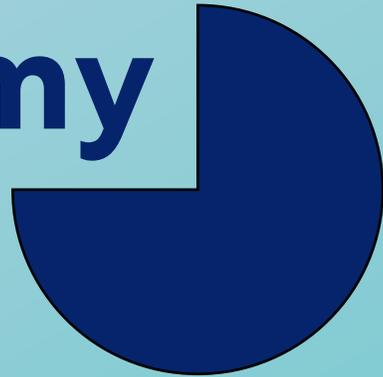


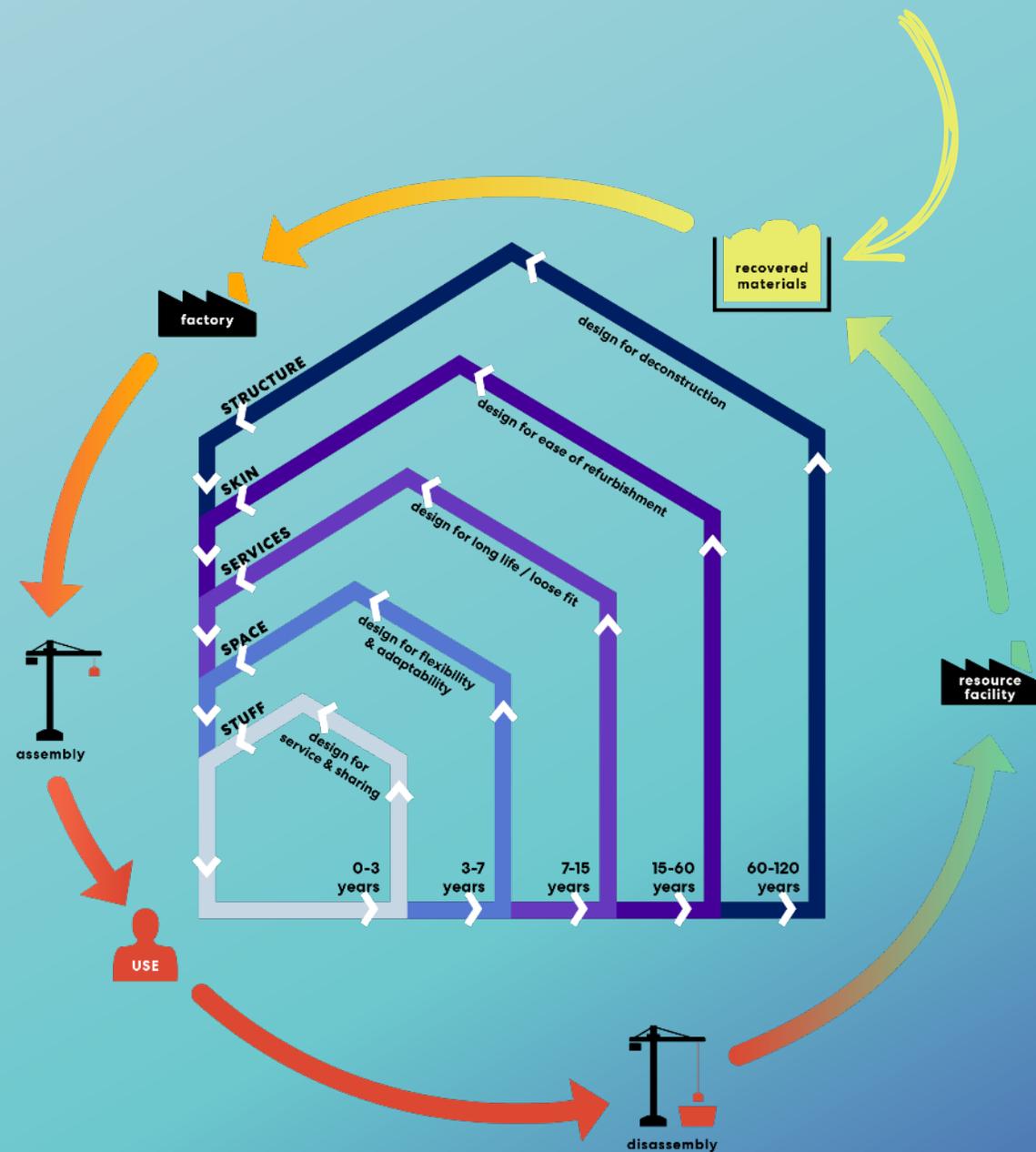
Closing the Loop on the Circular Economy



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Adapted from: Useful Projects

How can our project delivery promote material reuse & reclamation in support of a circular economy?

As a part of the Washington DC studio's early commitment to reduce embodied carbon in interiors, we have started conversations with manufacturers to learn where they are in their journey to reduce the embodied carbon impact of their products.

During these conversations we have discovered a gap in the circular economy with recycling and take-back programs. Manufacturers with these programs are frequently unaware of their products' removal from spaces during demolition, and unable to recover their product. This diversion leads to a gap in the circular economy.

Building on our commitment, it is our goal with this incubator to develop a deeper understanding of this gap and provide a toolkit with resources for use by all stakeholders in an effort to close the loop on the circular economy. Expanding our thought leadership in embodied carbon may also open the door for "Carbon Consultant" services to be provided to our clients.

Methodology



Our team sought to identify opportunities to close the gap on the circle, and that requires investigation outside of the design firm to understand views of critical project team components. Surveys were created for three groups – building owners and operators, general contractors, and product manufacturers. The surveys were tailored to each group, but alignments were made to ask similar questions or types of questions to determine how views differed on common topics.

The survey was initially circulated to invited individuals from each group, focused on the Washington, DC market, and was open for approximately three weeks. The survey was offered to participants anonymously; they were asked to identify their organization and if they wanted to receive a copy of the final report to include their email address.

Survey results were analyzed to look for patterns or areas where more than one group agreed on gaps in the circular economy.

For building owners and end users, respondents represented both for-profit development and building management companies as well as various segments of the U.S. federal government (not surprising for our office location and client base). Responding general contractors represented both national and regional companies that have a presence in Washington, DC. Product representatives who responded are all local to Washington, DC but represent national or global manufacturers. Due to the diversity of how vendors operate, some represented ceiling products, some represented carpet, and some represent both ceiling and carpet lines.

In addition to the virtual surveys, the research team also facilitated multiple focused conversations with representatives from global manufacturers of ceiling products, carpet, commercial office furniture, and other interior finishes. These conversations yielded less measurable data points for research but provided more anecdotal information about the challenges and successes of circularity in the industry.



Observations



Converging themes

- ❑ Close to 80% of survey participants reported **an alignment between general waste reduction and their corporate sustainability goals**. Specific diversion targets vary by project and client.
 - More and more companies are expressing publicly their corporate sustainability and ESG goals, though many have not yet found regular successful ways to implement and report them. Real estate owners and managers, contractors, and manufacturers all see waste reduction as a key factor in support of these goals.

- ❑ **Building owners and general contractors expressed interest in working with a carbon consultant** in some capacity to tailor their strategies to increasing diversion.
 - There is a clear need for more education across all groups for understanding how embodied carbon factors into material health, and how this component of the industry contributes to climate change. Manufacturers that reported having take-back programs provide a significant range of protocol for how to engage in that process, making the option confusing, time-consuming, and costly for contractors and owners. In addition, no one group among the three can offer the full range of circular options. A third-party consultant or team member who can focus on circularity may make significant headway in closing the loop on a project.

