RECYCLE COLORADO

Reuse and Waste Reduction Systems in Colorado: Kickoff Activity

Presented by Ryan Call, Eco-Cycle

eco·cycle®

Our mission:

Innovate, implement, and advocate for local and global Zero Waste solutions to foster a more regenerative, equitable, and climate-resilient future.

Waste reduction is underappreciated

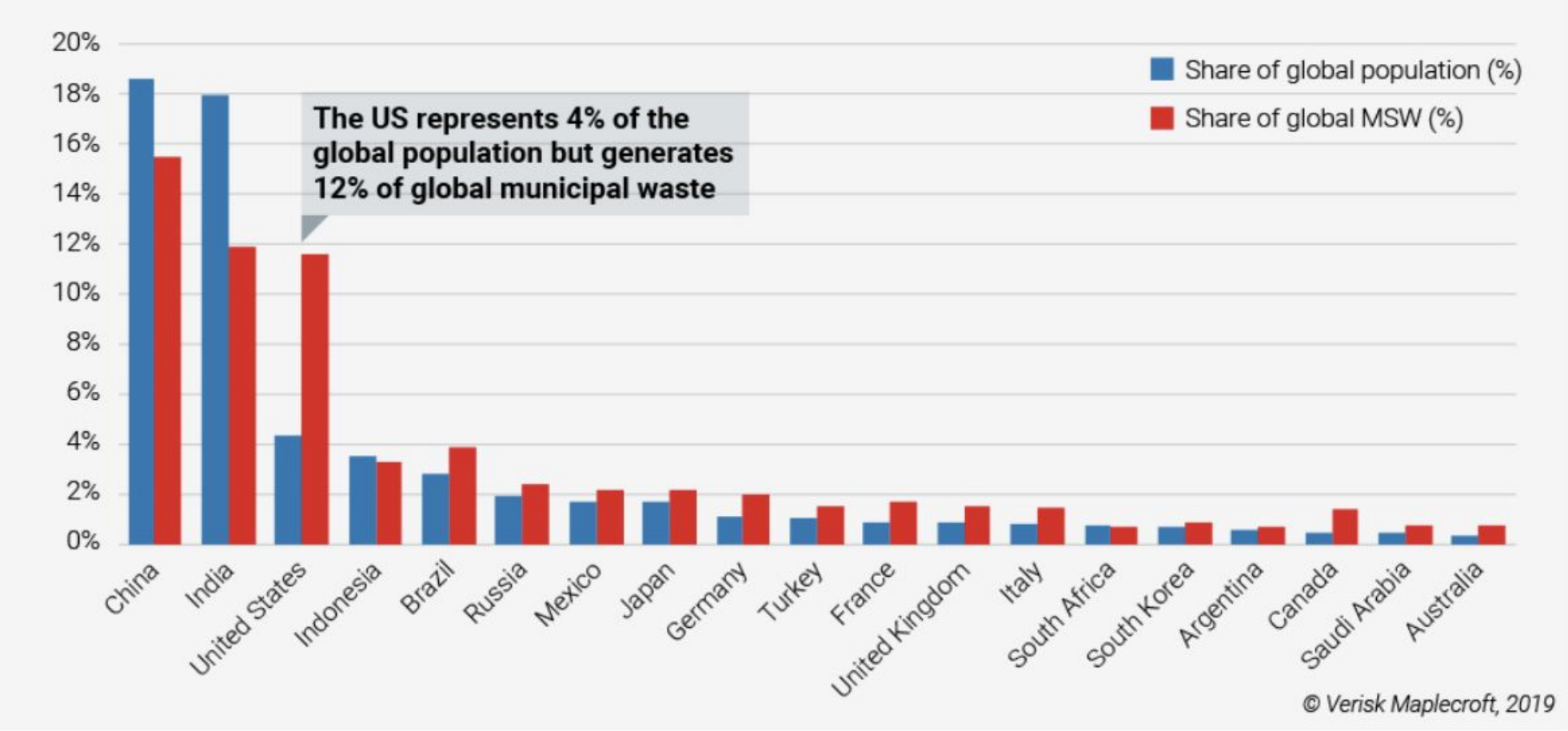
- Reduce, reuse, *then* recycle! The best way to manage waste is to make less of it.

