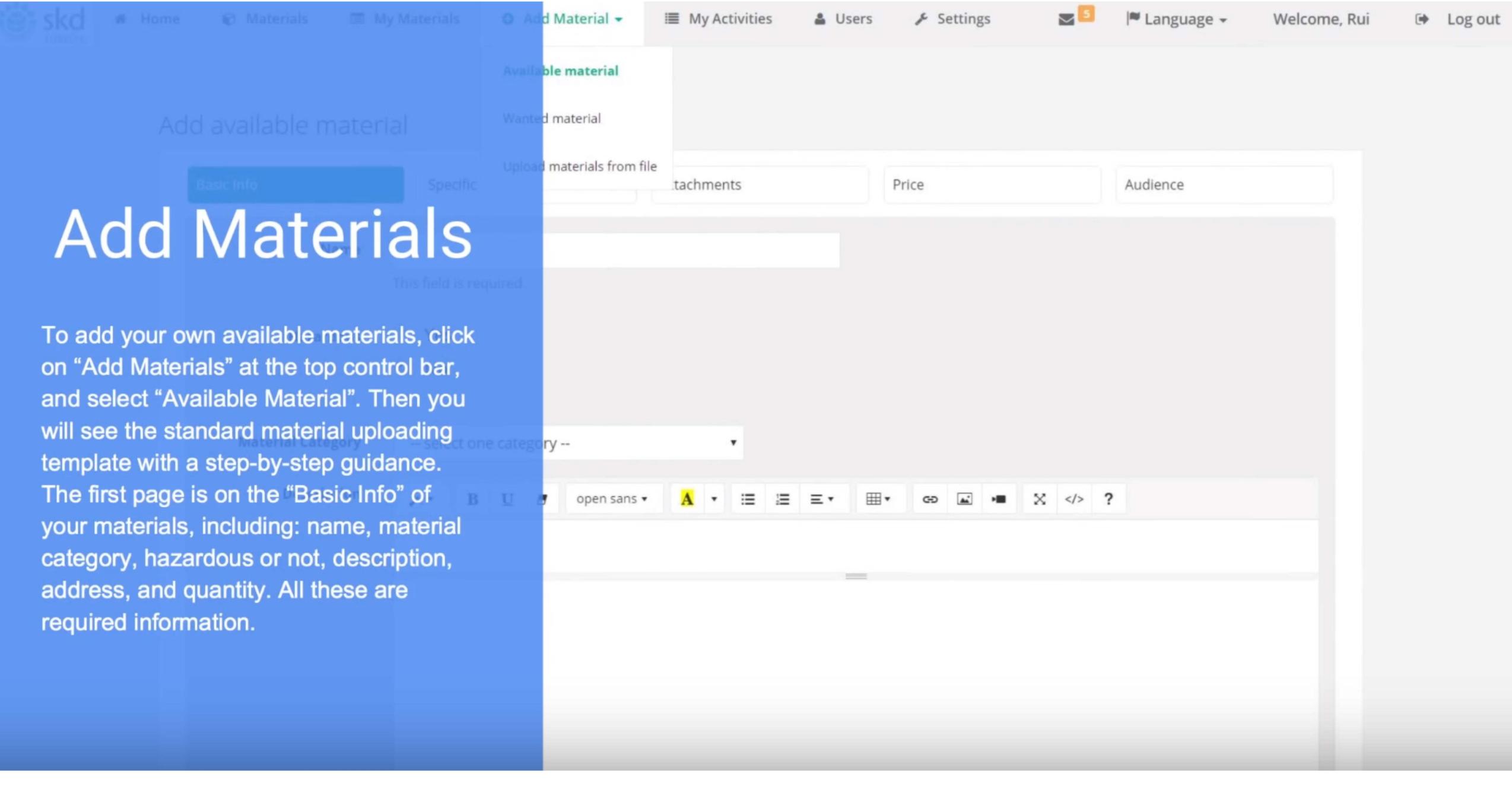
Yes

No

Material Category

-- select one category --

Description



Add Materials

To add your own available materials, click on "Add Materials" at the top control bar, and select "Available Material". Then you will see the standard material uploading template with a step-by-step guidance. The first page is on the "Basic Info" of your materials, including: name, material category, hazardous or not, description, address, and quantity. All these are required information.

Add available material

Basic Info

Specific

Available material

Wanted material

Upload materials from file

Attachments

Price

Audience

Material Category

-- select one category --

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?

Add available material

[Basic Info](#)[Specific Info](#)[Attachments](#)[Price](#)[Audience](#)

Size Description

Components
Description

Disposal Method

Conditions Info

[Previous](#)[Next](#)

Add available material

Basic Info

Specific Info

Attachments

Price

Audience

Add Materials

The second page is on the material "Specific info" of your materials. This page will vary depending on the material category you choose in the first step.

Common "specific info" include: size/dimension, components, disposal method, condition of the material, etc.

Previous

Next

Add available material

Basic Info

Specific Info

Attachments

Price

Audience

MSDS:

Drop MSDS file to upload or click here

Images:

Drop images to upload or click here

Files:

Drop files to upload or click here

Previous

Next

Add available material

Basic Info

Specific Info

Attachments

Price

Audience

Add Materials

The third step is to upload all the attachment files to offer additional details on the material. Uploading material pictures is highly recommended for all your listings. When a material is a hazardous material, we require a MSDS to be attached to the material.

Files:

Drop MSDS file to upload or click here

Drop images to upload or click here

Drop files to upload or click here

Previous

Next

Add available material

[Basic Info](#)[Specific Info](#)[Attachments](#)[Price](#)[Audience](#)

Price

Currency

[Previous](#)[Next](#)

Add available material

Basic Info

Specific Info

Add Materials

Currency

The fourth step is to price the material if applicable, or specify no price to tag it as free.

Attachments

Price

Audience

Previous

Next

Add available material

Basic info

Specific info

Add Materials

The last step is to specify the audience of the material, i.e. who can view this material.

We offer 3 options: Public (viewable to everyone), Participants only (only participants of the project and project staff can view), and Internal only (only users within the company and project staff can view). Public audience will give your materials the most exposure, which means the most creative brains thinking of how to reuse your material. "Internal only" option is provided if a material is very sensitive or confidential that you only want your internal users and marketplace project staff to work on it.

Attachments

Price

Audience

everyone)

participants and project staff can view)

within the company and project staff can view)

Previous

Save

Uploading materials from XLSX file

[Available material](#)[Wanted material](#)[Upload materials from file](#)[Download Excel Template](#)

Drop XLSX file with materials information here.