Observations



Challenges

- ❑ There is a recognized **lack of education at multiple points within the industry** and therefore on an average project team.
 - More education is needed for Building Owners and General Contractors during design about circular strategies
 - More education is needed for Demolition and Flooring Contractors about take-back programs.

- ❑ **Cost is a driver**; it should not cost more to reclaim than provide new, and project budgets should not have to absorb significant cost to recycle product.
 - Right now, the business case just isn't there based on responses from building owners. Paying more to ship old product away for recycling or repurposing on top of purchasing new product creates a burden on the project budget.

- ❑ **Manufacturers offer take-back programs, but don't make it easy to participate or find information.**
 - Manufacturers who indicated they offer take-back programs have a wide variety of protocol for engaging that process. Often the information is buried on their public websites and requires multiple steps before product can be shipped back.
 - Many of the programs have a minimum material quantity that will be accepted back by the manufacturer. This automatically exclude smaller projects or projects with a small amount of specific material.

- ❑ Recycling limitations and substances of concern make **taking products from other manufacturers challenging.**
 - Some manufacturers will only take back their own products, and owners do not always have an easy way of identifying the manufacturer for products installed years ago.



Strategy & Implementation Recommendations

In no particular order...

- **Communication in this instance cannot be circular.** It needs to move in multiple directions, with all parties provided the same Education and communication is needed among multiple parties in the project team.
 - The design team needs to talk about circularity in presentation materials and documentation provided to building owners.
 - General, demolition and flooring contractors need more direct conversation with product manufacturers.
 - Manufacturers may consider global partnerships with larger design firms to provide more volume support for take-back programs.
 - There is a significant gap in the flow of information throughout a project's life. Design teams do not engage with the same manufacturer reps that general contractors and subcontractors do, often resulting in differences in information supplied. The "A&D rep" and the vendors need the same information about material health, embodied carbon, and end-of-life options for materials to eliminate confusion and solidify delivery, especially when the project is trying to capture embodied carbon data.
- **Carbon consulting will need to become a service we provide.**
 - The new carbon forecasting tool (to be launched April 2022 by the Living Design community) will be a huge first step on this topic for design projects but especially for renovations to existing facilities.
 - For companies looking to fold embodied carbon reduction into their portfolio goals, this service will transcend individual projects and look at corporate purchasing and demolition policies and procedures and will need to offer quantifiable resulting for in order to properly track progress and report to investors.
- **Client Engagement needs to take on a new form.**
 - With internal tools like Hub and Pipeline, we have data about project completion dates, lease terms, tenant and building management points of contact. Eight years into leases our teams need to touch base with clients to inquire about plans for the future. Lease renegotiations may include renovations and upgrades and there is opportunity for circularity in what is enhanced. Moving to a new location may need to include relocation of furniture and equipment, but there may also be opportunity for reuse of materials within the new space. Working with clients in advance of real estate decisions may result in strategies that can both reduce embodied carbon and save money on renovations and fit-outs.
- **The business case for circularity will be an uphill battle** until costs for new product equalize with reused, relocated, or recycling old product.
 - Costs for sending used materials back to manufacturers should be neutralized, or perhaps rewarded with pricing incentives.
 - Case studies for circularity are needed for owners to understand the costs and return on investment.



Strategy & Implementation Recommendations *(continued)*

- **Manufacturers need to make identifying reclamation options easier, and perhaps take a cross-industry approach.**
 - Adding a printed QR code to the back of every carpet tile, ceiling tile, and other products that have a “non-finish” surface will allow contractors on site to quickly identify how a product can be recycled, sent back to a manufacturer, or even if the product is biodegradable and safe for landfill. Using codes will also allow manufacturers to update their circularity data over time (since most products will be in service for at minimum five years in tenant fit-outs).
 - Manufacturing organizations and certification platforms need to provide a clearinghouse for consistently formatted data, eliminating the research time design teams spend to determine how to deal with products at end of lease term.
- **New circularity workflow implementation** to require projects to assess or inventory existing conditions for reusable and salvageable material.
 - For projects in the pre-design or even real estate search stage, this may be a quick plan graphic based on site walk-throughs and creation of test fit plans.
 - In schematic design, teams need to identify existing project elements (aside from structure) that could be reused, repurposed, or returned to manufacturers. Direction for sending back to manufacturers needs to be included on demolition plans, in addition to the typical notes regarding salvage for reuse or return to owner.
- Specification updates may not be the answer, but **prioritizing manufacturers with take-back programs** is a good first start.
 - For projects with demolition as part of the scope, the demolition spec sections need to address more aggressive waste diversion tactics that may include recycling, reclamation, repurposing, salvage for donation, and salvage for reuse in addition to engaging in manufacturer-provided take-back programs.
 - Finish schedules can delineate products from manufacturers with take-back programs, which may be referenced when a space turns over in the future.
 - Creation of a clearinghouse for information on manufacturer take-back programs available firm-wide to provide more data to design teams in selecting materials. Ideally this database could be industry-wide, folding into existing tools such as Mindful Materials.

Observations



Take-back program database

As a result of our industry research, we've compiled the following list of Material Take Back Program resources available to help teams contribute **recovered materials** to the circular economy.

Carpet		
Manufacturer	Material Take Back Program	Resources
Interface	ReEntry Program	https://interfaceinc.scene7.com/is/content/InterfaceInc/Interface/Americas/WebsiteContentAssets/Documents/ReEntry/ReEntry%20Specs/wc-am-reentryspec-us-22021-final.pdf
Mannington	Participate in CARE (Carpet America Recovery Effort)	https://www.manningtoncommercial.com/sustainability/recycling/
Milliken	<u>Recycle Option</u> : Participate in CARE <u>Reuse Option</u> : Complete Milliken Reuse Form	https://floors.milliken.com/floors/en-us/sustainability/landfill-diversion-program
Mohawk	ReCover Carpet Recycling	https://www.mohawkgroup.com/sustainability/repurpose-reuse-recycle
Shaw Contract	Re[TURN]	https://www.shawcontract.com/en-us/sustainability/re-turn
Tarkett	ReStart Reclamation Program	https://tandus-production.s3.amazonaws.com/content/file/1093/Restart.pdf
Venture	Partners collect carpet at End of Life if they are notified	https://en.venturecarpets.com/environnement#CertificationSection

Ceiling Tiles		
Manufacturer	Material Take Back Program	Resources
Armstrong Ceiling	Armstrong Ceilings Recycling Program	https://www.armstrongceilings.com/commercial/en/performance/sustainable-building-design/ceiling-recycling-program.html
Rockfon	Rockfon Recycling Service	https://www.rockfon.it/siteassets/documents-uk/corporate/sustainability/grp-brochure-rockfon-recycling-service-a4_d_11_2019.pdf
USG	<u>USG Ceilings Recycling Program</u>	https://www.usg.com/content/usgcom/en/sustainability/ceilings-recycling-program.html
TURF	TURF Reclamation Program	https://turf.design/sustainability/
CertainTeed	Ceilings Recycling Program	https://www.certainteed.com/resources/358964889-recycling-program_pp3.pdf

Observations



A Few Words on Certifications

With a number of recently-completed and in-process design projects undergoing third-party certifications, the research team notes how little any of the available platforms address circularity. This feels like a significant gap across the board. There are attempts to address this issue in some platforms, but this topic needs significant concentration for it to be treated with the same level of importance as other sustainability and living design themes.