- “Our goal is to ensure more than 50% of Colorado’s current waste stream is diverted to **reuse**/remanufacturing or compost by advancing infrastructure, end markets and policies in **waste reduction**, recovery and diversion.” – Recycle Colorado

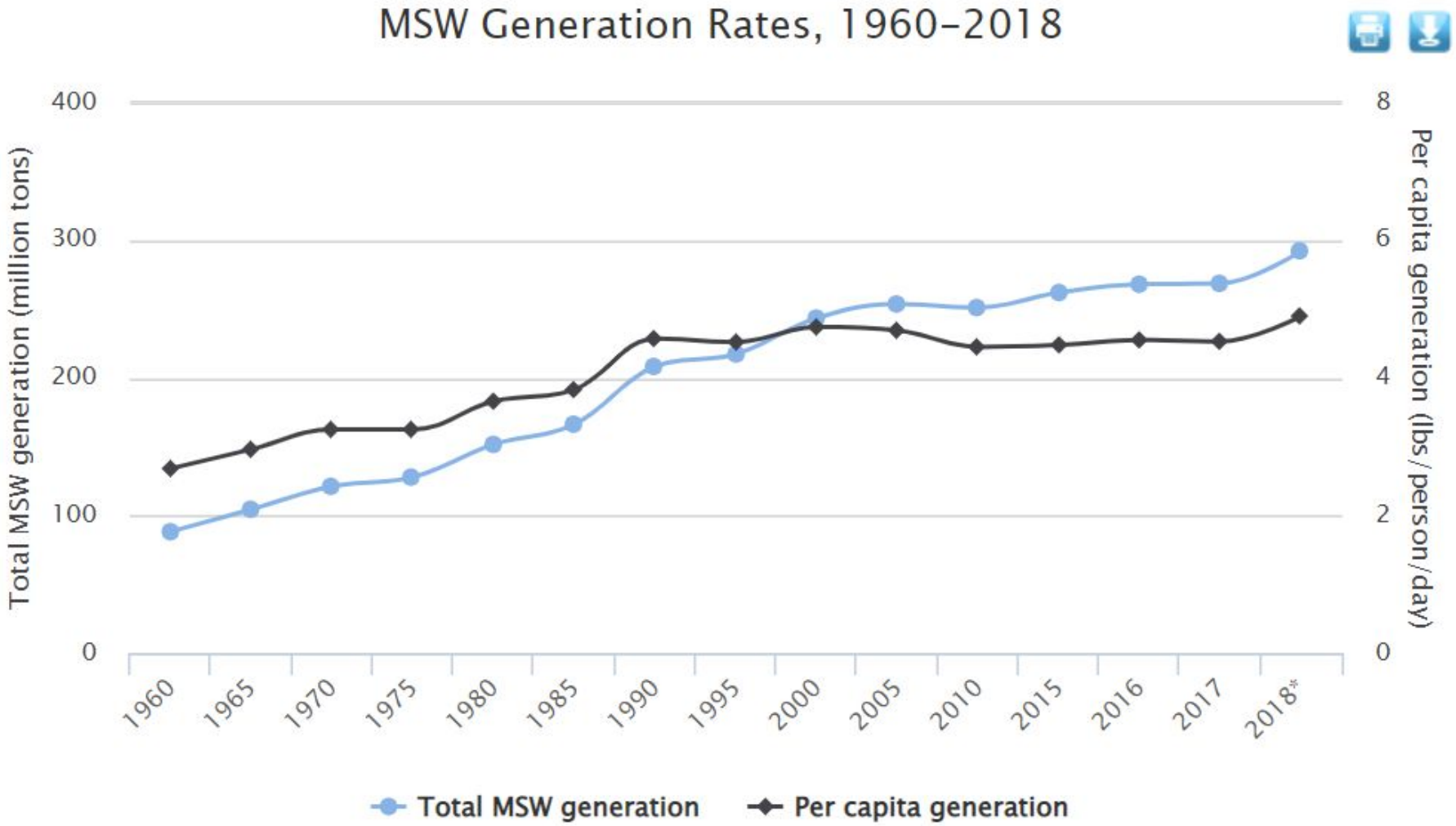
- Coloradans generate, on average, **6.3 pounds** of municipal solid waste per person, per day. (Source: CDPHE)

