Material Reuse Overview & LEED BD+C v4.1

28 February 2019

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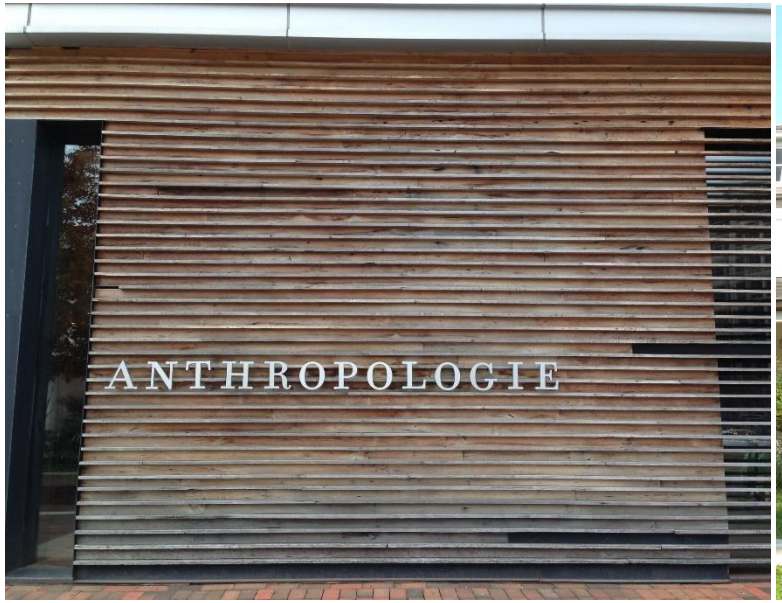
Current USA deconstruction / reuse foundations

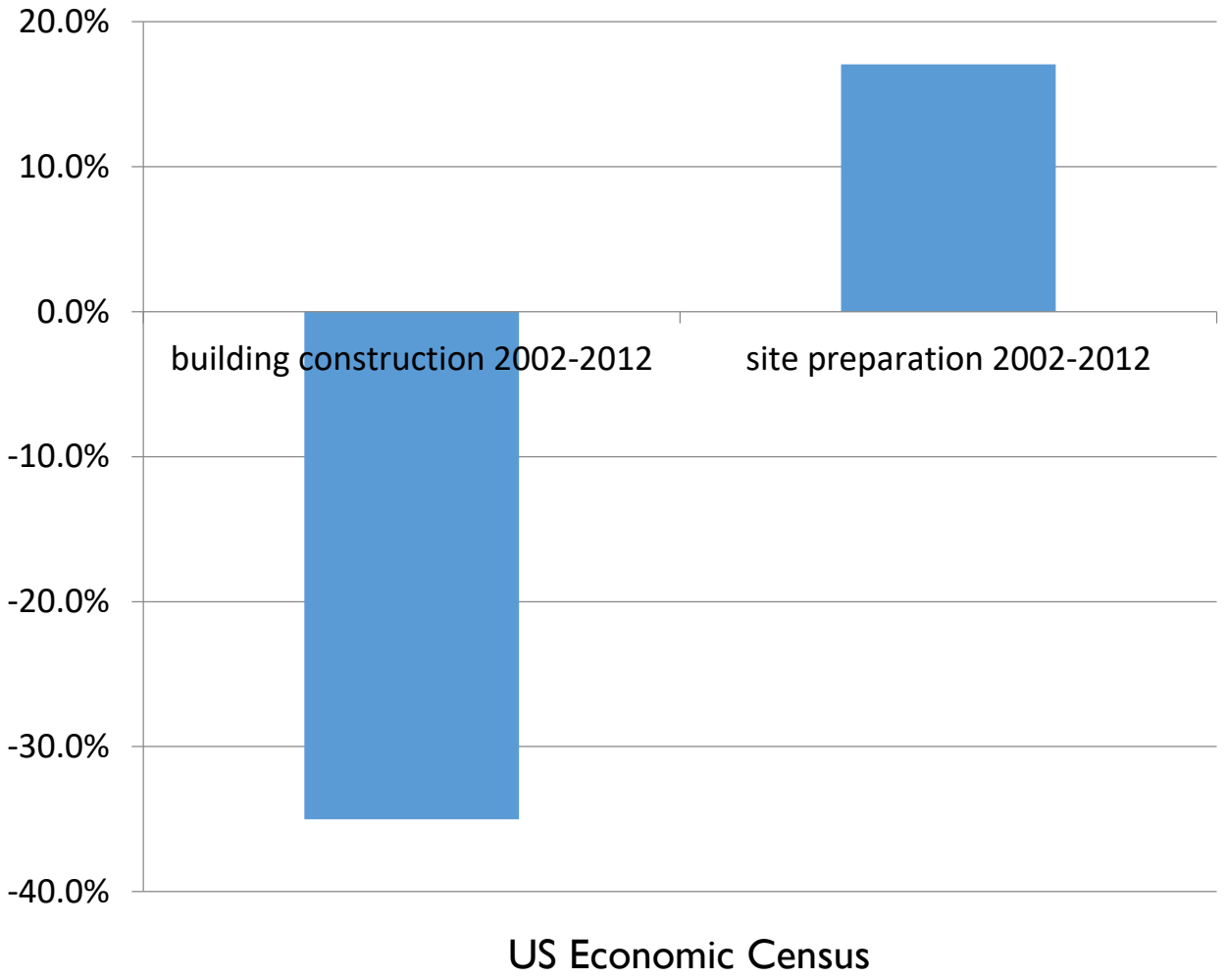
- AB 939 California Integrated Waste Management Act (IWMA) of 1989.
- HfH ReStores and non-cash charitable contribution Federal tax deduction.
- Starbucks-effect (corporate) and the Robert Redford-effect (personal).
- **Emergent properties**
- Circular economy, environmental justice, public health, embodied carbon.



Demolition trend

2002 – 2012 change in employment

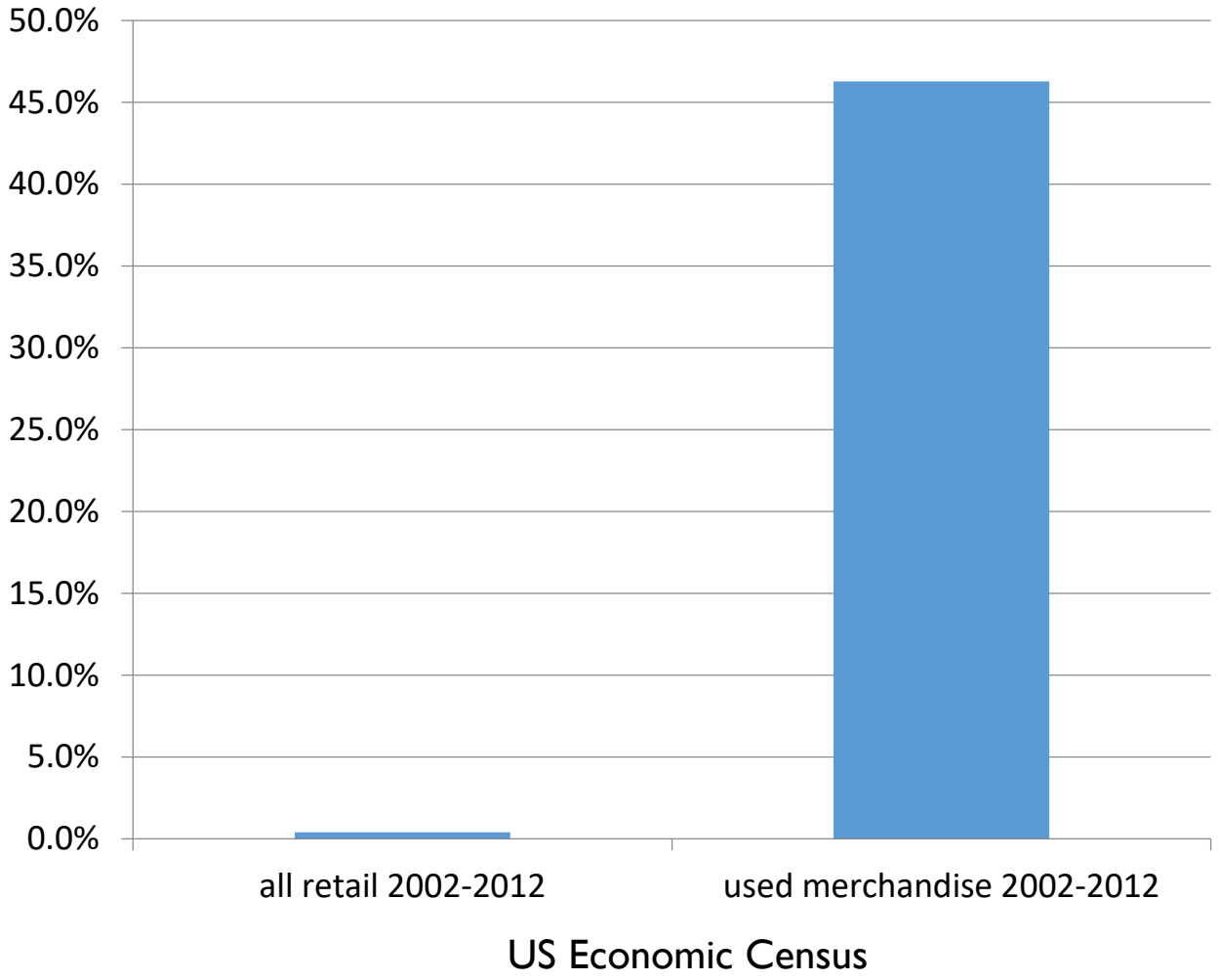
- Building construction = -35%
- **Site preparation = +17%**