- Available material
- Wanted material
- Upload materials from file

Uploading materials from XLSX file

Add Materials

If you would like to upload multiple materials that you have already documented in an excel compatible format, you can go to "Add Material" tab and select "Add materials from file". You can download our excel template, copy and paste your materials into the format of the template. After you upload the file, all your materials will be uploaded at once!

Drop XLSX file with materials information here.

- Available material
- Wanted material
- Upload materials from file

Add wanted material

Basic Info

Name

This field is required.

Hazardous Yes No

Material Category

Description



- Available material
- Wanted material
- Upload materials from file

Add wanted material

Basic Info

Add Materials

Similar to "Available material", you can also add "Wanted material" under the "Add Material" tab. The template for "wanted material" is similar to the first page of "available material" with less required information.

This field is required.

Form area with input fields and a dropdown menu.

-- select sub category --

Rich text editor toolbar with icons for bold, italic, link, image, etc.

- Show only my materials
- Show all company materials


[Available Materials](#)
[Wanted Materials](#)

Material Category ↓↑	Name ↓↑	Address ↓↑	Quantity ↓↑	Activity
Electronics/Electronics (functional)	Monitors	3	500	
Business Furniture, Fixture and Equipment/Business Furniture	Office desks	4	100	
Filter Cake and Sludge/Sludge	Bauxite residual (red mud)	5	1000000	
Paper and Cardboard/	Waste paper	7	20000	
Plastics/	PET water bottles	8	5000	
Inorganic Chemicals/	Spent Caustic	9	500	
Filter Cake and Sludge/Sludge	Deinking sludge	10	2000	
Ash and Slag/Coal Ash	Fly Ash	12	1000	
Organic Residual/	Food Scrap	14	1	
Textiles and Leather/	Used bed sheets	15	4	
Ash and Slag/Slag	Steel Slag	16	1000000	



Manage Materials

You can manage your materials by clicking the "My Materials" tab on the top control bar. All your available materials and wanted materials are listed as a table with key information: material category, name, quantity, address, owner, time added, status (active or inactive), and action (edit, activate/deactivate). You can sort your materials by each column, edit your materials and change the status of your materials by activating or deactivating them.



Name ↑↓	Address ↑↓	Quantity ↑↓	Activity
Monitors	3	500	
Office desks	4	100	
Bauxite residual (red mud)	5	1000000	
Waste paper	7	20000	
PET water bottles	8	5000	
Spent Caustic	9	500	
Deinking sludge	10	2000	
Fly Ash	12	1000	
Food Scrap	14	1	
Used bed sheets	15	4	
Steel Slag	16	1000000	

Module 3: Transaction

Conversation

Conversation

I want to start the conversation because

My current role is

Material



Steel Slag

Price: \$14 / ton (t)

Qty: 1000000

Start

Transactions

Interested in a material? You can contact the owner of the material to start a conversation.

[Start](#)[Cancel](#)

Material



Steel Slag

Price: \$14 / ton (t)

Qty: 1000000

Conversation

Conversation

I want to start the conversation because

I am interested in this material and I need to consult more people

My current role is

- ✓ buyer
- owner
- facilitator
- processor
- transportation
- expert

Material



Steel Slag

Price: \$14 / ton (t)

Qty: 1000000

Conversation
Start

Transactions

After you contact the owner, you will have to select one of the 4 scenarios:

1. I want to buy the material immediately
2. I know someone else who might be interested in this material
3. I am interested and would like to get more people involved
4. I just want to start a conversation

The owner will get notified on a “New Request”. He/she will either start this conversation or decline your request with a reason.

Material



Steel Slag

Price: \$14 / ton (t)

Qty: 1000000

Conversation

Transaction

In the reuse conversation, there are a few roles designed to better facilitate the transactions. We find it especially helpful for more complicated transactions.

- Owner
- Buyer/Taker
- Service Provider (transportation and logistics)
- Processor (processing of the material)
- Collaborators (anyone that contributes to the conversation from technical, legal, business perspectives)
- Facilitator (played by Project staff)

A buyer or a collaborator can initiate a conversation. Owner and facilitator are necessary in all conversations, and all roles can invite other users to join the conversation.

Material



Steel Slag

Price: \$14 / ton (t)

Qty: 1000000

Conversation

Conversation

[+Invite](#)**Rui HE**

2016-11-21T21:44:03.000Z

Hello, Campbell. I would like to reuse some of your steel slag in my cement production process. Could you please give me more details on your material? Thanks!

**Rui HE (buyer)**
(you)**Campbell McNeill**
(owner)

2016-11-25T03:48:01.000Z

Campbell McNeill

Ok, we generate 1 million tons of these slag material at our plant in Texas. We know they make perfect cement clinker. You can crush them into finer sizes if you like.

[Send](#)

Material



Steel Slag

Price: \$14 / ton (t)**Qty:** 1000000

Transactions

Quantity

500000 / 1000000

Pending[Cancel the transaction](#)

Conversation

Transaction

All participants in the conversations can communicate and interact in the Marketplace software through the chatting function.

Generally, an industrial materials reuse conversation include feasibility discussions on:

- Technology and process
- Regulations and laws
- Business and economic return
- Environmental and social impact
- Transportation and logistics

Facilitator will monitor the conversation and participate when needed. When a barrier is encountered, facilitator will work with the project team to help solve it or pull in other resources, services, and capabilities to solve it.

Material



Steel Slag
Price: \$14 / ton (t)
Qty: 1000000

+Invite

- Rui HE (buyer) (you)
- Campbell McNeill (owner)

Transactions

Quantity
500000 / 1000000

Pending

Cancel the transaction

Send

Conversation

Transaction

During the conversation, people can invite others to join in the expert, collaborator, logistics and other roles. Changes to roles (e.g. from collaborator or buyer when they see the opportunity) can be made from the same interface. If everyone except the owner and facilitator leaves, the facilitator will either invite others to join the conversation or cancel the conversation. Cancellation can also be initiated by the owner.

Material



Steel Slag

Price: \$14 / ton (t)

Qty: 1000000

Rui HE (buyer) (you)

Campbell McNeill (owner)

Transactions

Why do you cancel this transaction?

- Not match my expectation
- Some legal problems
- Others

Not match my expectation

Back

Submit

Send

Conversation

Conversation

+Invite



Rui HE

2016-11-21T21:44:03.000Z

Hello, Campbell. I would like to reuse some of your steel slag in my cement production process. Could you please give me more details on your material? Thanks!