LEED continues to be the most common certification platform in the DC office project portfolio, likely both for its public understanding and its acceptance as compliance path to current local codes. In the most current version of LEED BD+C and LEED ID+C (v4.1), there is the beginning of understanding circularity in the Materials & Resources credit Building Product Disclosure & Optimization: Environmental Product Declarations. This two-threshold credit requires EPDs from a minimum of five manufacturers covering twenty products, which is fairly achievable. It does not require project teams to really read or understand the documentation though. The second level in this credit requires a bit more research as the team is asked to specify products that carry a Life Cycle Impact Reduction Plan, or a LCA specific to embodied carbon with measurable reduction results. The current reality is there is an extremely small number of manufacturers who can meet the requirements of the second level of this credit, and most project teams find it challenging to pursue. There is also a “Circular Products” pilot credit available for products to pursue for an Innovation point. The pilot credit requires five products from at least three manufacturers to carry one of several third-party certifications related to closed-loop processing or zero waste. Here too we see a very narrow list of manufacturers who currently participate in this level of documentation, making this credit also quite challenging.

The primary wellbeing certifications – WELL and Fitwel – have done a lot to raise awareness of the connections between design and health issues. While they excel in encouraging active design principles and improved indoor air quality, neither makes the connection between climate change and human health. Neither platform looks at indoor product specification as having larger carbon emissions implications. With climate change being cited as one of the greatest threats to human health, this feels like a significant gap that could be bridged with the introduction of new strategies aimed at connecting the occupant experience with impacts on planetary health.

Living Building Challenge certification has long been seen as the exemplar for sustainability. A true “living building” treads extremely lightly on the planet and requires significant design, construction, and research effort to satisfy the multiple themes included in the program. Material health requirements are rigorous in this platform, requiring significant levels of ingredient documentation to confirm the lack of presence of known substances of concern (the “red list”). One of the Imperatives (credits) in LBC asks for an end-of-life plan be created for deconstruction and adaptable reuse. Circularity could be included in that phase plan but is not specifically called out.

Observations



Quick Wins (do these now)

In summary, we see opportunity for project teams to implement the following strategies and actions immediately as they require minimal effort and are low or no cost and could start to shift the understanding of circularity in full project teams.

- Update project specifications to reflect take-back programs** available not just in sections for new construction but also in Division 1 sections on demolition.
- Indicate products and manufacturers with take-back programs on the finish schedule.** As this sheet will become part of record drawings it will be kept on record for future renovations.
- Designers need to **ask product reps about take-back programs when they interact**, and especially when considering new product.
- Floor plan diagram during early design phases** indicating elements that can be reused, reclaimed, or recycled.
- Reference and add on to the take-back program database started in this project.**

Bigger Conversations

Moving the needle on circularity will require industry-wide conversation, understand, and implementation of new procedures. The following recommendations are based on survey results and will require more evolution but will have impact on the topic.

- QR codes on the non-finish face of products to allow demolition contractors to quickly understand if a product is recyclable, biodegradable, or otherwise able to be reclaimed.
- More specific information added to tools like Mindful Materials for manufacturers with take-back programs.
- More education at all levels of project teams at the start of a project.
- Carbon consulting may become a regular additional service offered to clients, especially in early phases of design.

Recommendations for Further Study & Next Steps



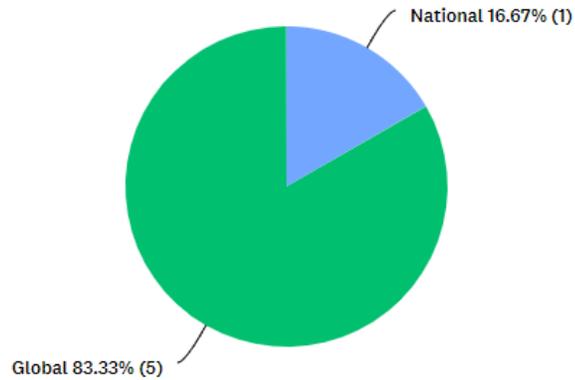
- ❑ Replicate the surveys in other Perkins&Will offices and geographic markets to see if patterns exist nationally/internationally and the common themes found in this survey hold true elsewhere.
- ❑ Implementation of the carbon forecast tool (anticipated April 2022).
- ❑ Continue the one-to-one conversations with manufacturers emphasizing our commitment to reducing embodied carbon.
- ❑ Encourage the *Metropolis* Climate Toolkit and other industry-wide programs to develop more specific resources focused on circularity.
- ❑ The research team has been invited to tour the Shaw Contract recycling plant and meet with Shaw's sustainability team to better understand their take-back program and commitments (May 2022).



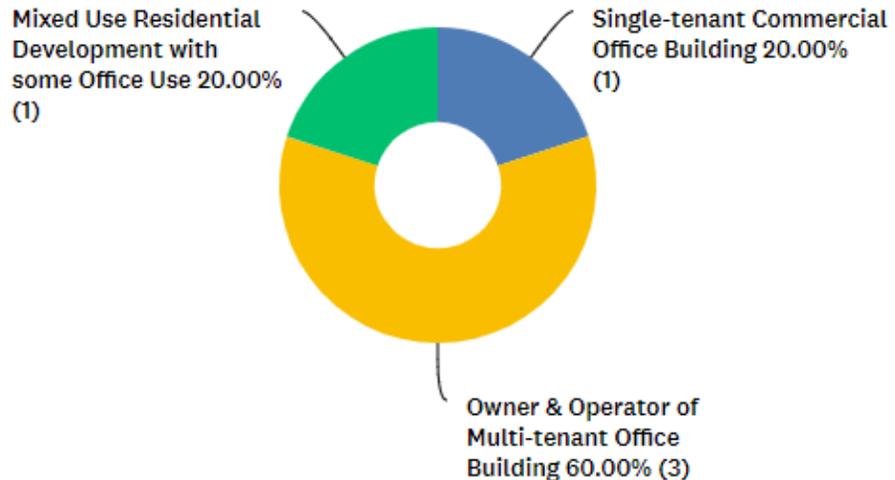
Survey Results

Building Owner/ Operator Company Demographics —

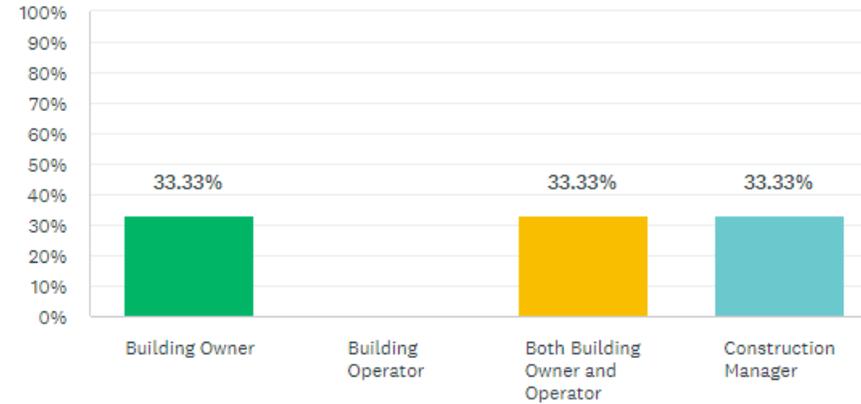
Are you a Regional, National or Global company?