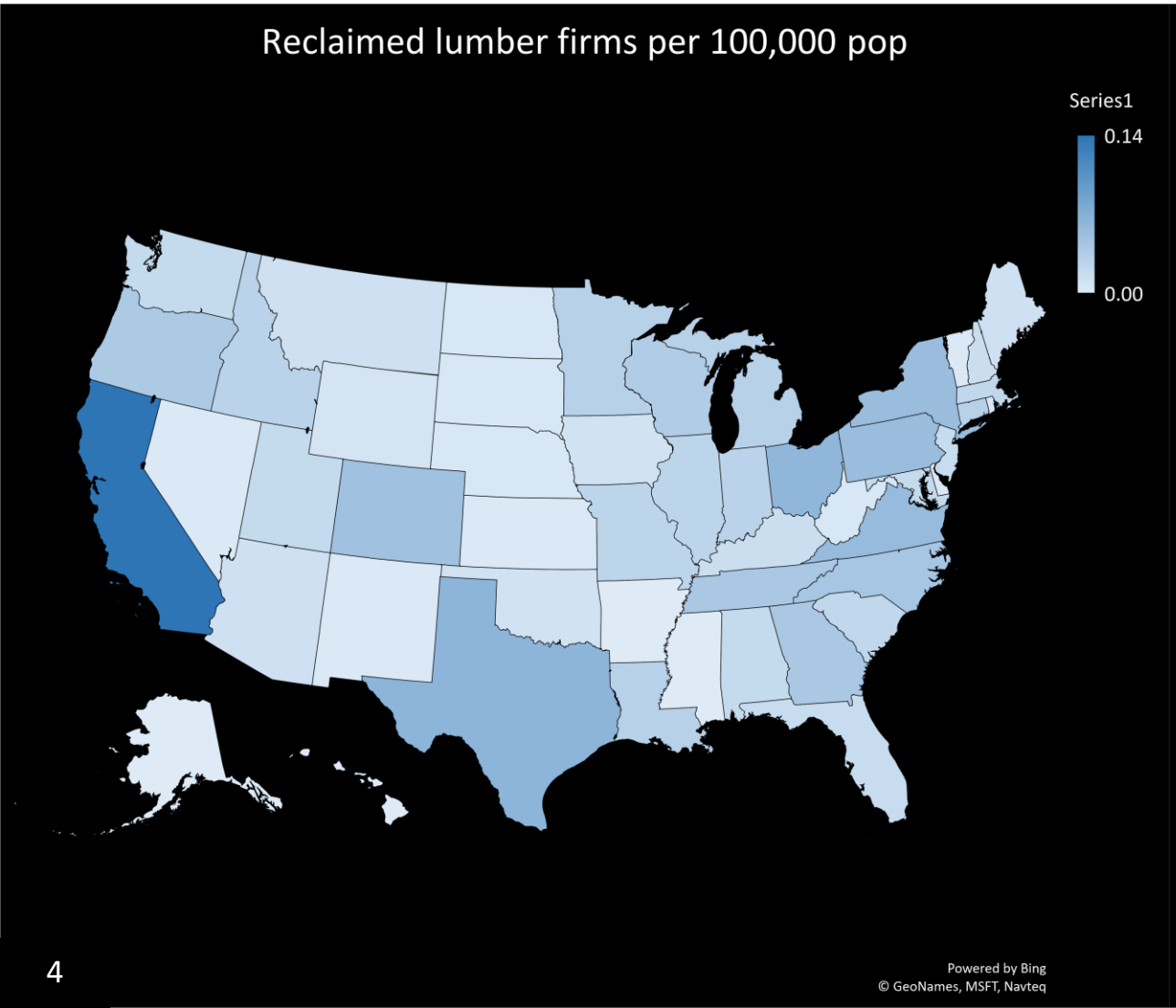
Reused materials trend

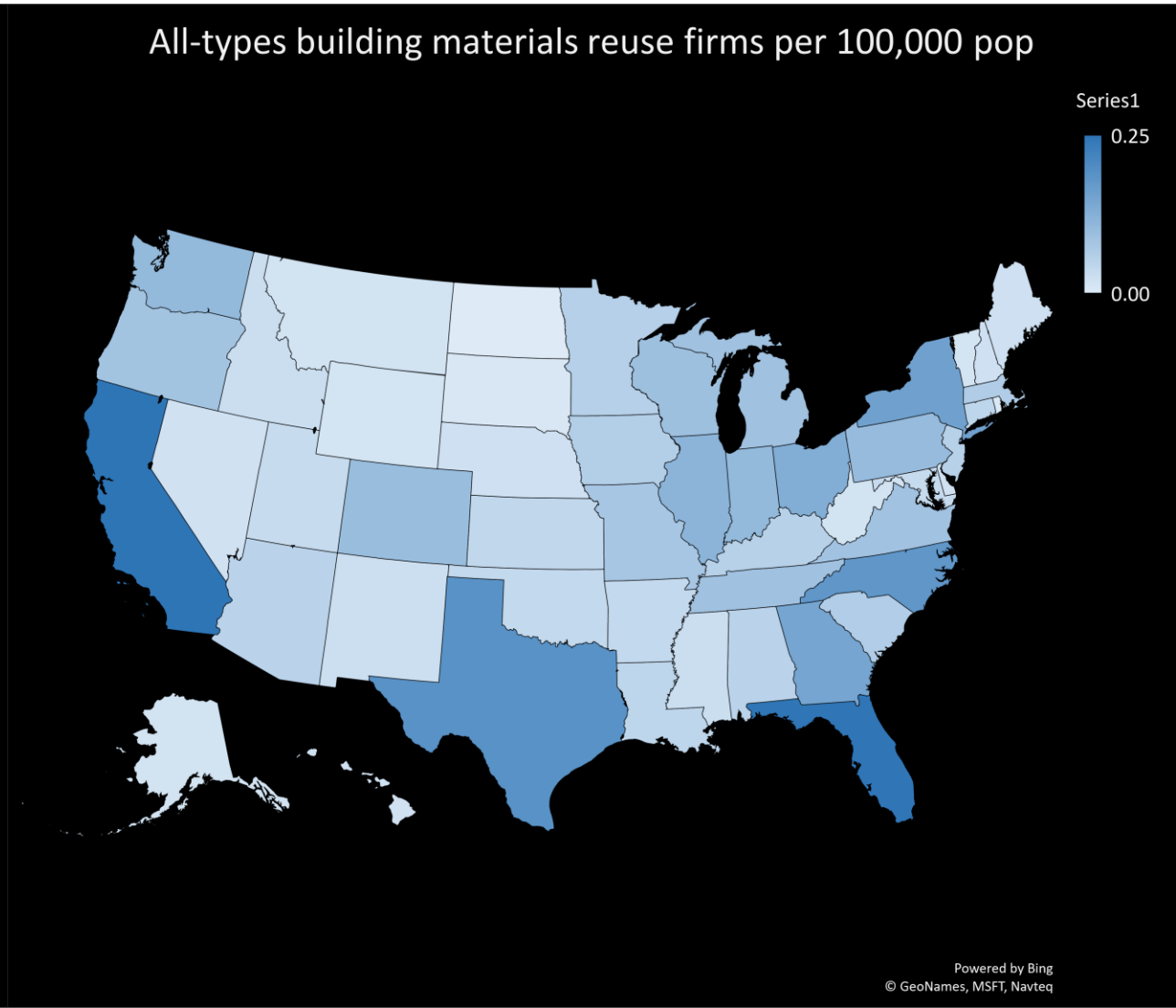
2002 – 2012 change in employment

- All retail = + 0.4%
- **Used merchandise = +46.3%**