Rui HE (buyer) (you)



Campbell McNeill (owner)

2016-11-25T03:48:01.000Z

Campbell McNeill

Ok, we generate 1 million tons of these slag material at our plant in Texas. We know they make perfect cement clinker. You can crush them into finer sizes if you like.



Enter message text

Send

Material



Steel Slag

Price: \$14 / ton (t)

Qty: 1000000

Transactions

Quantity

500000 / 1000000

Completed Transaction

Cancel the transaction

Conversation

Conversation

Transaction

After all the details are nailed down and all the barriers are worked out, a transaction can be completed after:

1. Buyer proposes price and quantity of the transaction
2. Service provider(s) and/or processor(s) provide their services description and price.
3. Owner accepts, and deal made
4. Facilitator verify the completion of the transaction and provide economic, environmental, and societal benefits estimation.
5. Owner and buyer verify the benefits and set up transactions automatic update (if recurrent)

Material

+Invite



Rui HE (buyer) (you)



Campbell McNeill (owner)

Send



Steel Slag

Price: \$14 / ton (t)

Qty: 1000000

Transactions

Quantity

500000 / 1000000

Completed Transaction

Cancel the transaction


[Ongoing Conversation](#)
[Conversation Invites](#)
[Recommendation](#)
[Completed Transaction](#)
[Cancelled Transaction](#)
[Watch List](#)

ID ↓↑	Last Update ↓↑	Material ↓↑	Participants ↓↑	Role ↓↑	Activity Type ↓↑	Quantity	Action
2	Nov 18, 2016 8:17:37 AM	Steel Slag	Daniel Kietzer (Participant Role: buyer) Rui HE (Participant Role: owner)	owner	Conversation Invites	2	View
3	Nov 21, 2016 2:35:12 PM	Bauxite residual (red mud)	Rui HE (Participant Role: buyer) Campbell McNeill (Participant Role: owner)	buyer	Conversation Invites	500000	View
5	Nov 21, 2016 3:43:09 PM	Steel Slag	Rui HE (Participant Role: buyer) Campbell McNeill (Participant Role: owner)	buyer	Conversation Invites	500000	View

Showing 1 - 5 of 5 items.

[Previous](#)
1
[Next](#)

Participants ↓↑	Role ↓↑	Activity Type ↓↑	Quantity	Action
Daniel Kietzer (Participant Role: buyer) Rui HE (Participant Role: owner)	owner	Conversation Invites	2	View
Rui HE (Participant Role: buyer) Campbell McNeill (Participant Role: owner)	buyer	Conversation Invites	500000	View
Rui HE (Participant Role: buyer) Campbell McNeill (Participant Role: owner)	buyer	Conversation Invites	500000	View

Showing 1 - 5 of 5 items.

Manage Transactions

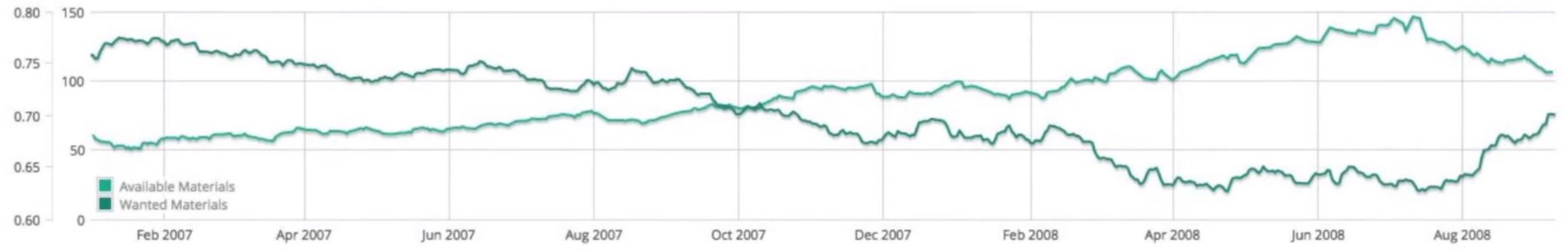
You can manage your conversations and other activities through "My Activities". Under this tab, you will find all your activities in the marketplace categorized into:

- Ongoing Conversation: conversations you are currently engaged in
- Conversation Invites: conversation that other users invite you to join or you requested to start with pending acceptance
- Recommendation: materials recommended to you from project staff
- Completed Transaction
- Cancelled Transaction
- Watch List: a list of materials you added to your watch list