What type of building do you represent?



What is your role on construction projects?

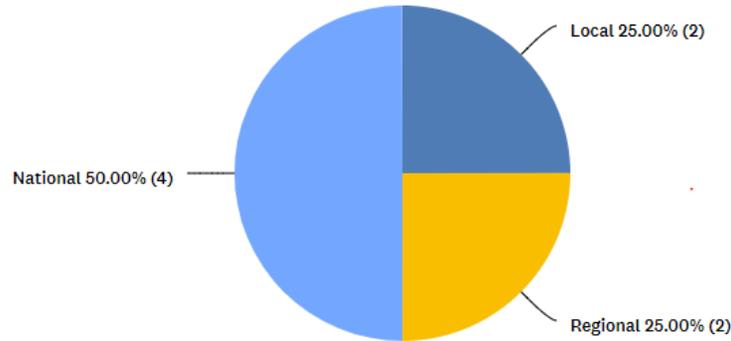


How many properties do you personally manage or oversee ?

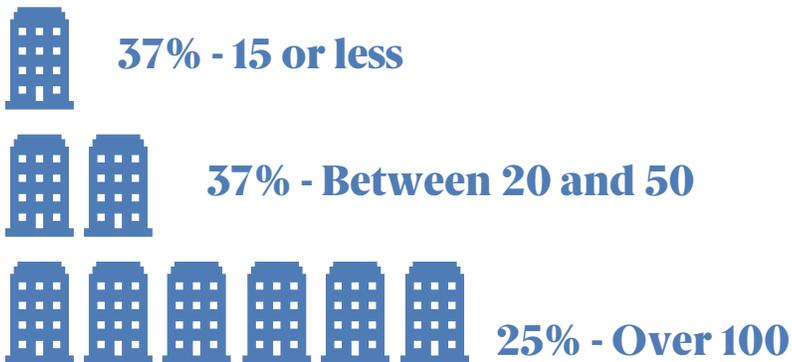


Contractor Company Demographics —

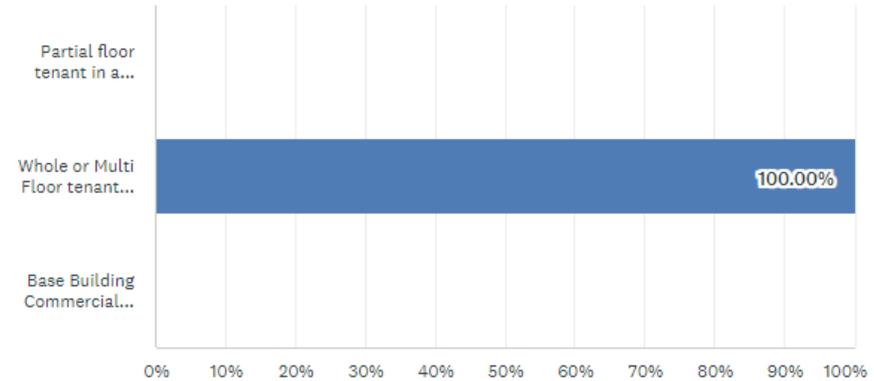
Are you a Local, Regional or National company?



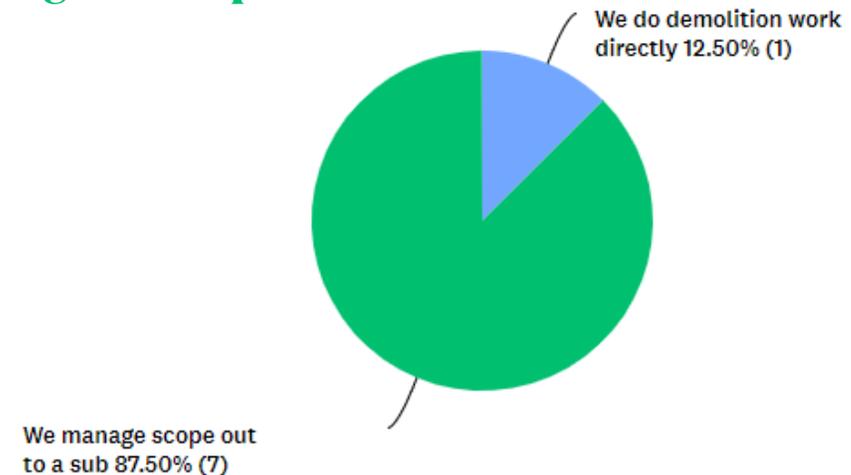
How many properties do you personally manage or oversee?



What type of Projects do you typically work on?

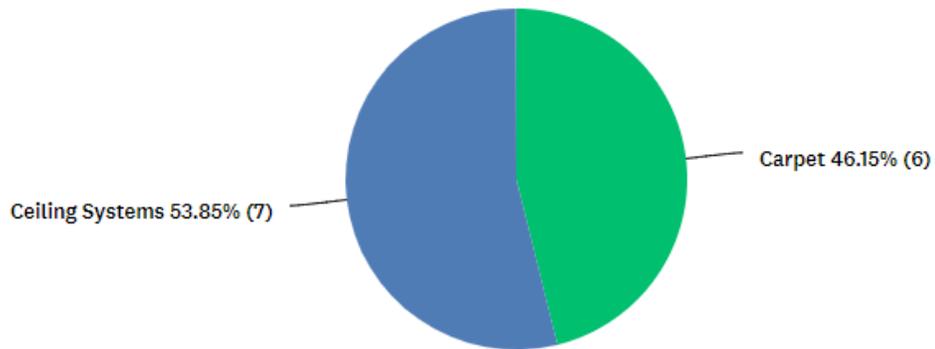


Do you typically execute demolition work directly, or manage the scope out to a sub?



Manufacturer Company Demographics —

**What product category do you rep:
Carpet or Ceiling Systems?**



What company do you work for?