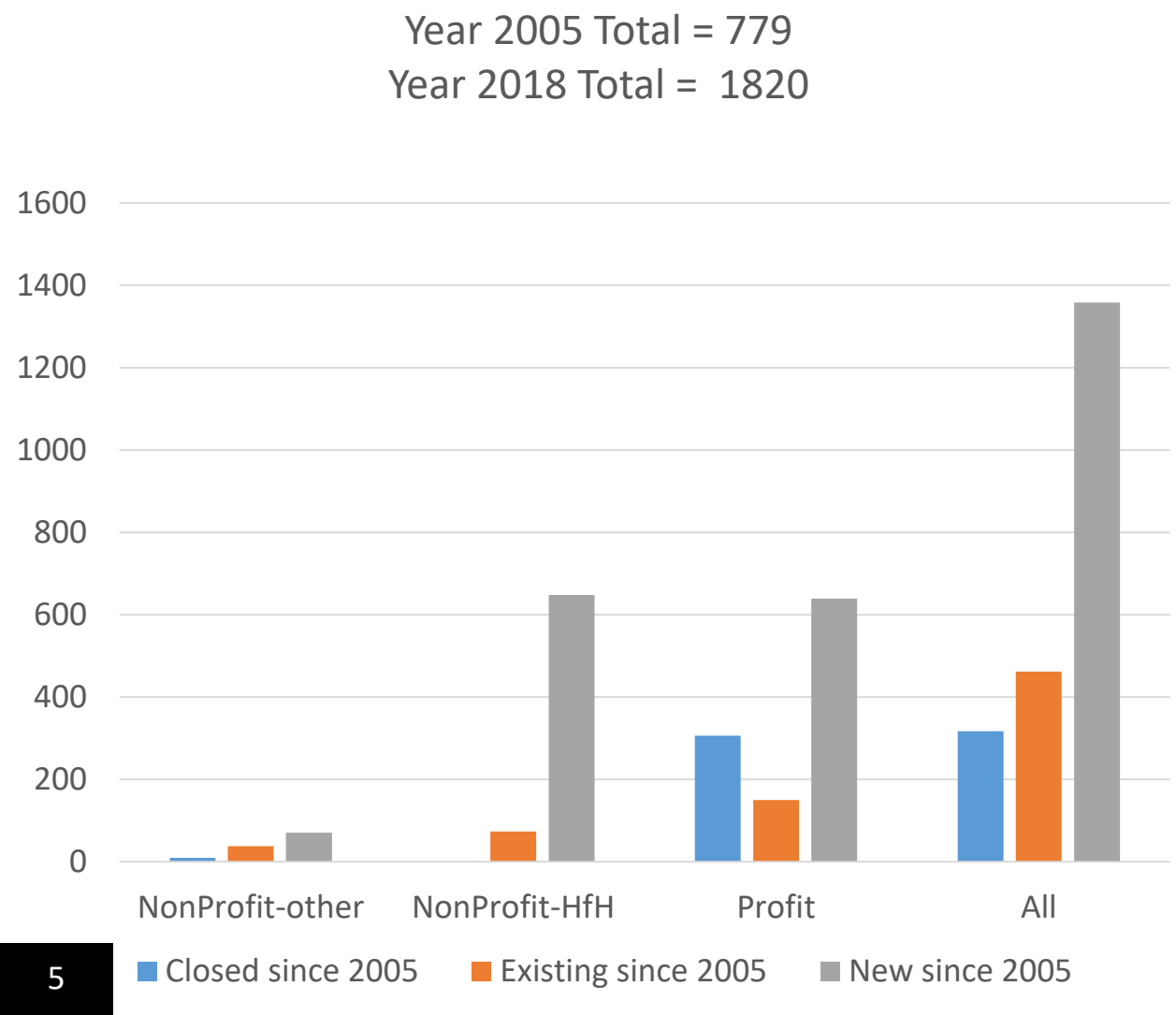


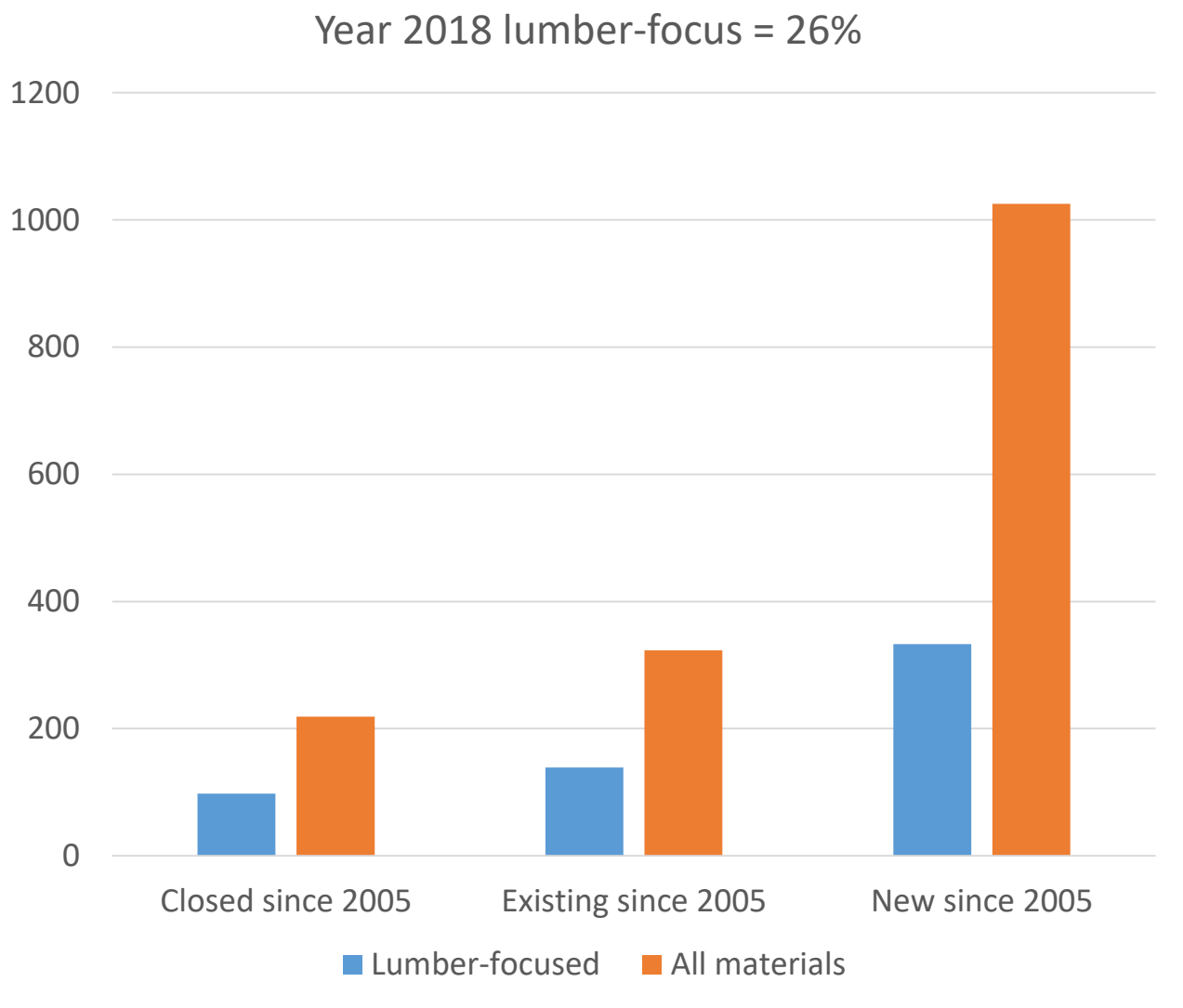
Geography of reused building materials 2018





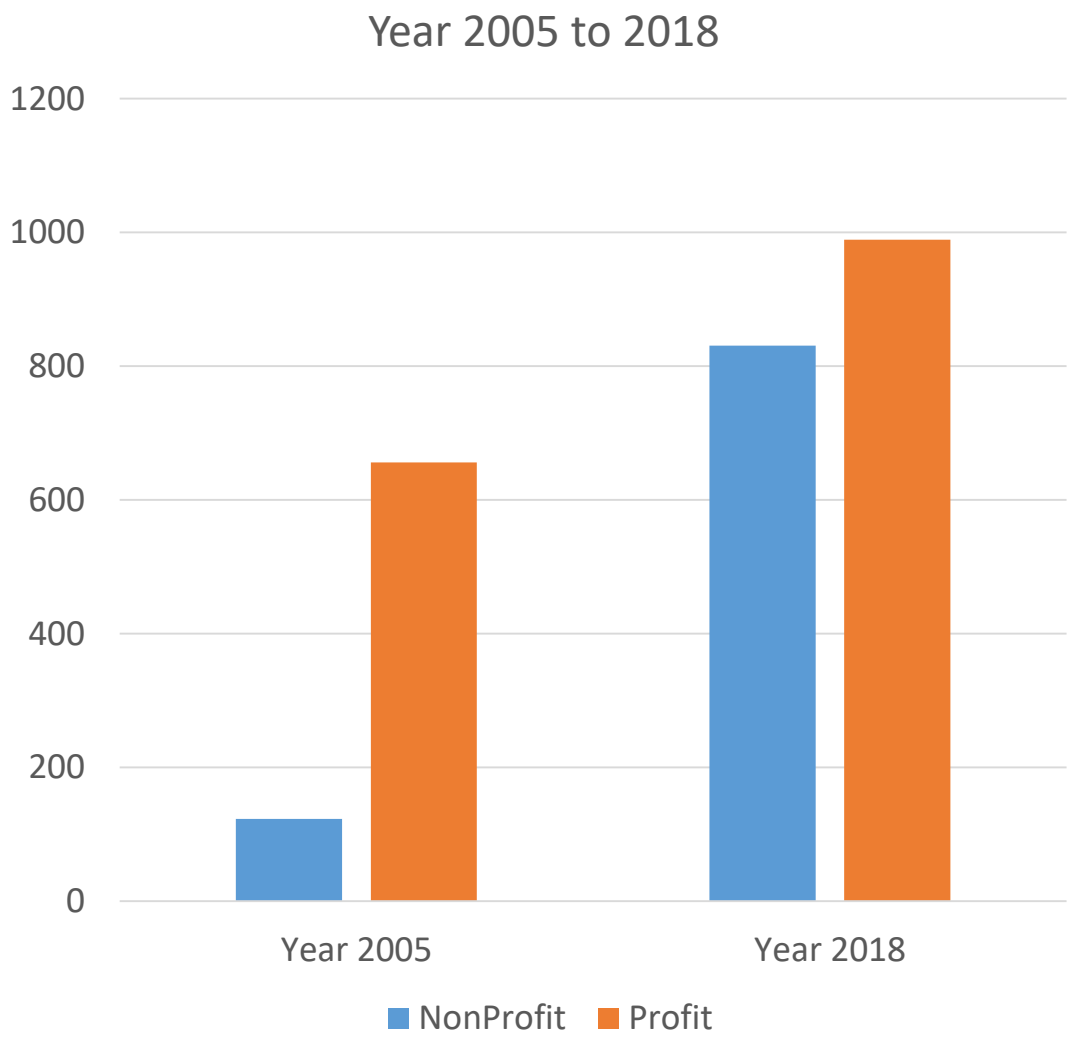
Trend of reused building materials USA 2005-2018