Module 4: Reporting

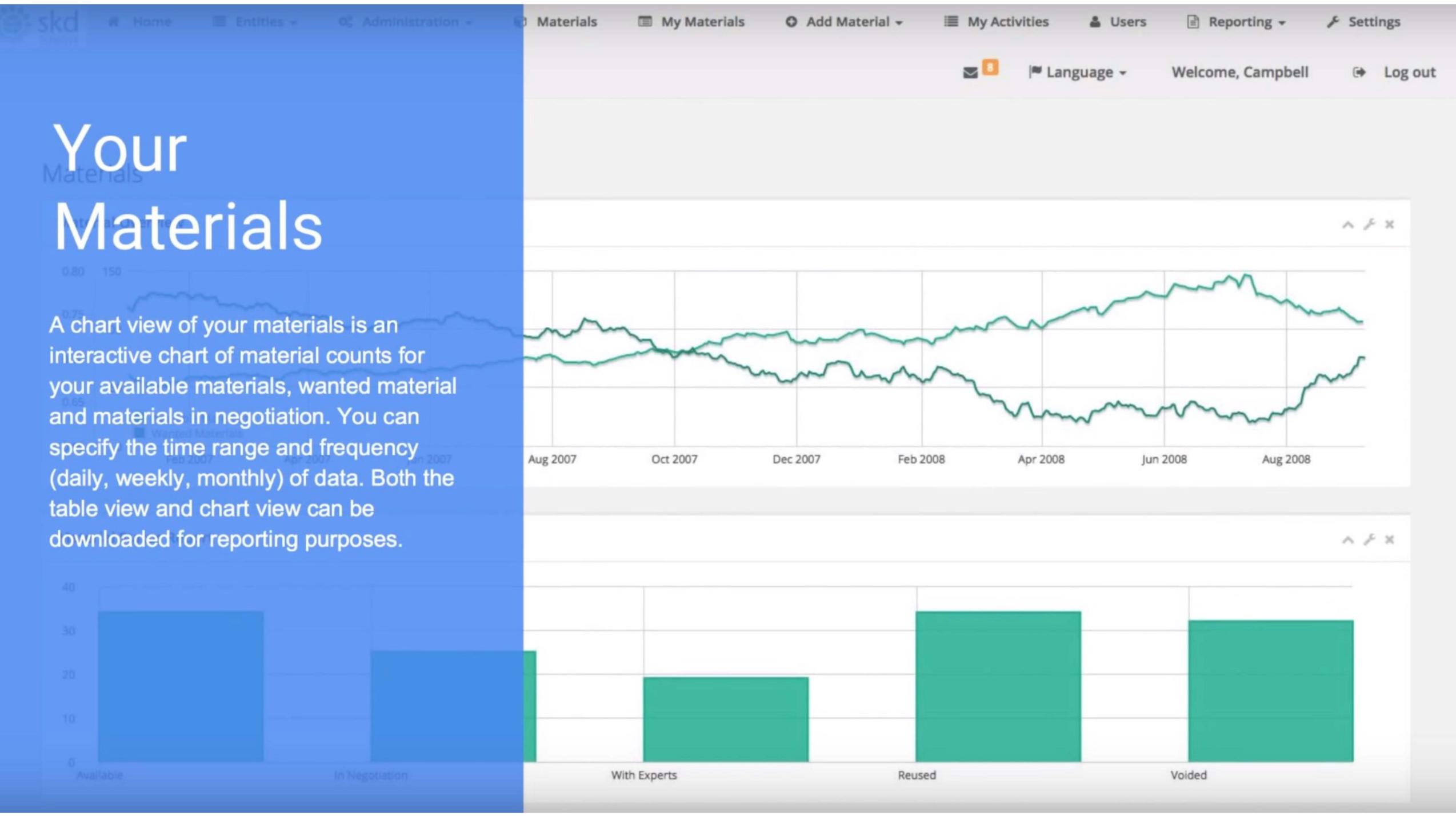
Materials

Material Overview



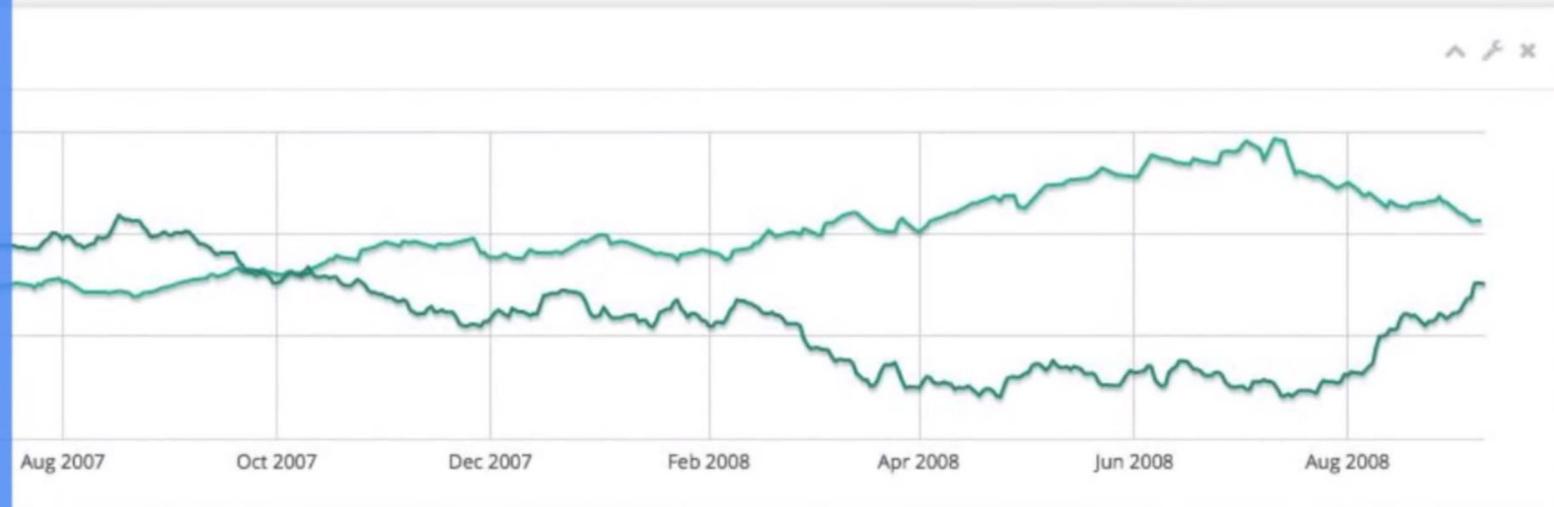
Material Status Report





Your Materials

A chart view of your materials is an interactive chart of material counts for your available materials, wanted material and materials in negotiation. You can specify the time range and frequency (daily, weekly, monthly) of data. Both the table view and chart view can be downloaded for reporting purposes.



Activities

Activity Report



Show 10 entries

Search:
[Copy](#)
[CSV](#)
[Excel](#)
[PDF](#)
[Print](#)

Showing 1 to 8 of 8 entries

ID	Last Update	User Id	Activity Type	Quantity	Cancel Reason	Material
1	Nov 17, 2016 3:19:42 PM	10	Conversation Invites	30		2
2	Nov 18, 2016 8:17:37 AM	10	Conversation Invites	2		16
3	Nov 21, 2016 2:35:12 PM	43	Conversation Invites	500000		3
4	Nov 21, 2016 2:38:36 PM	7	Ongoing Conversation			3
5	Nov 21, 2016 3:43:09 PM	43	Completed Transaction	500000		14
6	Nov 29, 2016 1:05:26 AM	44	Ongoing Conversation			1
7	Nov 29, 2016 1:21:13 AM	44	Recommendation			2
8	Nov 29, 2016 3:01:17 PM	10	Recommendation			1

Reporting

The Materials Marketplace software has various reports built in:

- Materials reports: table view of "My materials" and chart view of "My Materials"
- Activities reports: table view of each category of "My Activities" and chart view of "My Activities"
- Transaction results are documented in the "Completed Transactions" table.
- Marketplace-wide reports: number of companies, users, locations, materials, participants breakdown by industry type, materials breakdown by material categories are available on the Homepage

Showing 1 to 8 of 8 entries

Search: Copy CSV Excel PDF Print

ID	Last Update	User Id	Activity Type	Quantity	Cancel Reason	Material
1	Nov 17, 2016 3:19:42 PM	10	Conversation Invites	30		2
2	Nov 17, 2016 3:19:42 PM	10	Conversation Invites	2		16
3	Nov 21, 2016 2:35:12 PM	43	Conversation Invites	500000		3
4	Nov 21, 2016 2:38:36 PM	7	Ongoing Conversation			3
5	Nov 21, 2016 2:38:36 PM	7	Completed Transaction	500000		14
6	Nov 29, 2016 11:05:26 AM	44	Ongoing Conversation			1
7	Nov 29, 2016 1:21:13 AM	44	Recommendation			2
8	Nov 29, 2016 1:21:13 AM	44	Recommendation			1

Previous 1 Next

APPENDIX E

Acknowledgements and List of Contacts

Appendix E – Acknowledgement and List of Contacts

I would like to take the opportunity to express my gratitude to those who provided guidance, support, consultation, as well as provided resources and shared their experience in working towards improving diversion rates of C&D materials. The list below includes the names and positions of those who have been interviewed throughout this project.