Armstrong Ceilings

Buzzi

Rockfon

Saint Gobain

Soelberg

Turf

Interface

Mannington

Milliken

Mohawk

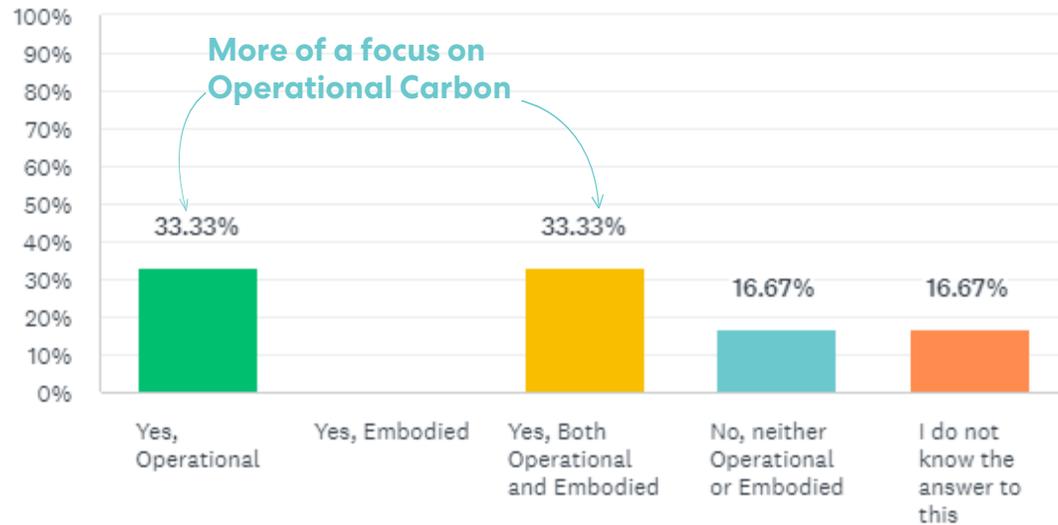
Shaw/ Patcraft

Tarkett

Venture

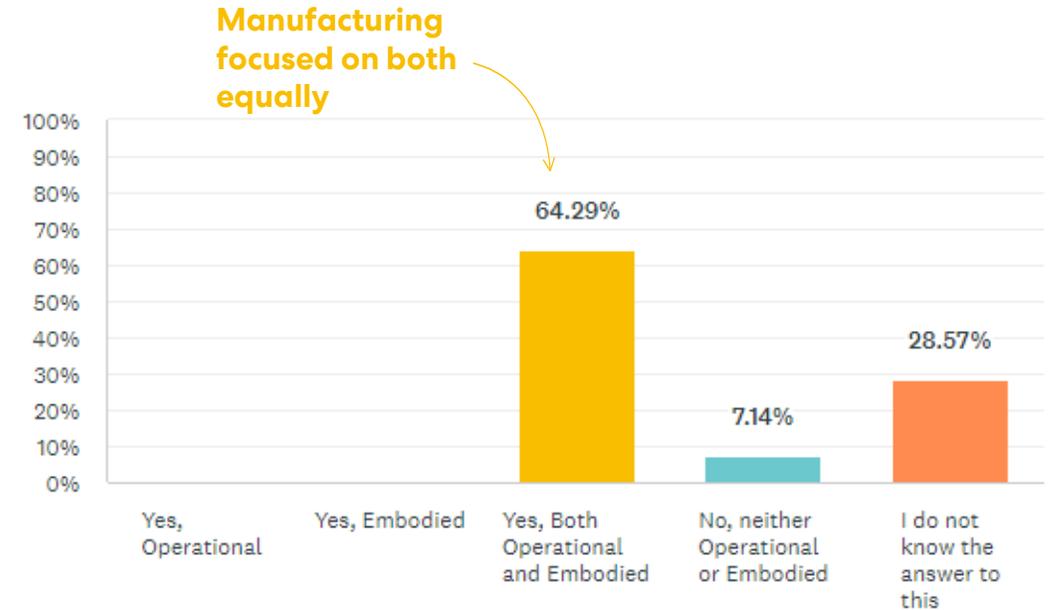
Carbon Goals —

Does your organization have carbon reduction goals, for either operational or embodied carbon?



Building Owners

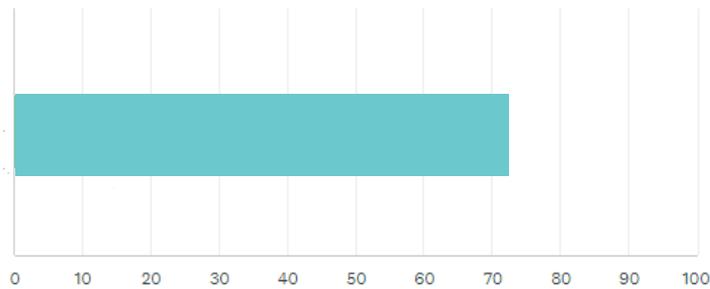
33% of Building Owners publicly report out through ESG or some 3rd party commitment



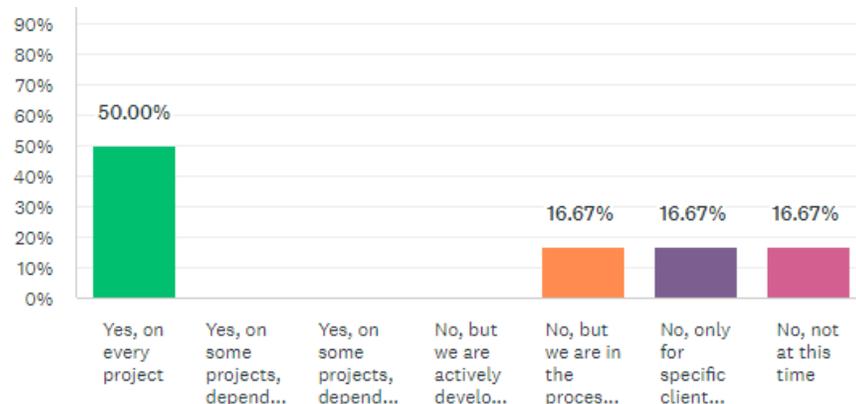
Manufacturers

Building Owner Specific Goals —

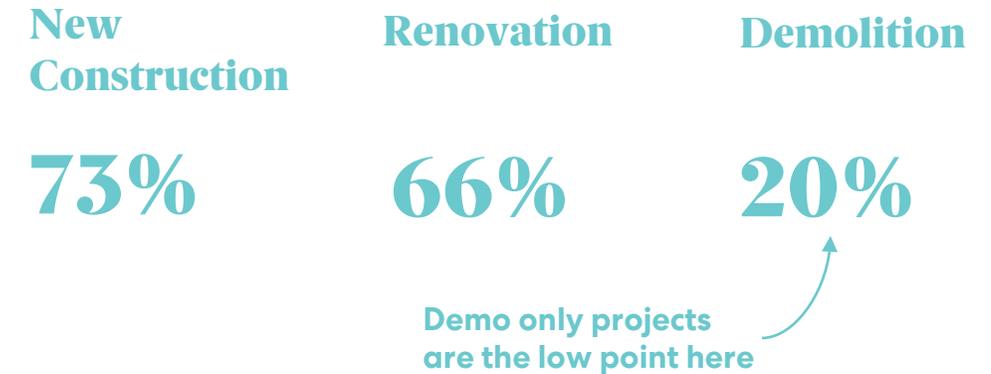
How important is waste diversion to your organization on projects?