Global Population vs. Share of MSW generation

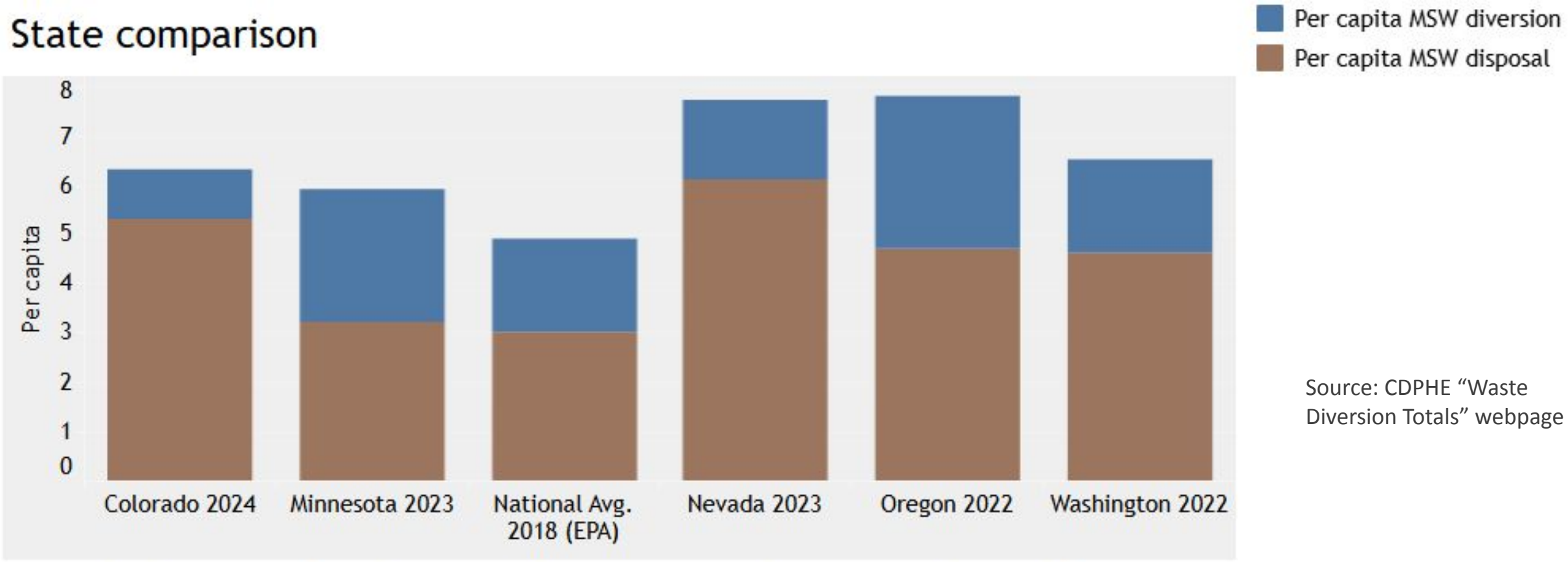
(Source: Verisk Maplecroft, 2019)



National Average (Source: EPA)



Waste generation per capita – State comparison



Per capita MSW diversion and Per capita MSW disposal for each State. Color shows details about Per capita MSW diversion and Per capita MSW disposal. Measurements in pounds.

Source: CDPHE "Waste Diversion Totals" webpage

Waste generation per capita – State comparison

State	Per capita MSW diversion	Per capita MSW disposal	Per capita MSW generation	Population
Colorado 2024	1.0	5.3	6.3	5,957,493
Minnesota 2023	2.7	3.2	5.9	5,800,306
National Avg. 2018 (EPA)	1.9	3.0	4.9	327,200,000
Nevada 2023	1.6	6.1	7.7	3,214,636
Oregon 2022	3.1	4.7	7.8	4,281,851
Washington 2022	1.9	4.6	6.5	7,864,400

The data shows that Colorado residents generate municipal solid waste at rates similar to residents in other states. However, Colorado residents recycle less material, at 1.1 pounds per person per day, compared to residents of other states.