Adam Corneil

*CEO & Co-founder
Unbuilders*

Adriana Velázquez

*Project Engineer, Zero Waste Implementation
Solid Waste Services
Metro Vancouver*

Amie Poole

*Director
Octiscapes Landscaping Ltd.*

Andy Smith

*Zero Waste Markets Program Manager
King County*

Brad Badelt

*Assistant Director, Sustainability
City of Vancouver*

Bryce Jacobson

*Senior Waste Reduction Planner
Oregon Metro*

Dave Bennink

*Owner
Re-Use Consulting*

Emily Roberson McCoy

*Director
Circular Economy Programs
US Business Council for Sustainable Development*

Faisal Mirza

*Senior Project Manager
Solid Waste Strategic Services
City of Vancouver*

Harvinder Aujala

*Director of Policy & Communications
Recycling Council of B.C.*

Jordan Jordan

*Senior Consultant
Safe + Sustainable Site Certification, Earth
Advantage*

Karen Storry

*Senior Project Engineer, Zero Waste
Implementation
Solid Waste Services
Metro Vancouver*

Katie Kennedy

*Waste Diversion Lead at Seattle Public Utilities
City of Seattle*

Kinley Deller

Waste Reduction Specialist at King County

Larry LaMotte

*Founder + CEO
ReCapturit*

Lisa Brideau

*Senior Sustainability Specialist
City of Vancouver*

Norm Ruttan

*Owner
iWasteNot Systems Inc.*

Shawn Wood

*Construction Waste Specialist
Bureau of Planning and Sustainability
City of Portland*

APPENDIX F

**King County Salvage Lumber Warehouse (SLW)
Business Plan Prospectus**

Salvage Lumber Warehouse (SLW)

Business Prospectus

Market Opportunity

Over several years, King County, the City of Seattle and construction and solid waste industry representatives have dedicated substantial research and thought into how our region can increase lumber reuse. Currently, the biggest challenges limiting lumber reuse in our region include:

1. Limited resources and incentives to cost-effectively access an untapped lumber stock from buildings currently demolished rather than deconstructed;
2. Limited demand from building owners specifying deconstruction over demolition to help drive up demand for deconstruction services and salvage lumber supply;
3. Lack of processing infrastructure that could more cost effectively and efficiently meet the basic processing demands needed for resale; and
4. Inconsistent supply of quality, competitively priced salvaged lumber for resale to meet a potentially broad and growing customer base.

The general consensus from past and current research is that a **Salvage Lumber Warehouse (SLW)** that establishes networks to connect supply and demand for salvaged lumber; and processes recovered lumber to market specification, could profitably increase the recovery and reuse of salvaged lumber regionally.

The Business Opportunity

Products and Services

The SLW would be a new for-profit component of an existing industry player focusing on collecting, processing, salvage grading, inventorying and coordinating with retail and wholesale partners for distribution of:

- Blanks processed to specification for value-added re-manufacturing (immediately);
- Non-Structural General Construction Lumber - soft wood salvaged non-grade dimensional lumber (immediately);
- Structural Framing Lumber - soft wood salvaged graded dimensional lumber (immediately); and
- Architectural Grade Lumber - larger dimensional beams and laminated beams for flooring, paneling, counter tops and other products (immediately).

While the primary focus of the SLW would be utility grade reuse and remanufacturing, architectural grade would be included to offset the higher processing costs/lower retail value of utility lumber and basic raw wood materials. In the longer-term, additional products and services could be added, including:

- Hard woods (long term);
- Engineered wood (long term);
- WWPA (structural) grading;
- "Processor for hire";

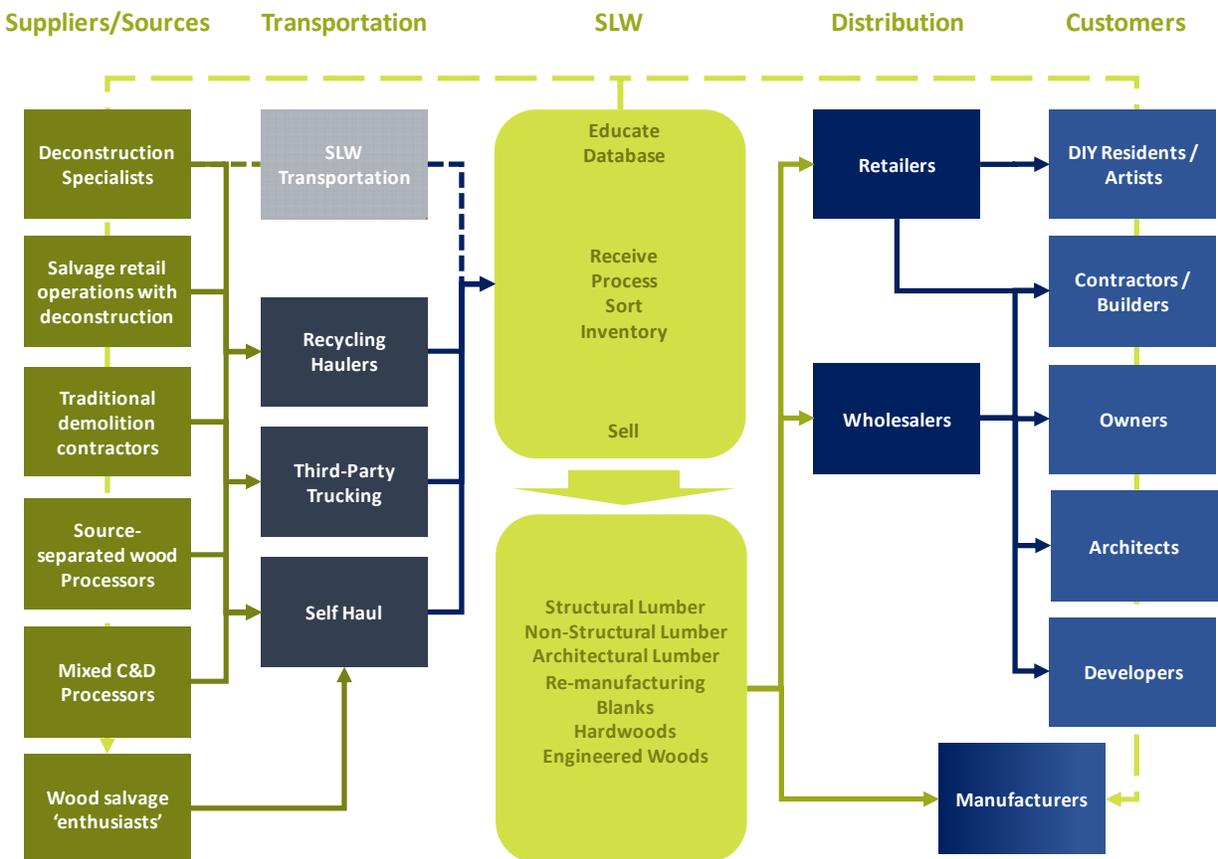
- Virtual market and information exchange to match supply and demand for salvaged lumber, using a 'just in time' or 'wish list' format; and
- FSC Group Certification.