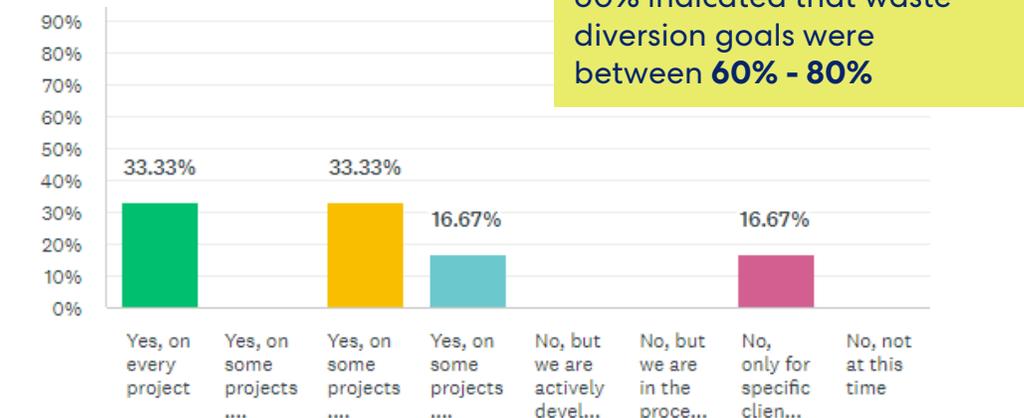
Do you consider supporting a circular economy when delivering a new construction or renovation project?



What is the percentage of projects that have a waste reduction target?

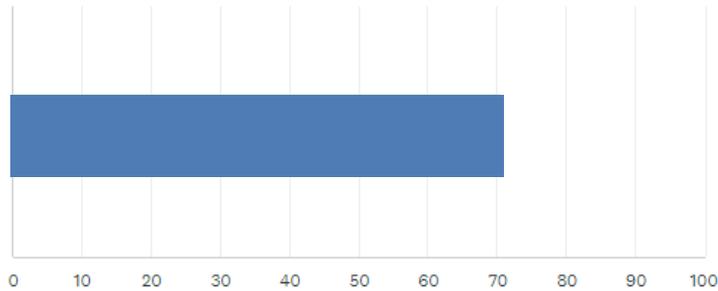


Do you set waste diversion goals/ thresholds on projects?

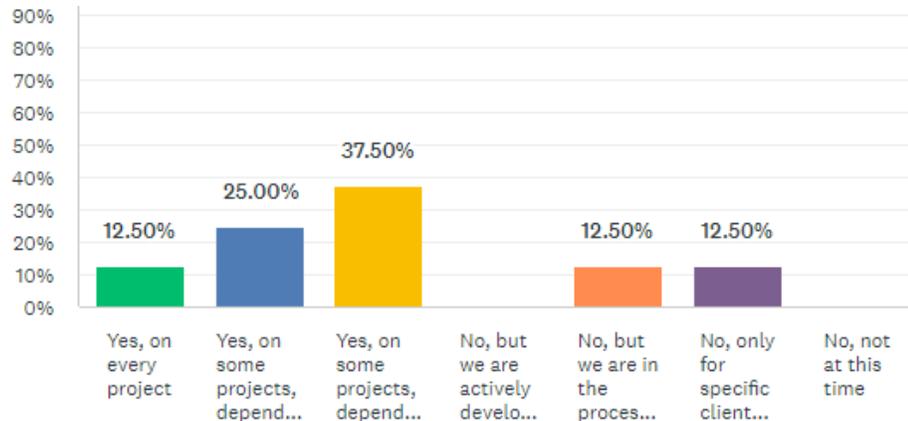


General Contractor Specific Goals —

How important is waste diversion to your organization on projects?



Do you consider supporting a circular economy when delivering a new construction or renovation project?



What is the percentage of projects that have a waste reduction target?

New Construction

68%

Renovation

68%

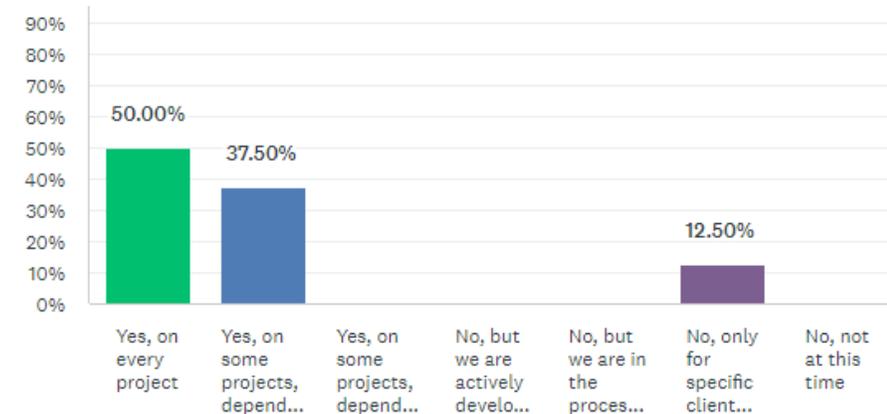
Demolition

72%

Approximately 60% of responses for all three indicated that **90-100% of projects** have waste diversion goals