Topics in reuse and waste reduction

- Reuse and waste reduction in EPR
- Waste reduction in the food service ware sector
- Reuse in the construction and demolition sector
  - *Reclaimed lumber, deconstruction*
- Thrift and second hand economy
- Materials reduction ordinances and goals
  - *Plastic Pollution Reduction Act, Skip the Stuff*
- Consumer-facing refill retail stores
- Repair clinics
- Food waste reduction and rescue

"...MINIMIZE WASTE and to INCREASE REUSE and recycling of products and packaging."

- HB22-1355 (EPR law) Legislative Declaration

Through a Producer Responsibility policy for containers, packaging, and printed paper, Colorado can:

INCREASE RECYCLING, REDUCE UNNECESARY PACKAGING, & STRENGTHEN SUPPLY CHAINS

US Plastic Pact Problematic and Unnecessary Materials List

- Materials to be eliminated by 2025*
  - Cutlery
  - Intentionally added PFAS
  - Non-detectable pigments, carbon black
  - Opaque or pigmented PET bottles
  - Oxo-degradable additives
  - PETG - Polyethylene Terephthalate Glycol
  - PS - Polystyrene
  - Problematic label constructions
  - PVC - polyvinyl chloride
  - Stirrers
  - Straws

Kickoff Activity: Future Headlines

- Introduce yourself to your table.
  - What interests you about reuse and waste reduction?
- **Collaborate to create a "future headline!"**
  - What do you hope to see Colorado achieve regarding reuse and waste reduction?
  - *When* is this headline set?
- Present your future headline.
  - Decide who at your table will present to the larger audience.

Join Eco-Cycle's Colorado Reuse Leaders network!

- Collaborate on Colorado-specific reuse and waste reduction topics and connect with others interested in this field.
- Upcoming "show and tell" activity.
- Sign up at ecocycle.org/reuse-leaders
- Email me (ryan@ecocycle.org) for recordings and notes

Thank you for your time and attention!

Contact: ryan@ecocycle.org
Website: ecocycle.org

RECYCLE COLORADO

KL&A
Engineers & Builders

WOOD REUSE

WHO WE ARE

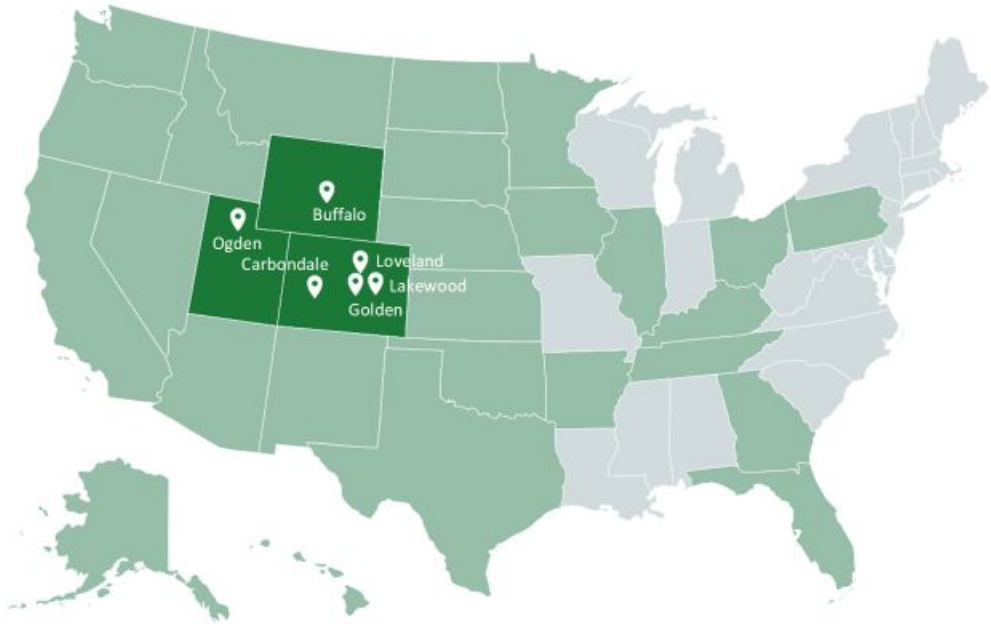
KL&A
Engineers & Builders

130+
Total Staff

70+
Licensed Engineers

6
Offices

31
Years in business



SERVICES

- Structural Engineering
- Civil Engineering
- Embodied Carbon Consulting
- Steel Detailing
- Steel Construction Management
- Mass Timber Construction Management