Value Proposition

The SLW would be the only local or regional salvage lumber operation that profitably accepts/collects, processes, grades, inventories, and distributes salvaged lumber while providing true value to:

1. **Suppliers.** Who would benefit from decreased salvage, disposal, and transportation costs, and improved public image.
2. **Manufacturers.** Who would be offered consistent salvaged lumber feedstocks processed and supplied to their specifications, thereby eliminating preliminary processing at their facilities.
3. **Retailers.** Who would be offered salvage lumber market stability, consistent material volume, stable pricing that suits the end-market, and off-site inventory. Competitive pricing would be based on market pricing.
4. **End-Users.** Who would save on renovation costs and time, or raw material costs, by being able to quickly and conveniently access specific grades, at affordable prices.

The Market



Supplier Markets

With LEED and other rating systems, there is a growing demand for recycling percentage specifications in building projects, but there is a limited equivalent for salvage and deconstruction materials. Supply is likely to come from existing stock in rapidly urbanizing communities – particularly those with less political or community momentum to protect land. Material from the outskirts of the county are an opportunity – especially where self-haul drop off options are limited.

The majority of the potentially recoverable lumber would come from residential demolition. Commercial does not produce much volume of structural lumber. The majority of the pieces are shorter (4 feet and less). Floor joists could be a more likely opportunity, if the industry can move towards green demolition.

The main motivation for salvaging wood is largely based on economics – most suppliers must be able to recoup the investment to access and process the wood in order to decide to go for more difficult to access timbers. Even those in the ‘enthusiast’ category still need to make the cost pencil out. Economics is also a major driver on where wood loads are hauled.

Source separated loads would increase the viability of a hauler being able to take a wood load to a different location. Some viable structural lumber makes it to C&D processing facilities though it requires additional processing to make it reusable; very little architectural grade lumber makes it to C&D processors. Outputs from processing include hog fuel and remanufactured products (staircases, flooring, furniture, engineered panels).

Material Supply

The following represent the greatest opportunities for tapping into supply in this region:

- Using 2012 as a proxy year, our modeling indicates that residential demolitions and residential remodels generated approximately 42,000 tons of clean wood from King County and the City of Seattle. Based on deconstruction industry experience, if hybrid deconstruction had been used on these demolitions and renovations, an estimated 2,970 tons of lumber or 2 million board feet could have been salvaged.
- Residential structures – huge quantity of them and greater ease in handling the materials. Homes that were constructed before the advent of plywood likely have the best quality wood.
- Best commercial supply is likely 100-year old and 3-4 story buildings in Seattle. Almost everything in these buildings was built from fir. Much of this product would have a market for architecturally interesting ‘rustic’ looking uses. Owners are savvier now, and tend to be aware of the value in their buildings, so may be more inclined to deconstruct. Less consistent and stable supply could come from military bases, old railroad trestles, bridges, and tank stocks (water tanks, oil tanks, wine tanks, etc).

Supplier Segments

There are a spectrum of professionals who could supply unprocessed salvaged lumber to the SLW:

- Full deconstruction specialists, who also provide training services
- Salvage retail operations with a deconstruction arm
- Wood salvage ‘enthusiasts’ who seek out and deconstruct, inventory, reuse in their own projects or remanufacture into new products, or broker sales with other buyers
- Traditional demolition contractors who provide some level of deconstruction, though typically not full hand deconstruction
- Source-separated C&D haulers and recyclers
- Mixed C&D haulers and recyclers

End Markets

Demand is likely to come from rapidly growing – yet not rapidly urbanizing – communities. Less urban areas often provide a greater demand for structural lumber, while more urban areas tend to maintain greater demand for architectural lumber and fixtures. Demand will also come from value-added manufacturers and artists looking for specific aesthetics, wood species, and raw material types to fill specific orders, enhance market position, or lower operating costs.

End Market Segments

The SLW would target the following end-markets:

- Owners
- Developers
- Architects
- Contractors/Builders
- DIY Residents / Artists
- Manufacturers

By specifically focusing efforts on all of these segments, the SLW would diversify its end-market customer base and selling price ranges.

Distribution Channels

SLW would establish partnerships or distribution agreements with existing retailers throughout the target geographic area to act as the primary distribution channel to end-markets. SLW's service package for partners would follow a basic strategy: provide the services that allow them to better service their customers, and provide them with the tools to acquire new customers - all for the purpose of expanding the volume of salvage lumber they can handle for a profit, and buy from SLW.

SLW would also establish supply agreements with value-added remanufacturers throughout the geographic region to act as an additional distribution channel to end-markets. Consistent material supplies would add stability to a sometimes volatile supply stream.

The SLW would actively establish supply partnerships throughout the county and region to enhance the capability to recover and consolidate salvage lumber from businesses, haulers, and processors that generate or handle it, wherever it is generated. The SLW would also develop operational partners to provide a sourcing and transportation presence, and opportunity for expansion.

Competition

No retailers have positioned themselves for a great increase in salvage lumber inventory. While it is not particularly difficult to source or sell, it is not a high value commodity and therefore not prioritized. For those who have not invested in additional storage space, storage remains a big challenge for retail locations interested in selling salvage lumber due to the high cost of holding inventory and the low value of the commodity.