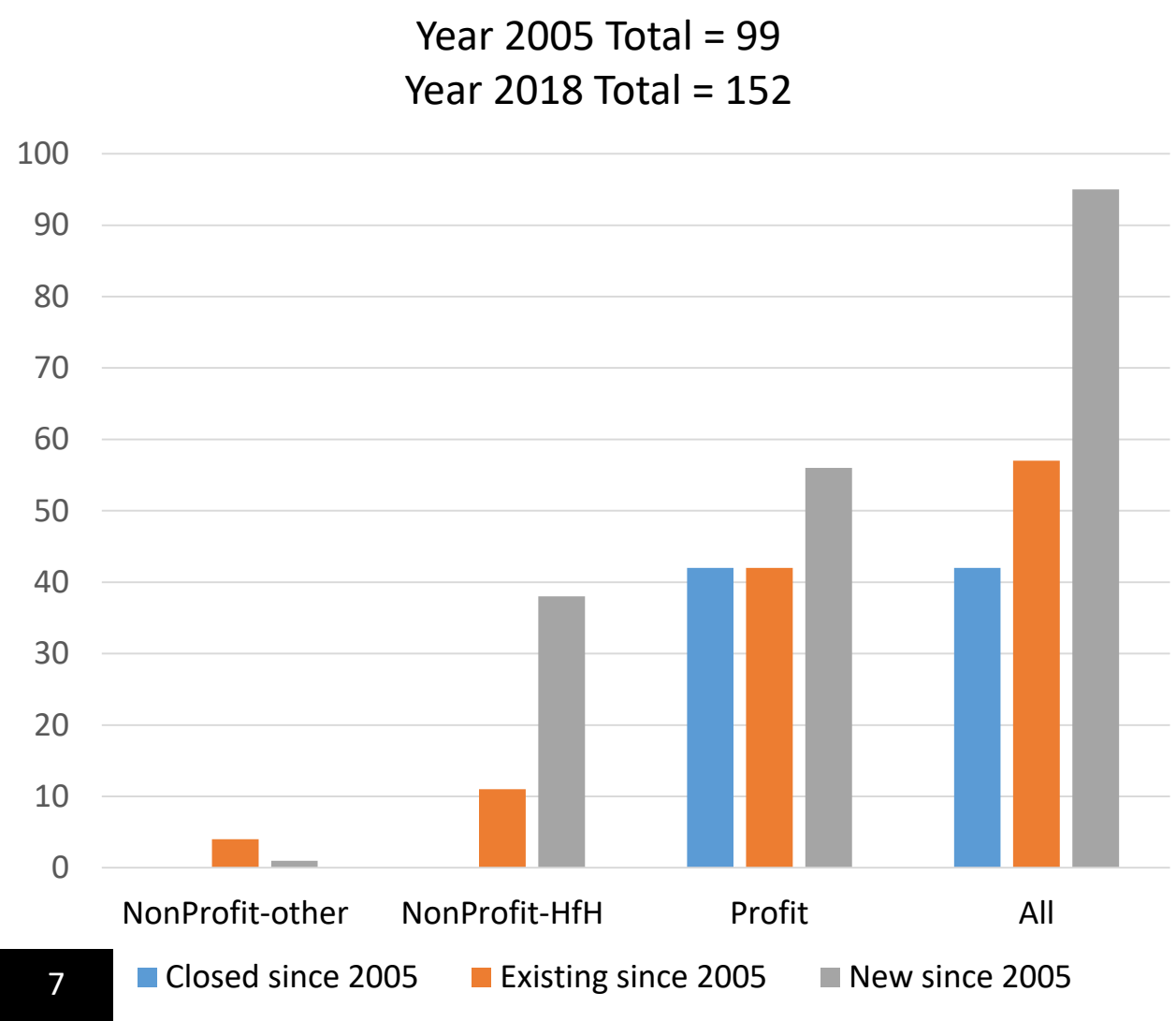


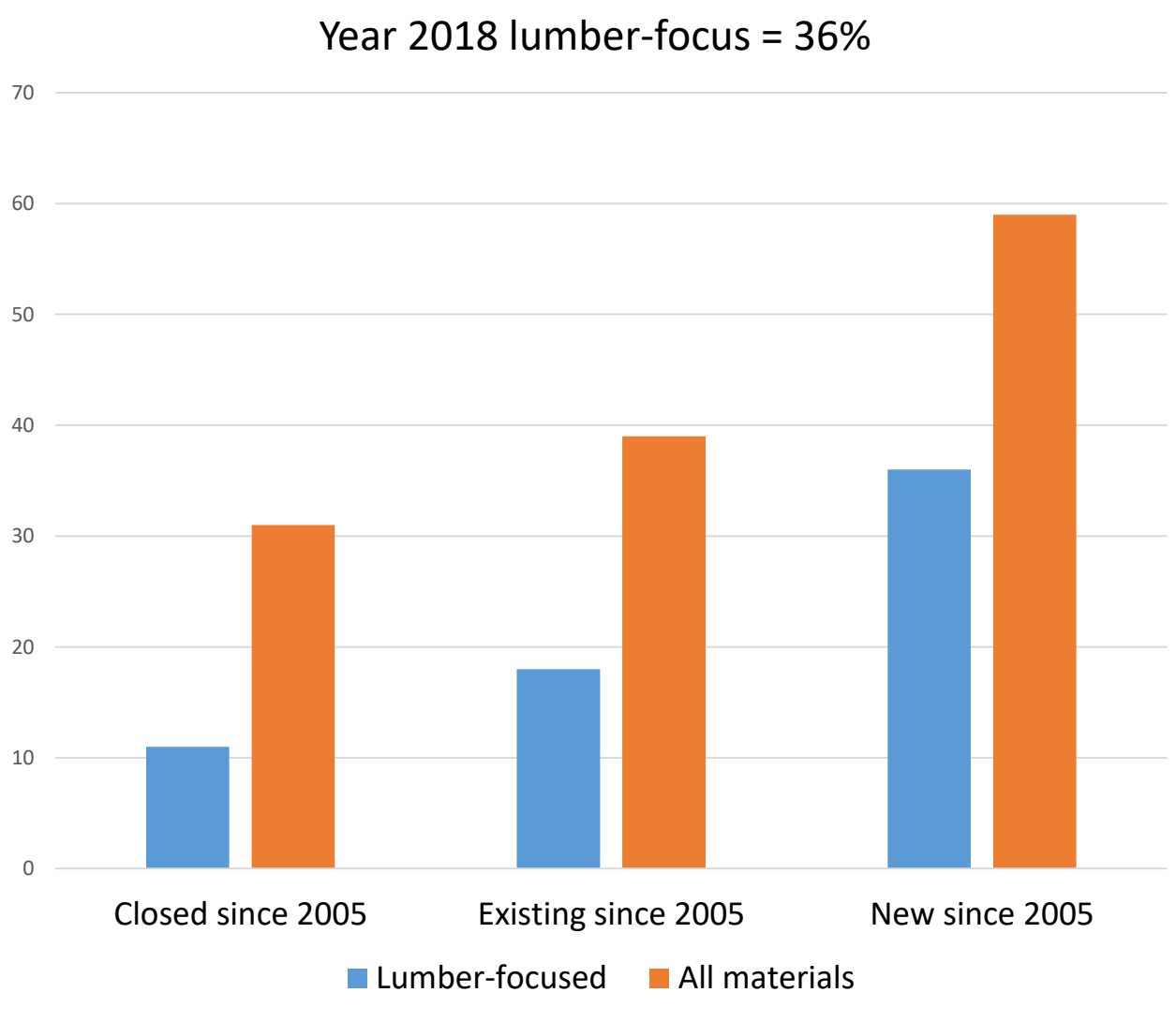
Summary 2005 to 2018 USA

- NonProfit sector dominated by HfH ReStores.
- HfH ReStore and Profit sector each added ~640 firms 2005-2018.
- NonProfit sector growth 433%.
- Profit sector growth 51%.
- ~98% of lumber-focus are Profit firms.



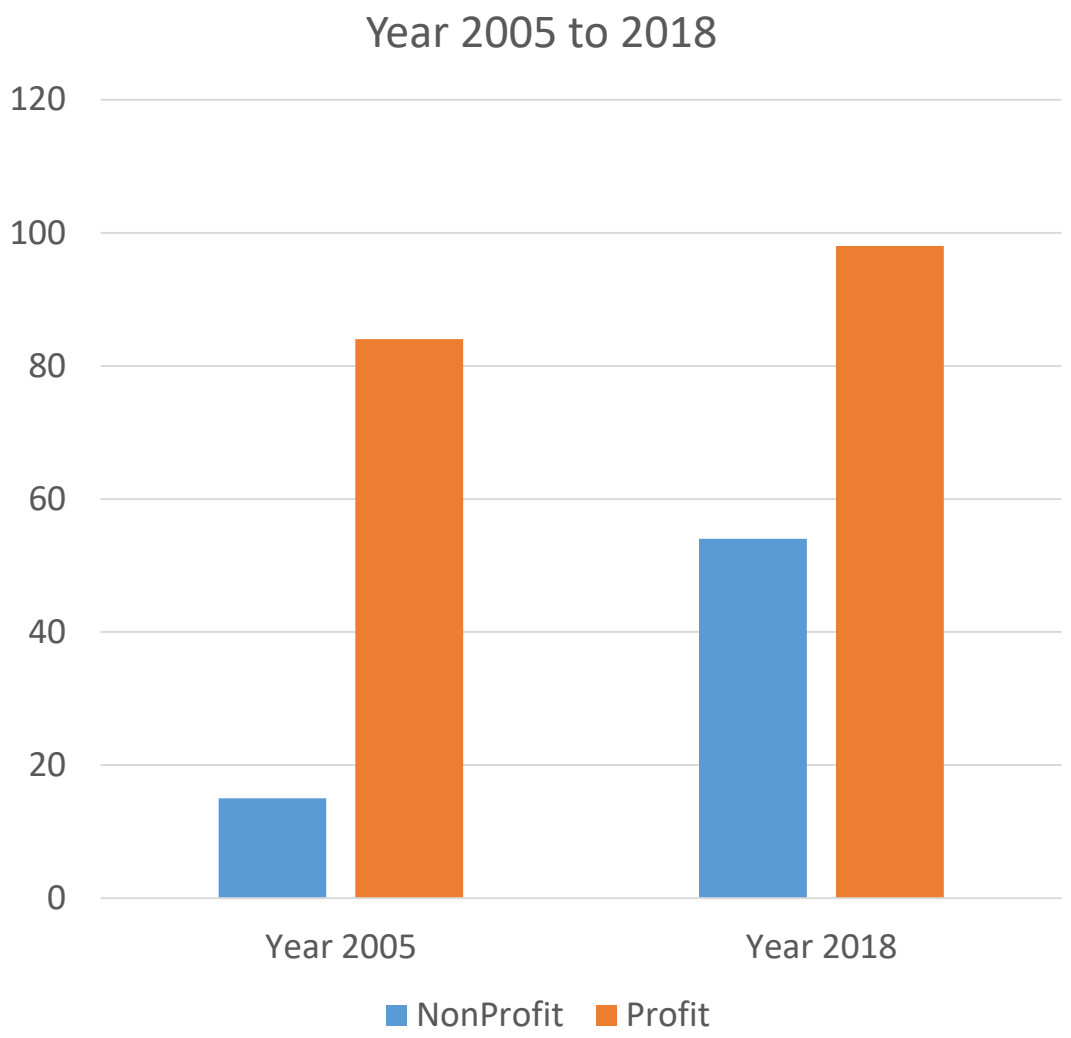
Trend of reused building materials California 2005-2018