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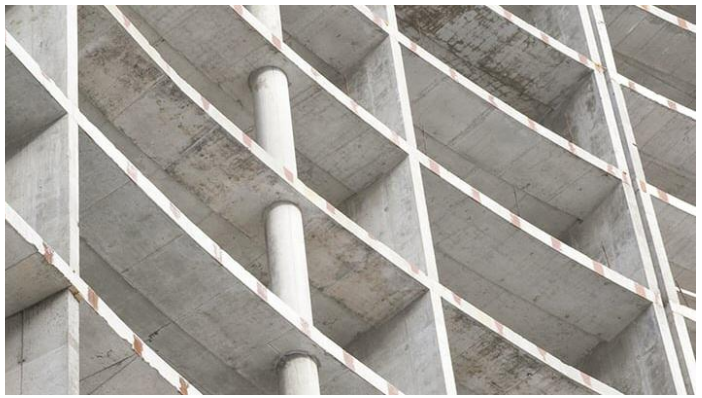
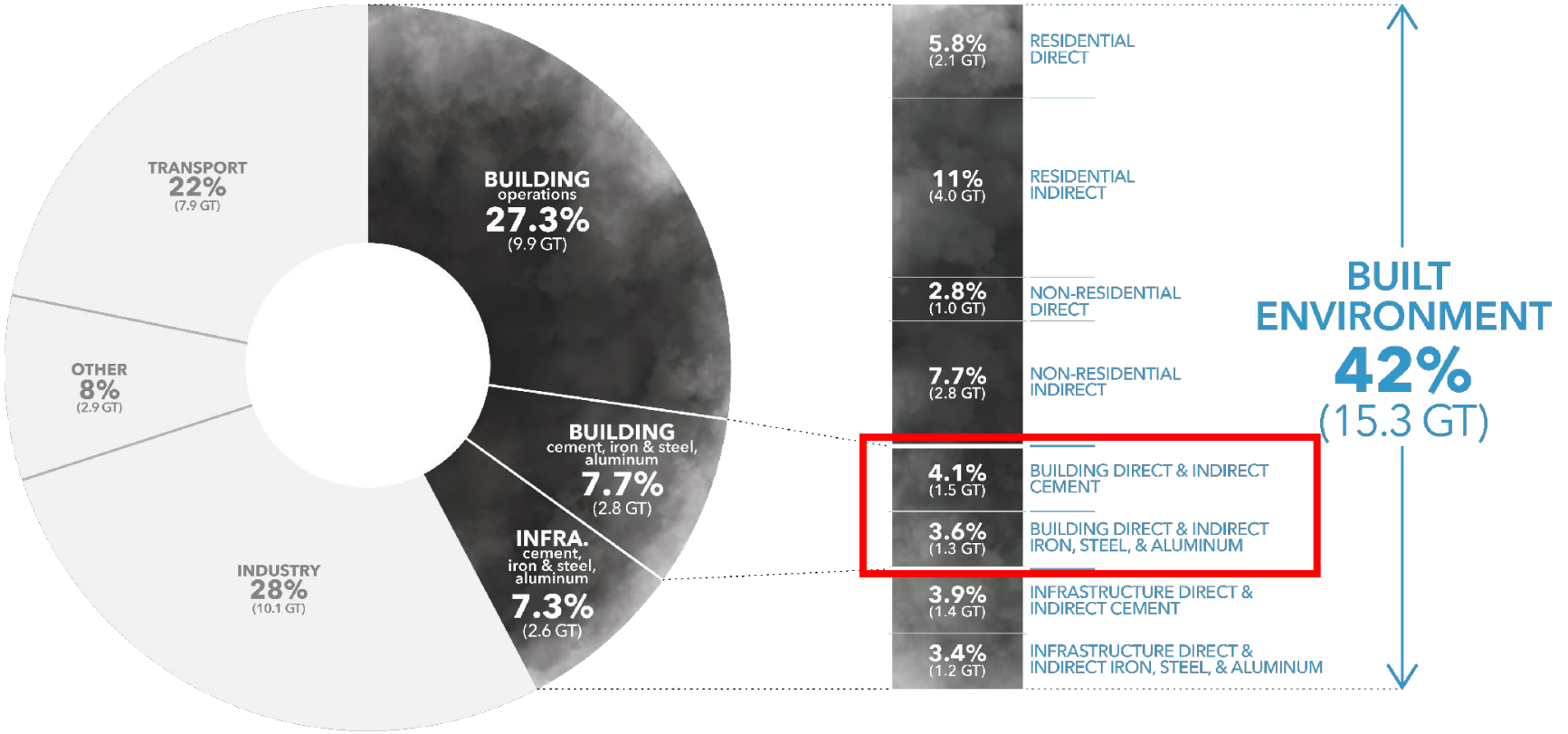
EMBODIED CARBON