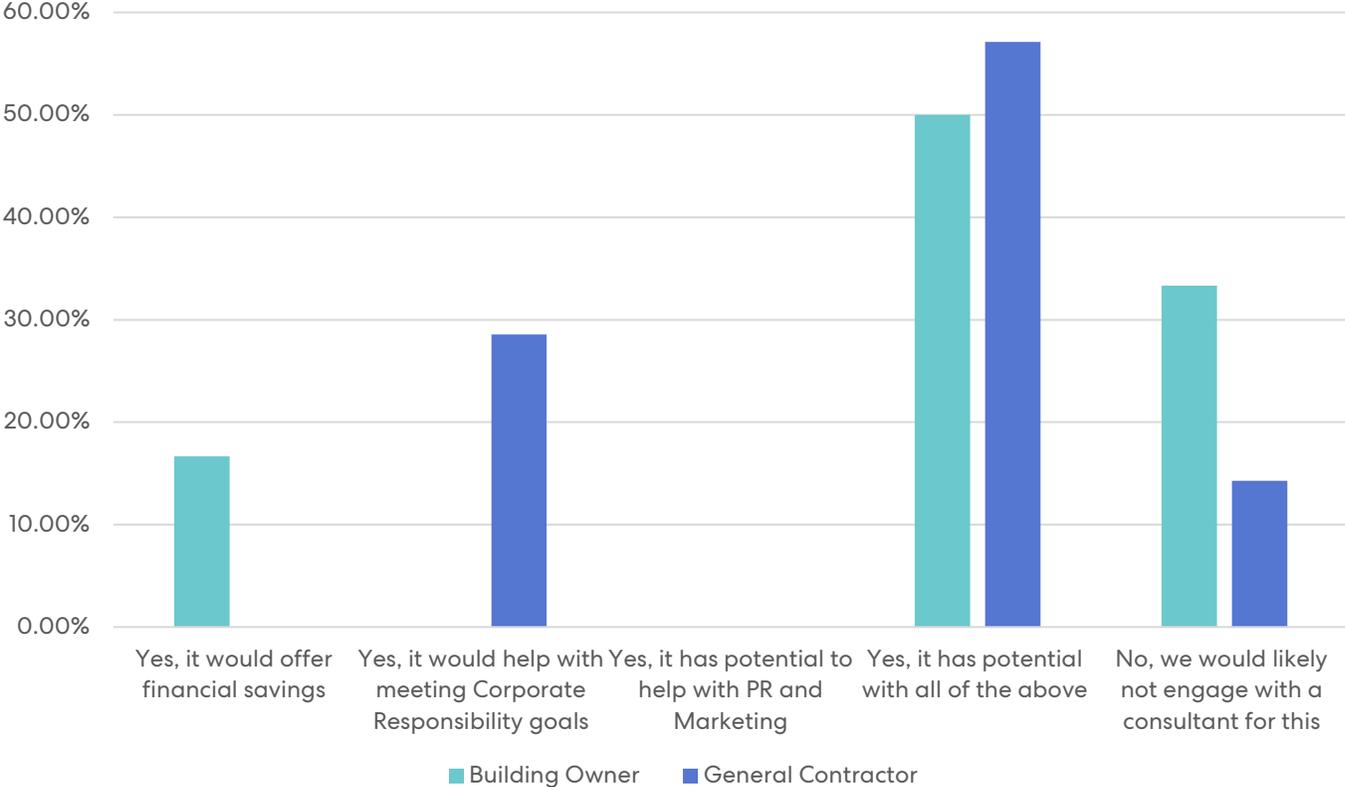
+52% from Building Owners

Do you set waste diversion goals/ thresholds on projects?



Carbon Consultant

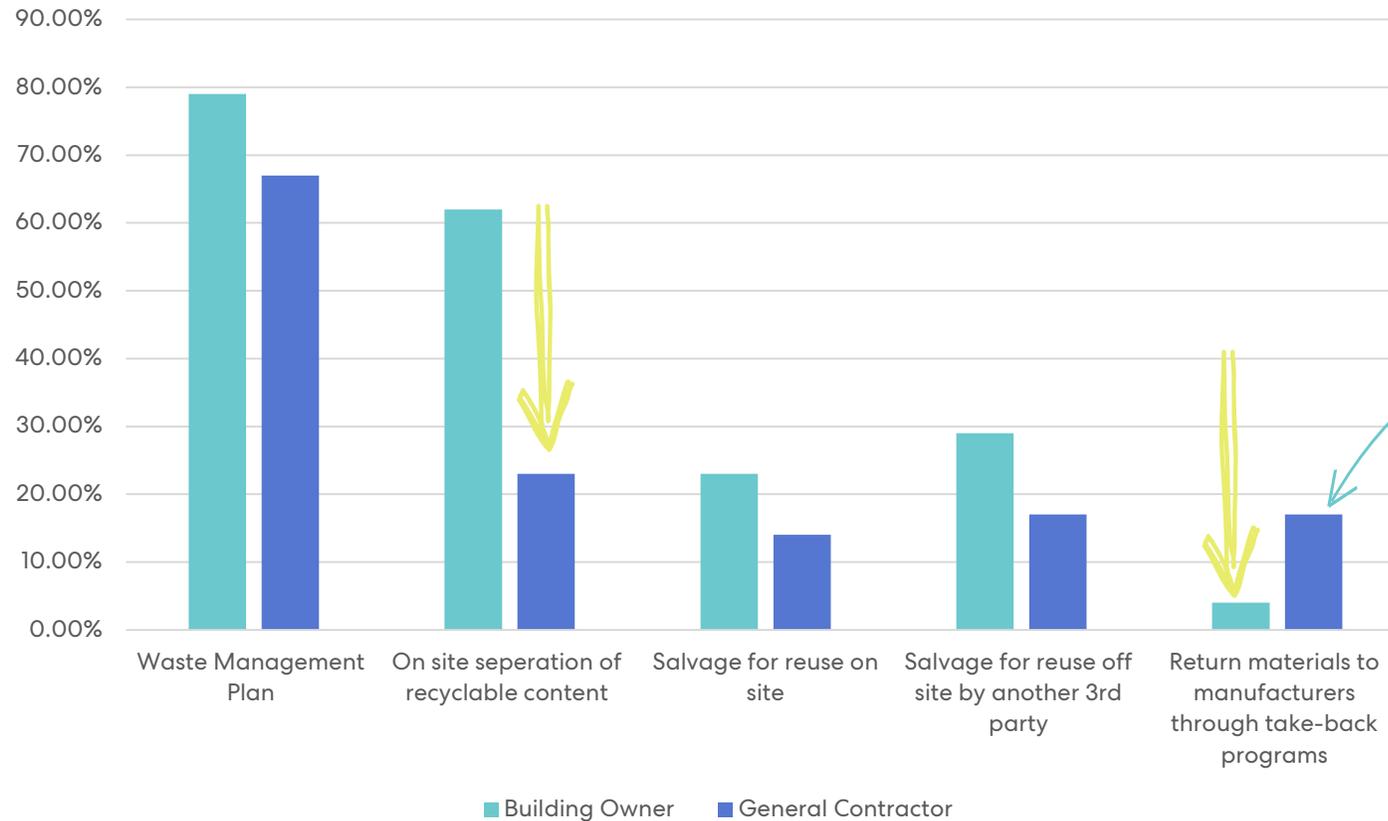
Do you, or would you, engage with a consultant to help conduct material audits of spaces pre-demolition to identify strategies and opportunities for maximizing waste diversion ?



Interest from both Building Owners and General Contractors in engaging a **Carbon Consultant**

Waste Reduction Strategies —

How frequently are waste strategies used on projects?

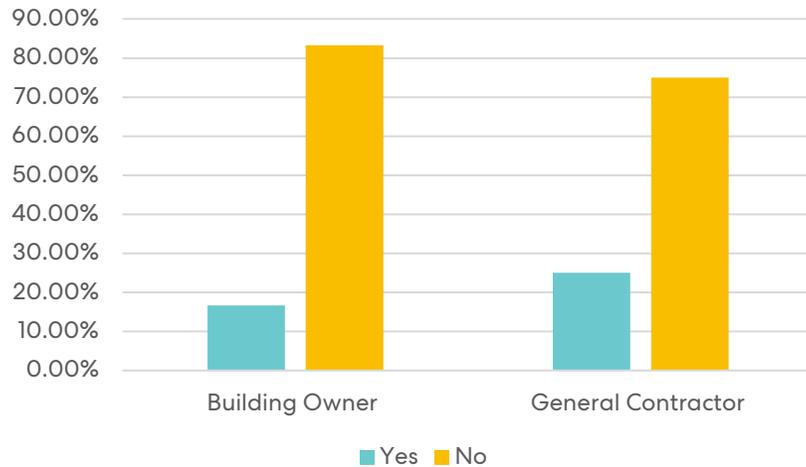


What Percentage do reclaimed materials represent of the total materials going into manufacturing new products?