Summary 2005 to 2018 California

- NonProfit sector dominated by HfH ReStores.
- NonProfit added 39 firms and Profit sector added 56 firms 2005-2018.
- NonProfit sector growth 260%.
- Profit sector growth 67%.
- 100% of lumber-focus are Profit firms.



DC regional green building and C&D / reuse policies

- Arlington County Green Building Incentive Policy
- **LEED** certification for County buildings
- Bonus densities via increased F.A.R. for green building and priority credits including:
- **Building reuse and materials reuse**
- Montgomery County Adoption of 2012 IGCC and Green Building
- Minimum 50% C&D diversion rate
- Montgomery County Property Tax Credit – green buildings
- Higher **LEED** Certification level for higher credit
- DC Green Building Act of 2006 and Adoption of 2012 IGCC
- **LEED** Certification requirement public and private buildings

2013 DC Green Construction Code (materials)

- Exempt <10,000 SF unless otherwise required.
- Commercial buildings >50,000 SF LEED certification or DC GCC electives.
- Applies to raze, demolition, and alteration projects as applicable.
- **Materials Resource Conservation and Efficiency Electives**
- *Construction and Demolition Waste Management.*
- ***Materials Selection: including reuse / indigenous materials.***
- ***Design for Deconstruction and Building Reuse.***
- *Existing or Historic Building Reuse.*

https://up.codes/viewer/district-of-columbia/igcc-2012/chapter/A/project-electives#A105.5

Sustainable DC 2.0 Plan (by 2032)

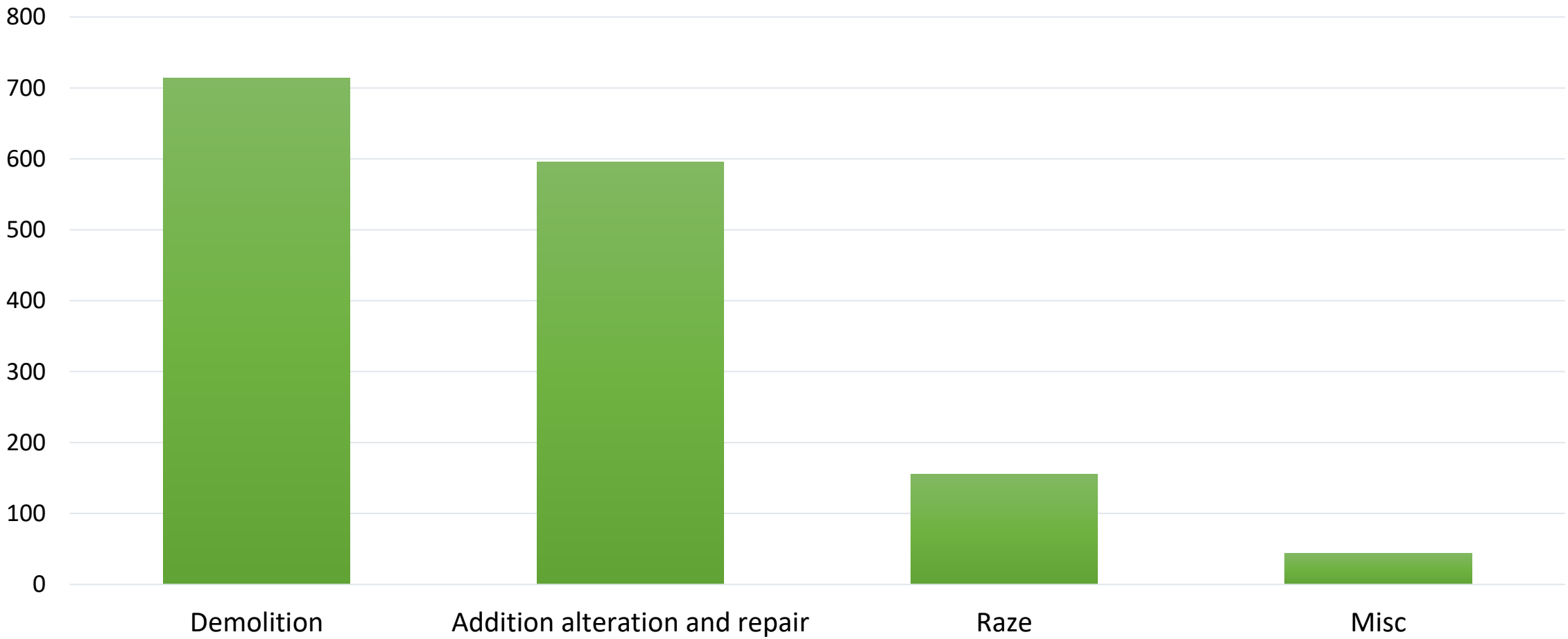
- Facilitate local reuse and recovery of materials to capture their economic and social value.
- Target 2: reuse 20% of all waste produced in the District.
- WS2.1: reuse or recycle 50% of all commercial construction waste.
- WS2.2: reuse 5% of all non-hazardous residential building materials.

http://www.sustainabledc.org/wp-content/uploads/2018/08/18-08-31-SDC2-DRAFT-PLAN.pdf

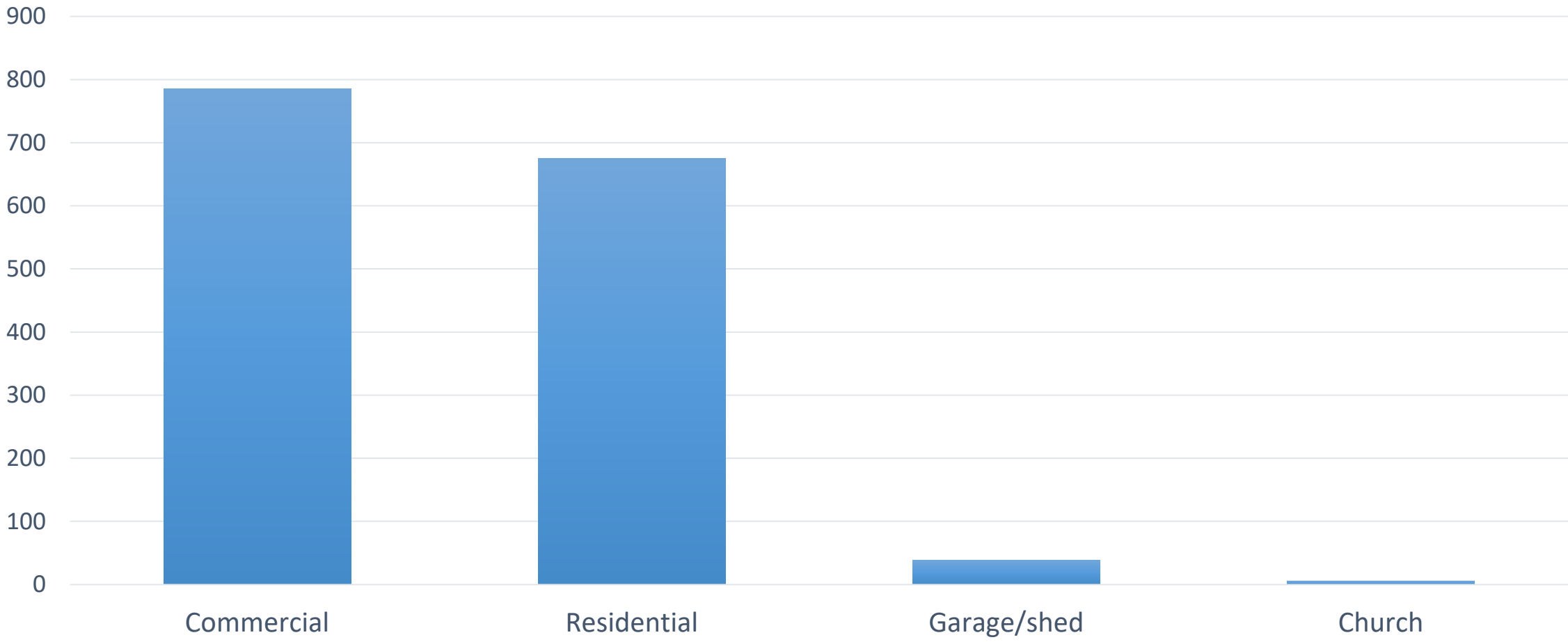
DC Raze and demolition permits

- **Raze permit** - complete removal of entire building from site, including carriage houses and garages.
- **Demolition permit** – partial removal of a building from site.