Promotion, Marketing, Sales

The SLW's strategy for building a diverse and consistent client base would be set on its position as an independent liaison between raw salvage lumber suppliers and lumber retailers and their end markets, and providing consistent and quality products (potentially graded) that are price competitive with virgin lumber and as convenient to supply to customers.

On a practical level, that would require marketing and promotion strategies applicable to all market segments – suppliers and end-markets – and include:

- Branding – including FSC certification potential

- Promotions – including advertising, direct mail, newsletter
- Social Media – including Facebook, YouTube, blog, online webinar, etc.
- Direct Business to Business Outreach
- Outreach to Public Stakeholder Networks
- Sales Force Development

SLW would undertake a variety of methods for establishing relationships with potential suppliers and end-markets to support and execute the marketing strategy. Some of these methods would have greater applicability to one target group over the other, and include pricing, equipment, and contracts.

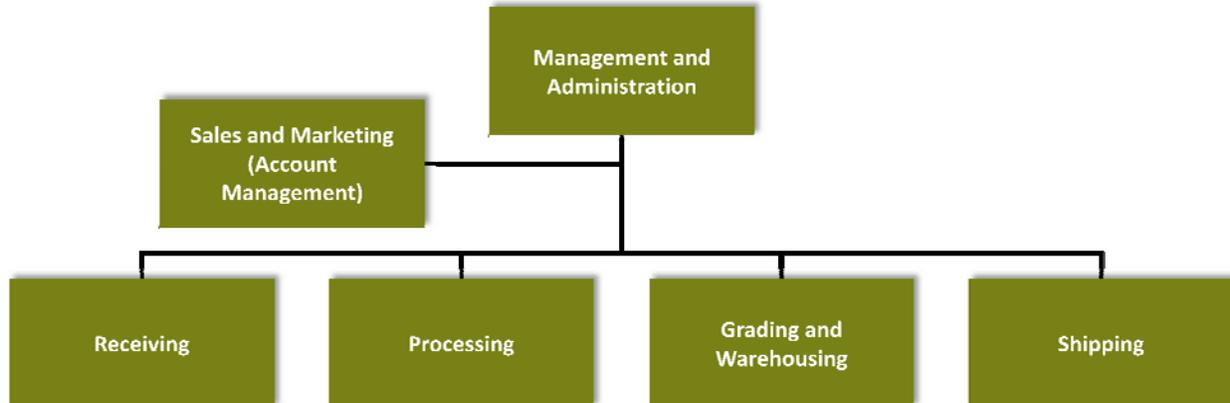
Management and Organization Plan

The SLW would likely be organized as part of an existing organization (such as a non-profit or a for-profit corporation). The SLW operator would:

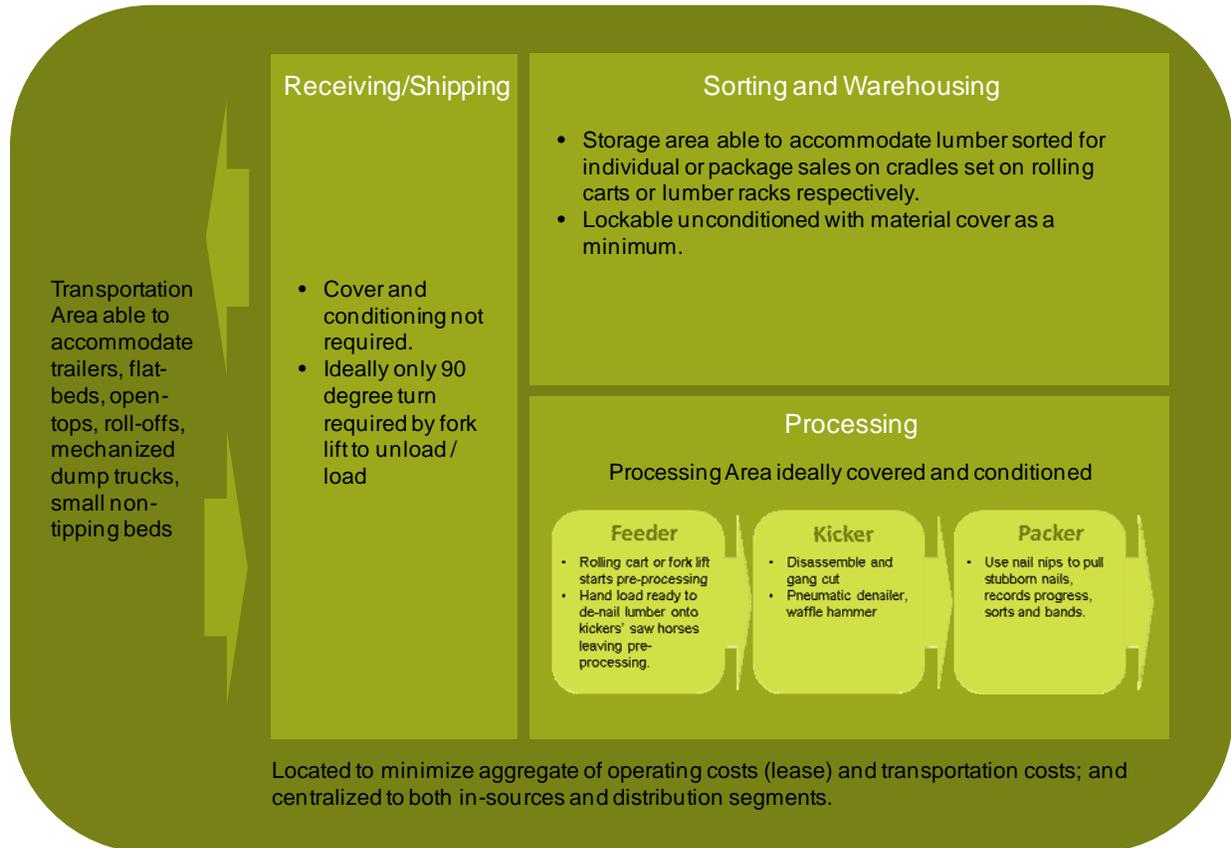
- Manage administration
- Execute communications and marketing strategy
- Manage supply and distribution partnerships
- Manage and operate receiving, warehousing, processing, and salvage grading functions
- Make capital investments, as appropriate
- Collect and manage service revenue, and manage operating expenses.

Organization Structure

The SLW functional structure would likely consist of the following:



Operations Infrastructure



Immediate personnel needs

Initially, the SLW organization would need two (2) facility staff, with organizational support needed for operations management, accounting, administration, and sales/marketing. Additional staff would be hired as needed to accommodate increasing volume, or to supplement existing staff, particularly related to technical function (i.e., WWPA (structural) grading) or related to supplier and end-market development.