EMBODIED CARBON INDUSTRY OVERVIEW



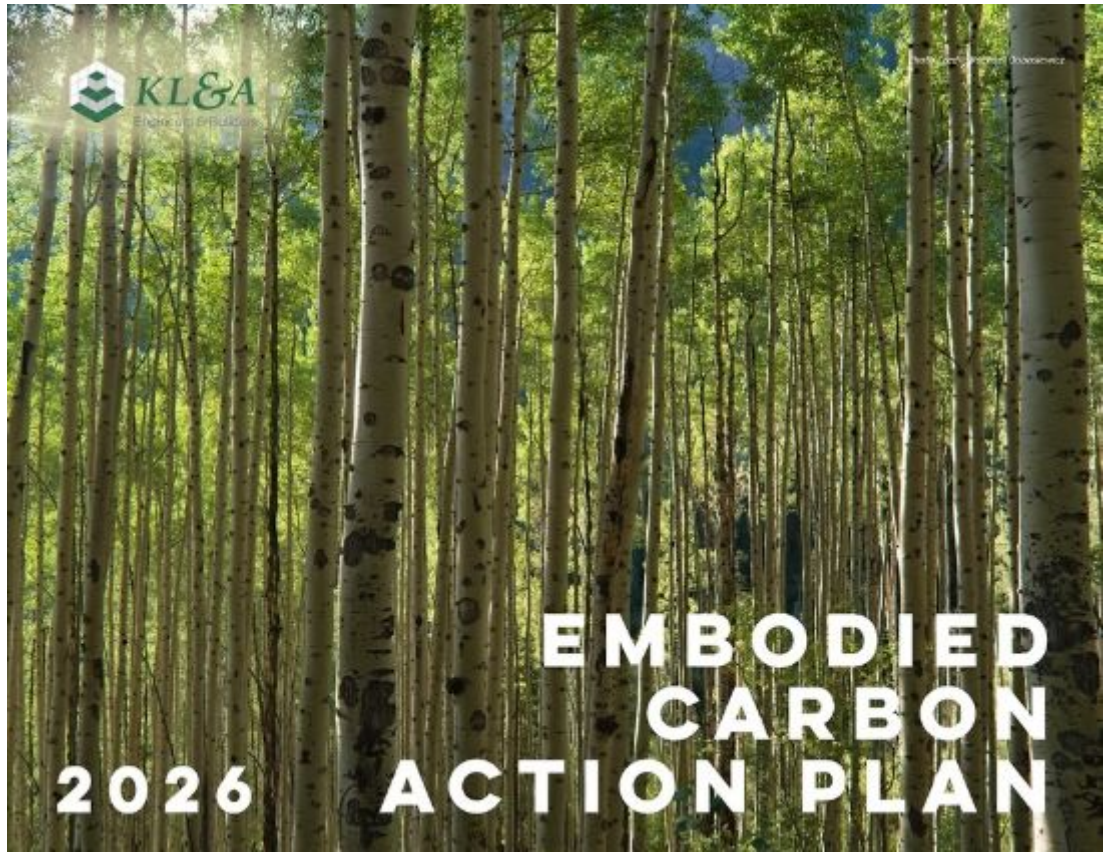
TOTAL ANNUAL GLOBAL CO_2 EMISSIONS
Direct & Indirect Energy & Process Emissions (36.3 GT)