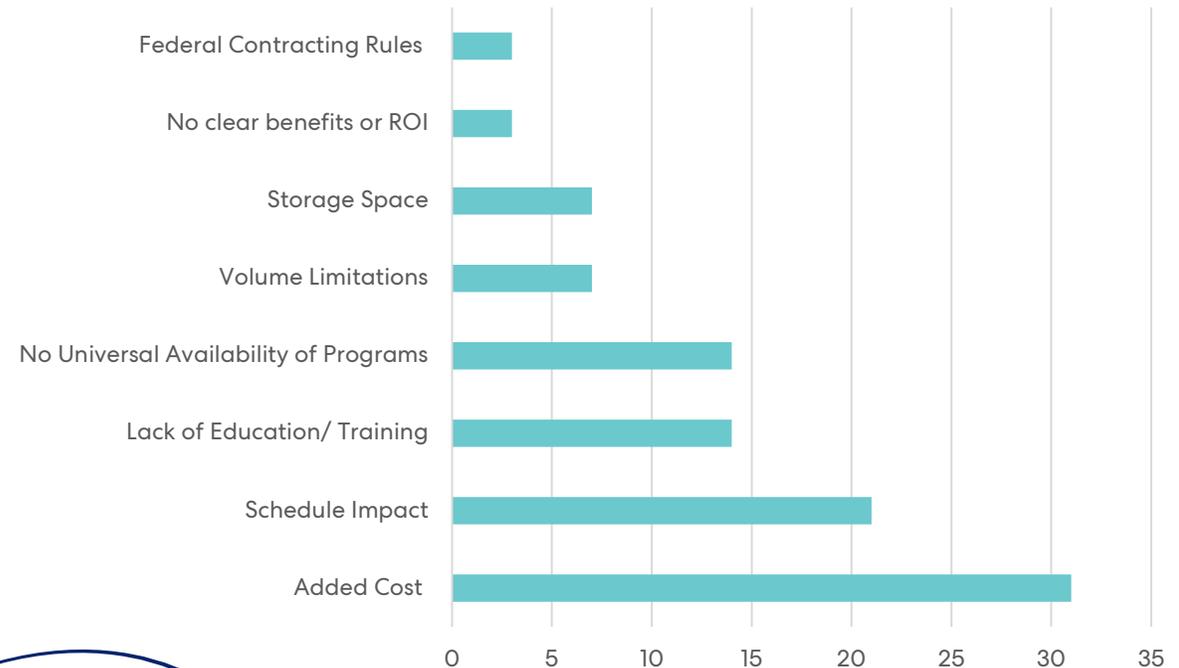
— seems to vary from product to product and location, but quantifiable responses ranged from 9%-20%

Prioritizing Take-back Programs

Is specifying manufacturers with take-back programs a priority on your projects?



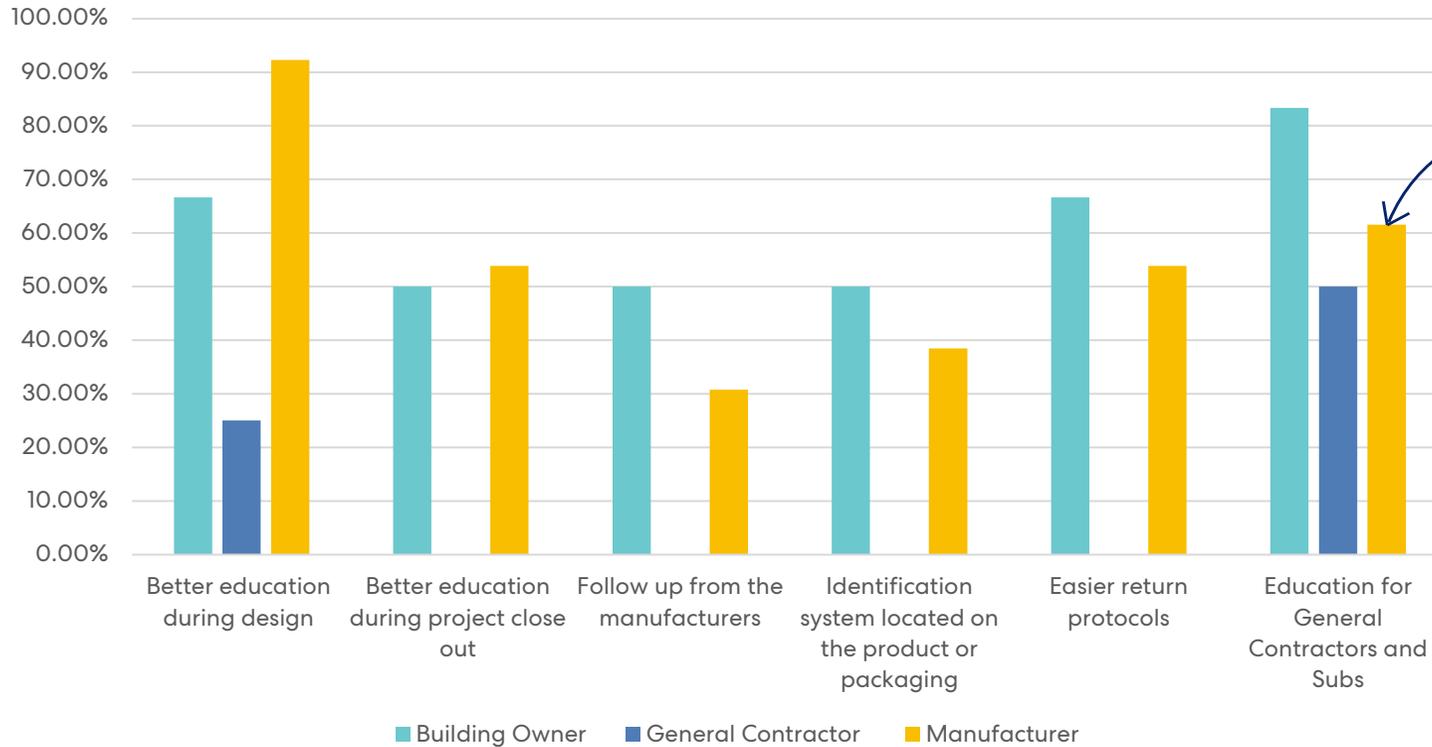
What are the primary reasons for NOT utilizing take-back programs?



Primary reasons were the same when asked about take-back programs in general, and specific to carpet and ceiling systems

Tools for Promoting Take-back Programs —

What tools/ actions might better facilitate utilizing material take-back programs?



Training – specifically for General Contractors and subs – was identified by all three groups

Other Recommendations

-  Incorporate take-back information into Finish Schedule
-  Global partner solutions for larger companies

Open comments from respondents —

The key to our success has to be in **collaboration with our customers** in order to make the circular economy a reality.

It would be great if there were more options for take back programs and manufacturers were more **open to accepting products that aren't from their product line** (if the ingredients are similar).

The burden for a client to spend the additional budget, staff resources, and contractor coordination to accomplish this do not currently outweigh the benefits to the client as the benefits to the individual client and **the impact on their bottom line or business model is not inherently clear.**

Often in tenant interior work the schedule is extremely tight and **if the take-back programs are not efficient and cost-effective they won't be executed.** For example, for a carpet take-back program, it is more often done for a larger project (100K SF) vs a smaller project (20K SF) because it is more cost-effective in larger quantities.

It would be immensely helpful if manufacturers **accepted smaller quantities of product** to offer the opportunity of recycling to smaller demoed projects.

Very few manufacturers who have take-back programs have viable recycling systems, let alone third-party certified recycling systems. **More transparency and verification is needed to make the circular economy scale.**

The largest problem we are having currently is **the cost of recycling and feasibility to recycle old products** due to chemicals that were previously deemed safe but are no longer accepted.

At best, I think the Federal sector could only offer a contractor some version of salvage rights.