Financial Summary

Financing/Assets Required

- \$60,000 working Capital
- \$56,500 Equipment load
- Access to line of credit
- 7,500 square feet warehouse space

Important Assumptions

- Total available supply assumed to be 42,000 tons in year one (with an annual growth rate of 2%).
- Total recovered supply assumed to 10,500 tons in year one (with an annual growth rate of 15%).
- Total market share assumed to be 525 tons in year one (with an annual growth rate of 15%).
- Product pricing assumed to be approximately \$525 per mbf for structural lumber; approximately \$1,200 per mbf architectural lumber.

- Cost of Goods Sold includes only material purchases.
- Average inbound transportation costs assumed to be \$90 per ton.
- Some inventory investment, but annual purchases equal annual sales.
- Finance raw salvage lumber supply growth through retained earnings.
- Finance infrastructure development through a combination of conventional financing, end-market and partner investment, and equity investment.
- Operate on approximately 80% gross margin.

Three Year Financial Projections

See attached.



Green Tools - Salvage Lumber Warehouse

Cash Flow Years 1-3

4/9/2014

	Year 1 Totals	Year 2 Totals	Year 3 Totals
Beginning Balance			
Cash Inflows			
Cash Sales	\$ 77,908	\$ 79,466	\$ 81,055
Accounts Receivable	\$ 108,673	\$ 119,035	\$ 121,416
Total Cash Inflows	\$ 186,581	\$ 198,501	\$ 202,471
Cash Outflows			
Investing Activities			
New Fixed Asset Purchases	\$ -	\$ -	\$ -
Additional Inventory	\$ 28	\$ 28	\$ 29
Cost of Goods Sold	\$ 26,786	\$ 28,438	\$ 29,007
Operating Activities			
Operating Expenses	\$ 59,805	\$ 61,272	\$ 62,783
Payroll	\$ 89,653	\$ 92,254	\$ 94,931
Taxes	\$ 900		\$ 835
Financing Activities			
Loan Payments	\$ 10,908	\$ 10,908	\$ 10,908
Owners Distribution	\$ -	\$ -	\$ -
Line of Credit Interest	\$ -	\$ -	\$ -
Line of Credit Repayments	\$ -	\$ -	\$ -
Dividends Paid	\$ -	\$ -	\$ -
Total Cash Outflows	\$ 188,080	\$ 192,901	\$ 198,494
Net Cash Flows	\$ (1,499)	\$ 5,600	\$ 3,977
Operating Cash Balance			
Line of Credit Drawdown	\$ -	\$ -	\$ -
Ending Cash Balance			
Line of Credit Balance			



Green Tools - Salvage Lumber Warehouse

4/9/2014

Income Statement Years 1-3

	2014		2015		2016	
Revenue						
Structural Lumber	123,278		125,744		128,259	
Architectural Lumber	71,491		72,921		74,379	
Total Revenue	\$ 194,769	100%	\$ 198,665	100%	\$ 202,638	100%
Cost of Goods Sold						
Structural Lumber	21,283		21,709		22,143	
Architectural Lumber	6,620		6,752		6,887	
Total Cost of Goods Sold	27,903	14%	28,461	14%	29,030	14%
Gross Margin	166,867	86%	170,204	86%	173,608	86%
Payroll	89,653		92,254		94,931	
Operating Expenses						
Total Operating Expenses	\$ 59,805	30.71%	\$ 61,272	30.84%	\$ 62,783	30.98%
Income (Before Other Expenses)	\$ 17,408	8.94%	\$ 16,678	8.40%	\$ 15,894	7.84%
Other Expenses						
Total Other Expenses	\$ 12,910	7%	\$ 12,341	6%	\$ 11,718	6%
Net Income Before Income Tax	\$ 4,498		\$ 4,338		\$ 4,176	
Income Tax	\$ 900		\$ 868		\$ 835	
Net Income/Loss	\$ 3,599	2%	\$ 3,470	2%	\$ 3,341	2%



Green Tools - Salvage Lumber Warehouse
Balance Sheet Years 1-3

4/9/2014

ASSETS	2014	2015	2016
Current Assets			
Cash	58,501	63,234	67,211
Accounts Receivable	8,189	8,352	8,519
Inventory	28	56	85
Total Current Assets	\$ 66,718	\$ 71,642	\$ 75,816
Fixed Assets			
Equipment	56,500	56,500	56,500
Total Fixed Assets	\$ 56,500	\$ 56,500	\$ 56,500
(Less Accumulated Depreciation)	\$ 8,071	\$ 16,143	\$ 24,214
Total Assets	\$ 115,146	\$ 111,999	\$ 108,101
LIABILITIES & EQUITY			
Liabilities			
Accounts Payable	1,117	1,140	1,162
Commercial Loan Balance	50,430	43,791	36,529
Total Liabilities	\$ 51,548	\$ 44,931	\$ 37,692
Equity			
Common Stock	60,000	60,000	60,000
Retained Earnings	3,599	7,069	10,410
Dividends Dispersed/Owners Draw	-	-	-
Total Equity	\$ 63,599	\$ 67,069	\$ 70,410
Total Liabilities and Equity	\$ 115,146	\$ 111,999	\$ 108,101
Balance sheet in or out of balance?	\$ -	\$ -	\$ -
	Balanced!	Balanced!	Balanced!



Green Tools - Salvage Lumber Warehouse

Financial Ratios

4/9/2014

Ratios	Year One	Year Two	Year Three
Liquidity			
Current Ratio	1.3	1.6	2.0
Quick Ratio	1.3	1.6	2.0
Safety			
Debt to Equity Ratio	0.8	0.7	0.5
Debt-Service Coverage Ratio - DSCR	0.2	0.3	0.3
Profitability			
Sales Growth	0.0%	2.0%	2.0%
COGS to Sales	14.3%	14.3%	14.3%
Gross Profit Margin	85.7%	85.7%	85.7%
SG&A to Sales	76.7%	77.3%	77.8%
Net Profit Margin	1.8%	1.7%	1.6%
Return on Equity (ROE)	5.7%	5.2%	4.7%
Return on Assets	3.1%	3.1%	3.1%
Owner's Compensation to Sales	0.0%	0.0%	0.0%
Efficiency			
Days in Receivables	15.1	15.1	15.1
Accounts Receivable Turnover	23.8	23.8	23.8
Days in Inventory	0.4	0.7	1.1
Inventory Turnover	999.0	504.4	339.6
Sales to Total Assets	1.7	1.8	1.9