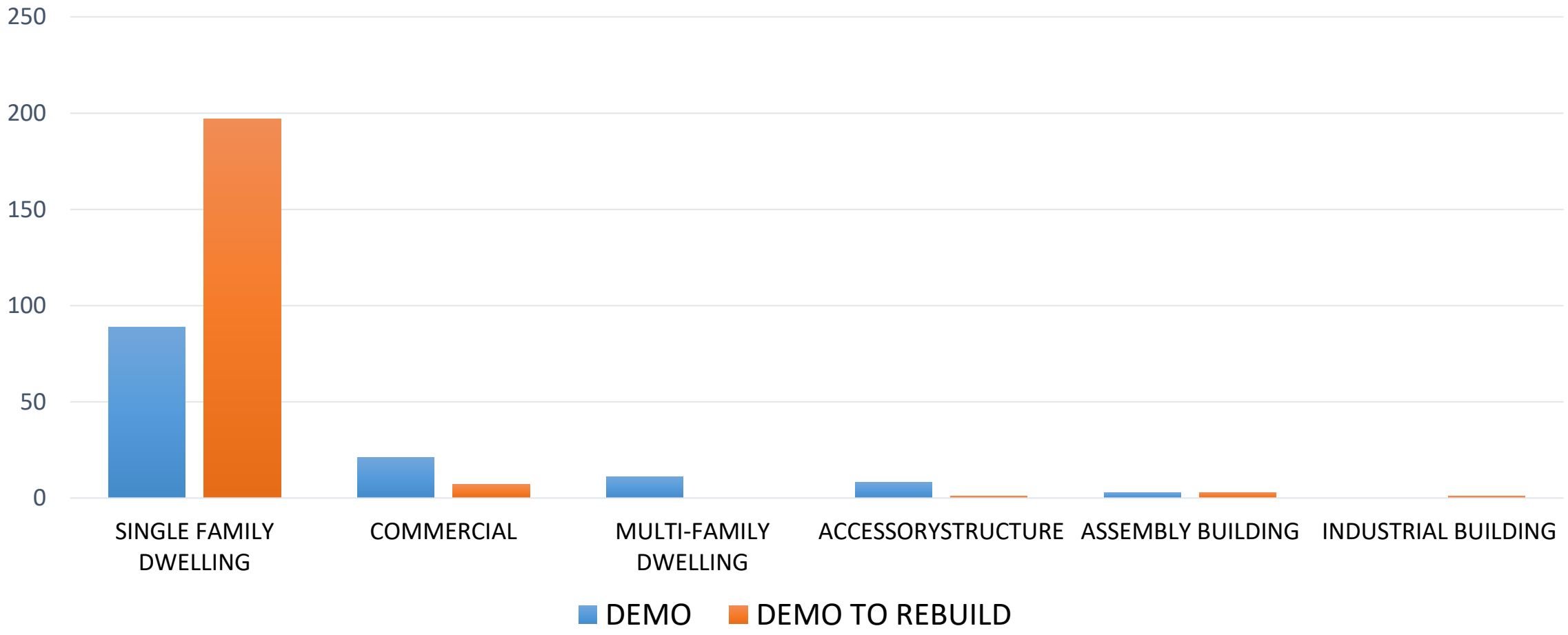
DC 2017 Alteration, demolition & raze permits (1509)



DC 2017 Alteration, demolition & raze permits by type



Demolition permits Montgomery County 1 year (341)

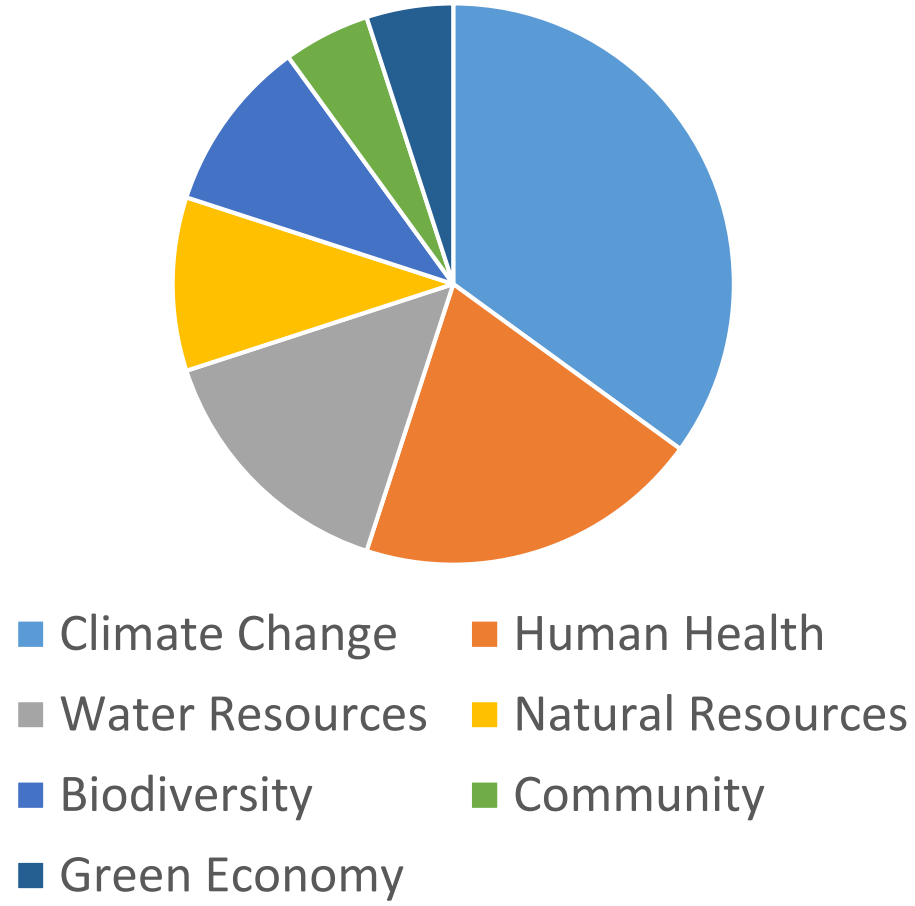


LEED Materials and Resources (MR) Overview

- Each requirement identifies a specific action that fits into the larger context of a **life-cycle approach** to **embodied impact reduction**.
- **Scope and phases;** climate change, cradle-to-…, etc.
- **and a hierarchical** approach (reduce, reuse, recycle).
- …associated with the extraction, processing, transport, maintenance, and disposal of building materials.

LEED System Impact weightings

Climate Change	**35%**
Human Health	20%
Water Resources	15%
Natural Resources	**10%**
Biodiversity	10%
Community	**5%**
Green Economy	**5%**



LEED Credit Categories / points

Energy and Atmosphere	33	30.0%
Indoor Environmental Quality	16	14.5%
Location and Transportation	16	14.5%
Materials and Resources	**13**	**11.8%**
Water Efficiency	11	10.0%
Sustainable Sites	10	9.1%
Innovation	6	5.5%
Regional Priority	4	3.6%
Integrative Process	1	0.9%

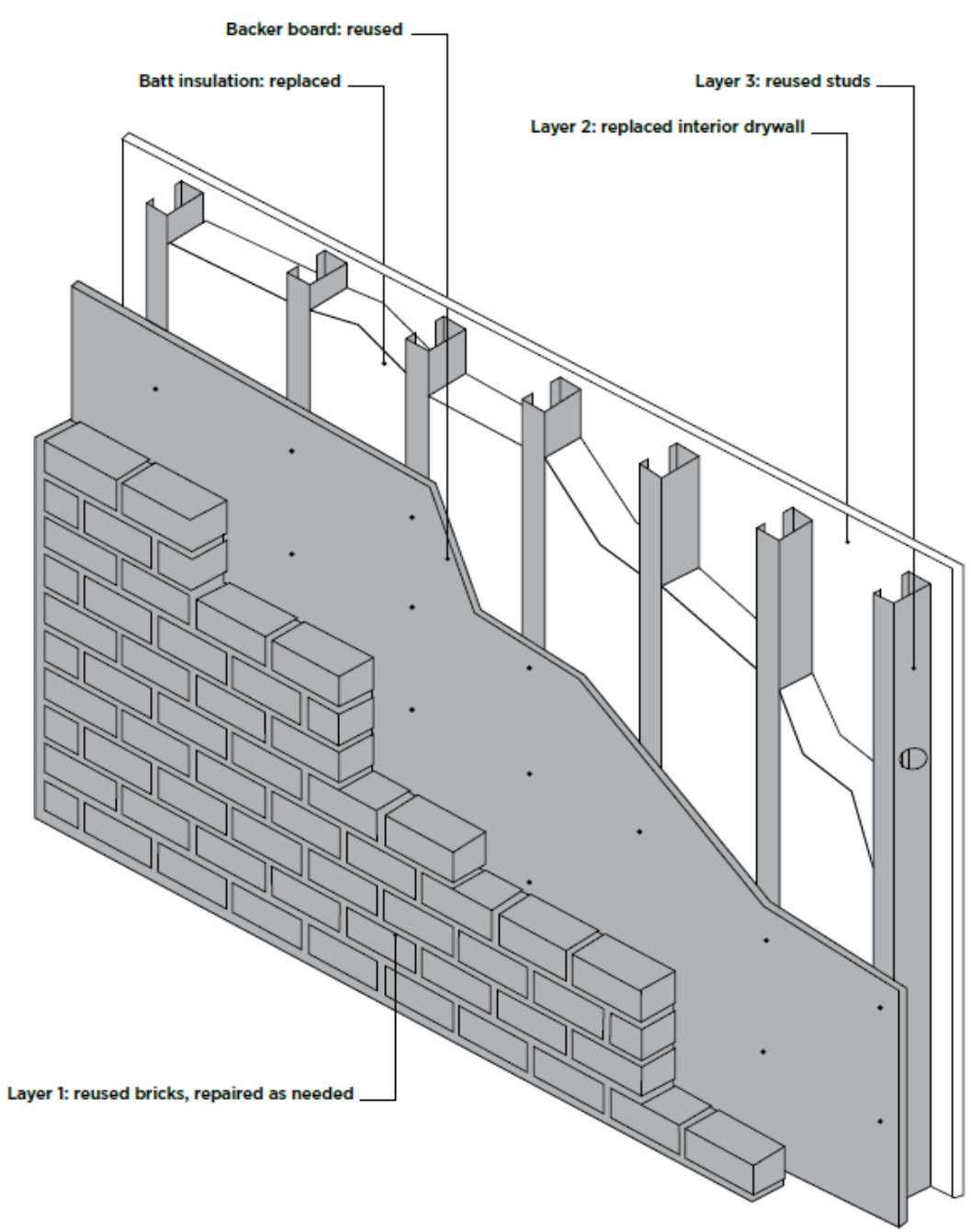
MR - Building Life-Cycle Impact Reduction

- **Option 1: Historic Building Reuse**; no threshold for compliance (5 pts).