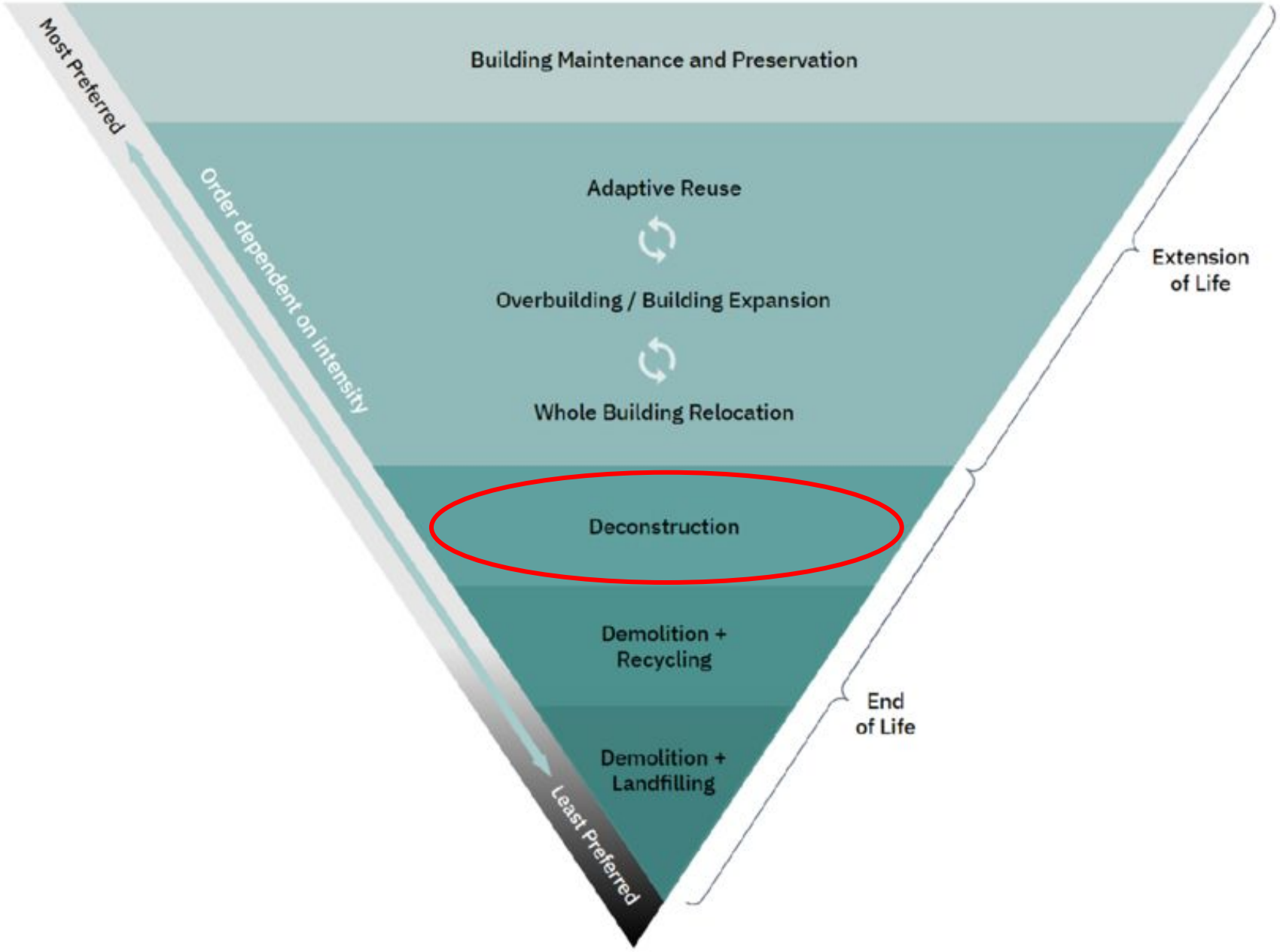
Analysis & Aggregation by Architecture 2030 using data sources from IEA & Statista.

10 STRATEGIES TO REDUCE EMBODIED CARBON

1. Start Now
2. Big Rocks First
3. Innovate
4. **Reuse Buildings & Components**
5. More Biogenic Materials
6. Less Cement
7. Long Life, Loose Fit
8. Cost Matters
9. Market Evolution & Incentives
10. Open-Source Effort



REUSE


Most Preferred
Order dependent on intensity
Least Preferred
Building Maintenance and Preservation
Adaptive Reuse
Overbuilding / Building Expansion
Whole Building Relocation
Deconstruction
Demolition + Recycling
Demolition + Landfilling
Extension of Life
End of Life

DESIGN FOR DISASSEMBLY

Simplified connections!