- **Option 2: Renovation of Abandoned or Blighted Building**; reuse at least 50% of surface area, and if more than 25% of building is to-be-demolished, project is ineligible for this option, must use **Option #3** (5 pts).

Building Life-Cycle Impact Reduction

- **Option 3: Building and Material Reuse**; reuse or salvage building materials from on or off-site.
- **Path 1:** Combination of **reuse or salvage structural and non-structural elements** from **on or off-site** (25% - 2 pts: 50% - 3 pts: 75% - 4 pts).
- Path 2 a/b: a. Maintain only structure and envelope of walls, floors and roofs (25% - 1 pt: 50% - 2 pts: 75% - 3 pts); b. Maintain interior non-structural elements at least 33% by area of completed building, including additions (1 pt).



Structure or envelope element	Existing area (m^2)	Reused area (m^2)	Percentage reused
On-grade floor assembly			
Foundation, slab on grade	3120	2740	87.8%
Subfloor	3000	2000	66.7%
Hardwood flooring	3000	1500	50.0%
2nd-floor assembly			
Structural deck	3120	1050	33.7%
Hardwood flooring	3000	2500	83.3%
Ceiling tiles	2225	1300	58.4%
Roof deck			
Reused roof deck	1905	985	51.7%
Roof deck (structurally unsound and removed)	920	-	-
Asbestos ceiling tiles (hazardous material removed)	1905	-	-
1st-floor wall assemblies (excluding windows)			
Brick enclosure	1525	1525	100.0%
Insulation	1525	765	50.2%
Drywall	1525	0	0.0%
2nd-floor wall assemblies (excluding windows)			
Brick enclosure	1525	1525	100.0%
Insulation	1525	380	24.9%
Drywall	1525	0	0.0%
TOTAL	26 995	16 270	60.3%

ed materials included in credit calculations

Building Life-Cycle Impact Reduction

- **Option 4: Whole-building Life-Cycle Assessment;**
- Path 1 - life-cycle assessment of the project's structure and envelope (1 pt).

- Path 2 – life-cycle assessment of the project's structure and… a minimum 5% reduction in 3 of the 6 environmental impacts including global warming potential (GWP) (2 pts).

- **Path 3** - life-cycle assessment of the project's structure and envelope… a minimum 10% reduction in 3 of the 6 environmental impacts including GWP (3 pts).

- Path 4 – meet Path 3 and incorporate building reuse and/or salvage materials into the structure and envelope for the proposed design. Demonstrate a minimum 20% reduction in GWP and 10% reduction in an additional 2 environmental impact categories (4 pts).

MR - Sourcing of Raw Materials

Responsible Sourcing of Raw Materials (1 to 2 pts)

- Use permanently installed products from at least 3 manufacturers that meet at least one of the criteria, for at least 20% by cost, of total materials value (1 pt).
- Use permanently installed products from at least 5 manufacturers that meet at least one of the criteria, for at least 40% by cost, of total materials value (2 pts).

Responsible Sourcing of Raw Materials Criteria

- **Materials reuse**, including salvaged and refurbished products, **valued at 200% of cost for credit.**
- **Recycled-content** as sum of post-consumer recycled content + ½ of pre-consumer recycled content, based on cost, valued at 100% of cost for credit.
- Products sourced **within 100 miles** of the project valued at 200% of base cost or two (2) products for credit achievement maximum.
- No double-counting except FSC with recycled-content and bio-based.

Material Reuse – Calculation for value

- **Cost paid or replacement value whichever is higher.**
- ***If actual cost below equivalent new item cost, use higher value.***
- Source location distance is 0 for reuse of materials from project site.
- May use salvage from same Owner from another site.
- Furniture from same Owner and another site, must have been purchased at least 2-years prior to “reuse”.
- Salvage directly from other sites or third-party reuse store, source location is last location before reuse, either another site or the reuse store.

Indoor Environmental Quality - Reuse

Low Emitting Material (1 to 3 pts based on number of products)

- **Flooring and Ceilings**
- At least 90% of all flooring, by cost or surface area, meets the *VOC emissions evaluation* OR *inherently non-emitting sources criteria*, OR salvaged and reused materials criteria.
- **Wall Panels and Composite Wood**
- At least 75% of all wall panels, by cost or surface area, meet the *VOC emissions evaluation*, OR *inherently non-emitting sources criteria*, OR salvaged and reused materials criteria.
- **Furniture**
- At least 75% of all furniture in the project scope of work, by cost, meets the *VOC emissions evaluation*, OR *inherently non-emitting sources criteria*, OR salvaged and reused materials criteria.

MR - Construction & Demolition Waste Management

Option 1: Diversion (1 to 2 pts)

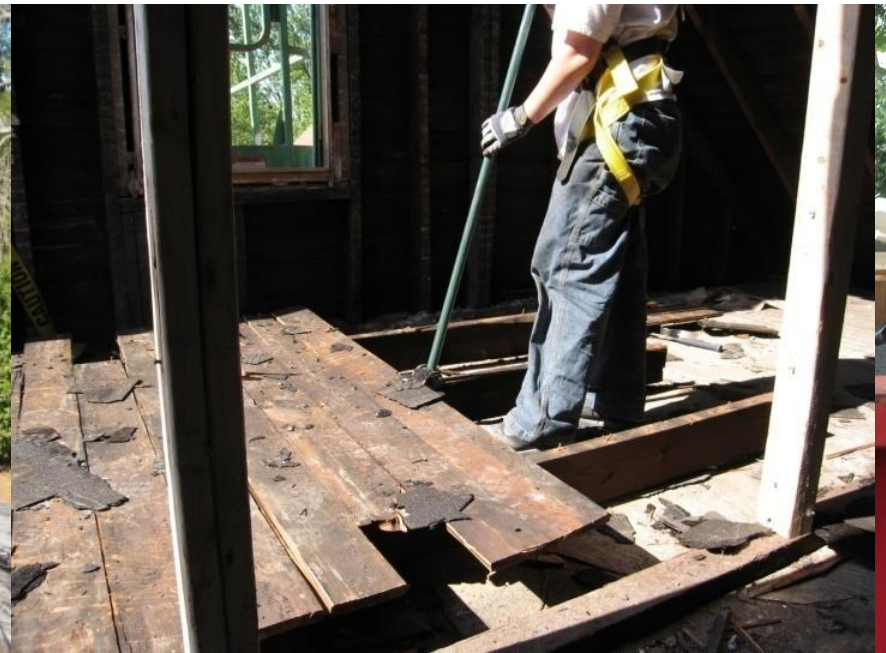
- Path 1a - Divert 50% and three (3) Materials Streams (1 pt).
- **Path 1b – Divert 50% using certified commingled recycling facility and one (1) more material stream (i.e. two (2) materials streams) (1 pt).**

- Path 2a - Divert 75% and four (4) Materials Streams (2 pts).
- **Path 2b – Divert 75% using certified commingled recycling facility and two (2) more material stream (i.e. three (3) materials streams) (2 pts).**

Construction & Demolition Waste Management

Option 2: Reduction of total waste material (2 pts)

- Do not generate more than 7.5 lbs/SF of new construction waste, **and for renovation and demolition waste, salvage or recycle at least 75%, not including ADC (required).**

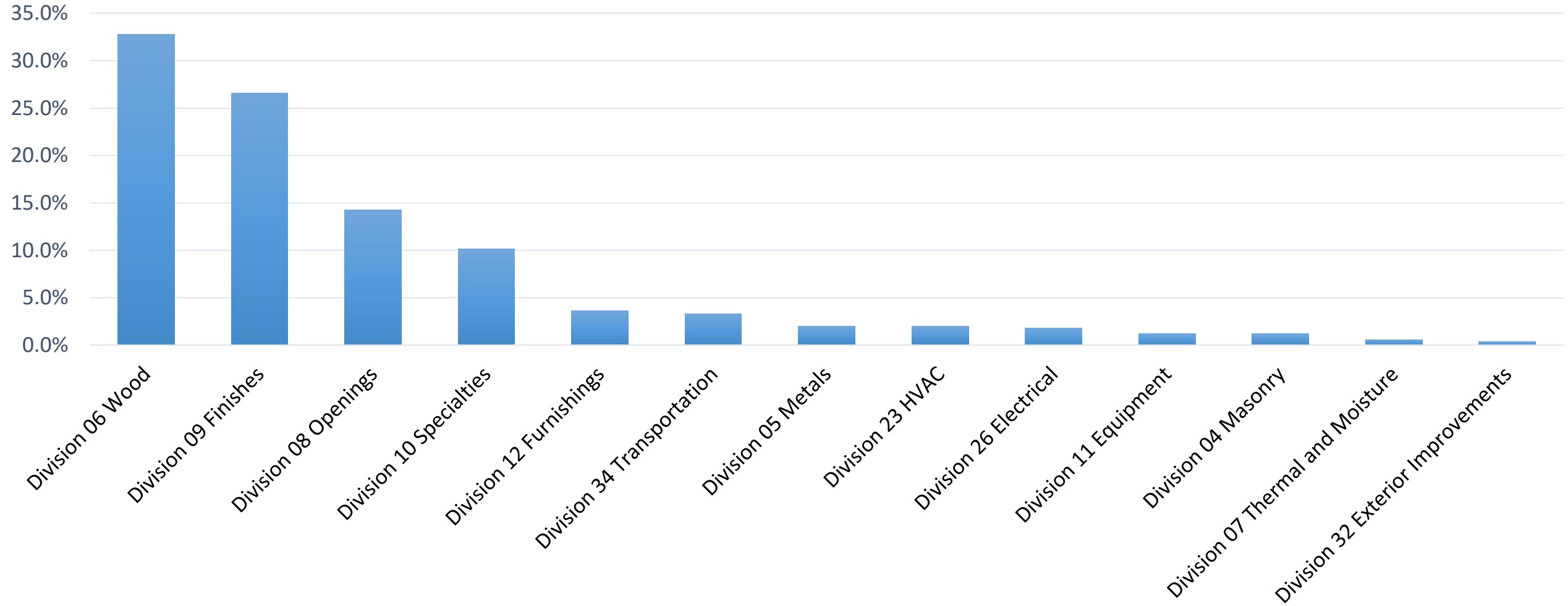


LEED Residential BD+C Multifamily and Homes (MR)

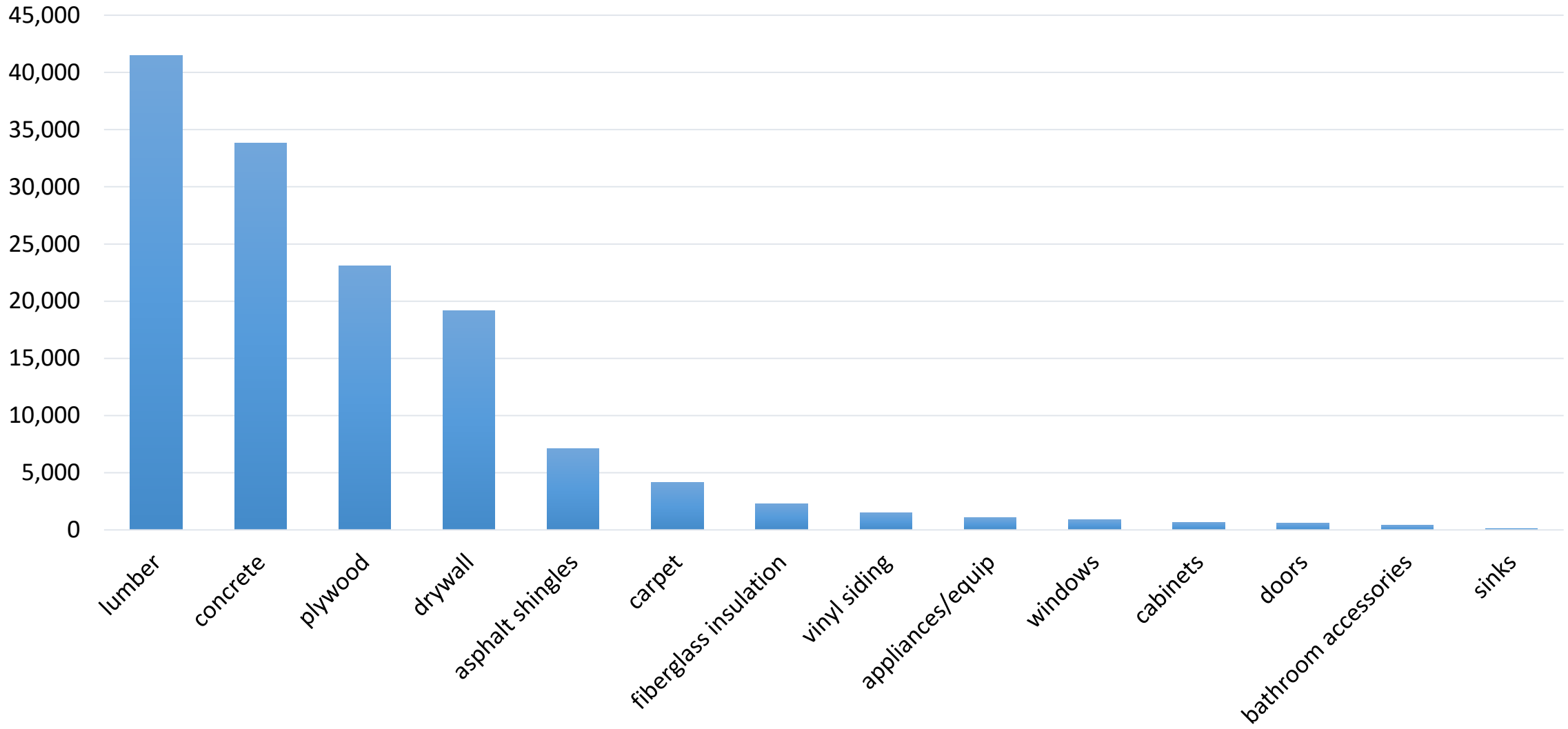
- **Environmentally Preferable Products (1 to 6 pts)**
- Product contains at least 25% reclaimed materials, including salvage, refurbished or reused. For renovation, existing components are considered reclaimed. Includes urban forestry, deadfall, landfill or river recovery.
- **Construction Waste Management (1 to 3 pts)**
- Reduction from a baseline scale of waste relative to number of bedrooms and home size. Allowable Project Construction Waste = total waste - (recycled waste *0.25):
- 20% reduction = 1 pt up to 60% reduction = 3 pts.

LEED Commercial interiors (122) % reused material type

$4.6 million reuse value = ~$37,000 per project



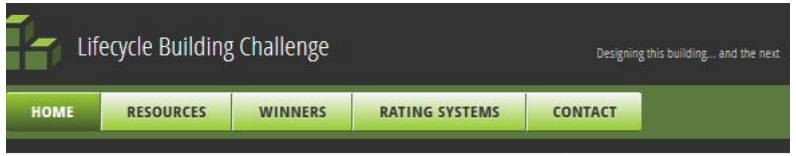
Mass of average new US single family dwelling (2,085 SF)



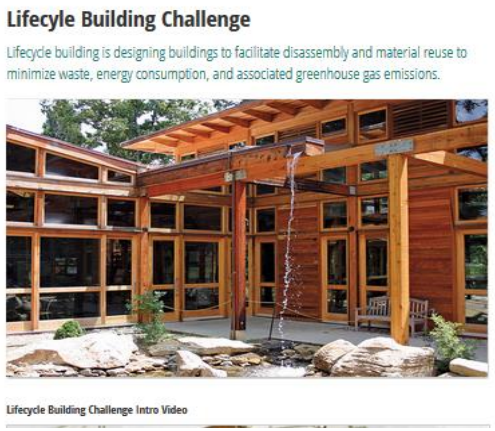
65 lbs/SF; 180 CY as waste = 9 @ 20 CY roll-offs

Salvage value per Non-Structure and Structure

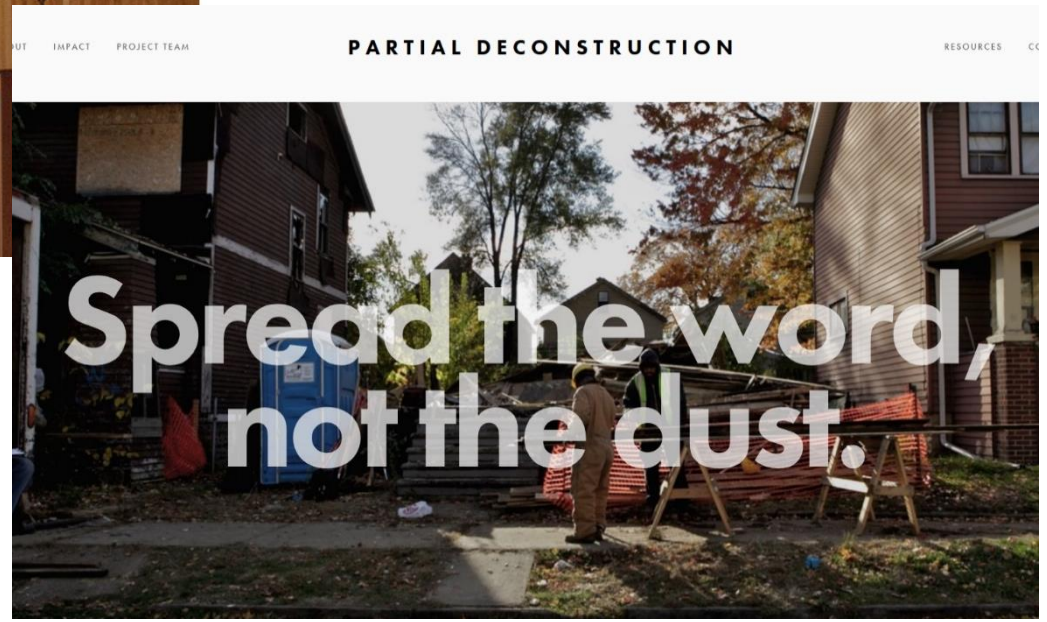
Resources



http://lifecyclebuilding.org/



https://issuu.com/publicarchitecture/docs/design_for_reuse_primer_issuu



https://www.deconstructionproject.com/

Q & A Thank you ! Brad Guy materialreuse@gmail.com