Panelized systems!

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REUSE PROJECTS

COMPONENT REUSE - 2004

16TH Street Pedestrian Bridge

MATERIAL REUSE - 2010

National Renewable Energy Lab

DECON, SALVAGE, AND REUSE – 2020-2026

Boulder Community Hospital (Deconstruction)

Site and Building Owner	**City of Boulder**
General Contractor	Ameresco Inc.
Deconstruction Contractor	Colorado Cleanup Corporation
Steel Stockpile Owner	City of Boulder
Steel Decon & Stockpile Manager	KL&A Engineers & Builders - Team Carbon

Boulder Fire Station 3 (New Construction)

Owner	**City of Boulder**
General Contractor	Mark Young Construction
AOR	Davis Partnership
EOR	KL&A Engineers & Builders
Steel Fabricator	Full Metal Iron

Boulder Western City Campus (Redevelopment)

Owner	**City of Boulder**
General Contractor	Saunders
AOR	ZGF
EOR	Anthem
Steel and Timber Subcontractor	KL&A Engineers & Builders

Boulder Community Hospital

DECON, SALVAGE, AND REUSE

- REUSE
  - 12 ENTITIES
    21 PROJECTS
  - DIRECT - TIER 1
    - (89) BOULDER FIRE STATION 3
    - (4) BOULDER MOD
    - (48) BOULDER WESTERN CITY CAMPUS
    - (5) BOULDER FIRE TRAINING CENTER
  - DIRECT - TIER 2
    - (70) DOUGLAS COURT RESIDENCE
    - (6) MARION RESIDENCE
    - (3) GULASH RESIDENCE
    - (26) COLORADO CLEANUP CORPORATION
    - (276) HARTSEL DIRTWORK
    - (23) EVOKE GARDENS LANDSCAPING
  - INDIRECT - TIER 3
    - (10) TRADITIONAL ROOTS JOINERY
    - (17) HARTSEL DIRTWORK
    - (7) KL&A LAKEWOOD OFFICE
  - DID NOT PROCEED
    27 ENTITIES

INSTITUTIONAL BUILDING

SINGLE FAMILY RES.

MULTI USE

MULTI USE

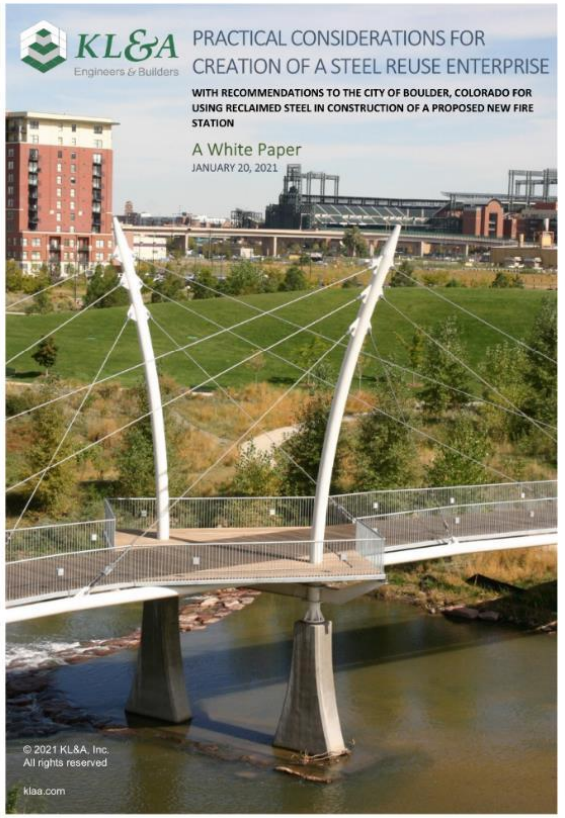
STRUCTURAL REUSE

NON STRUCTURAL

IBC
Commercial
Larger scale
Multi-Story

Residential
Smaller scale
Non-building Structures
Single-Story

Non-Structural



13 projects reused steel
40 projects interacted in total

DECON, SALVAGE, AND REUSE

Goal (Boulder ordinance):

75% landfill diversion (by weight)

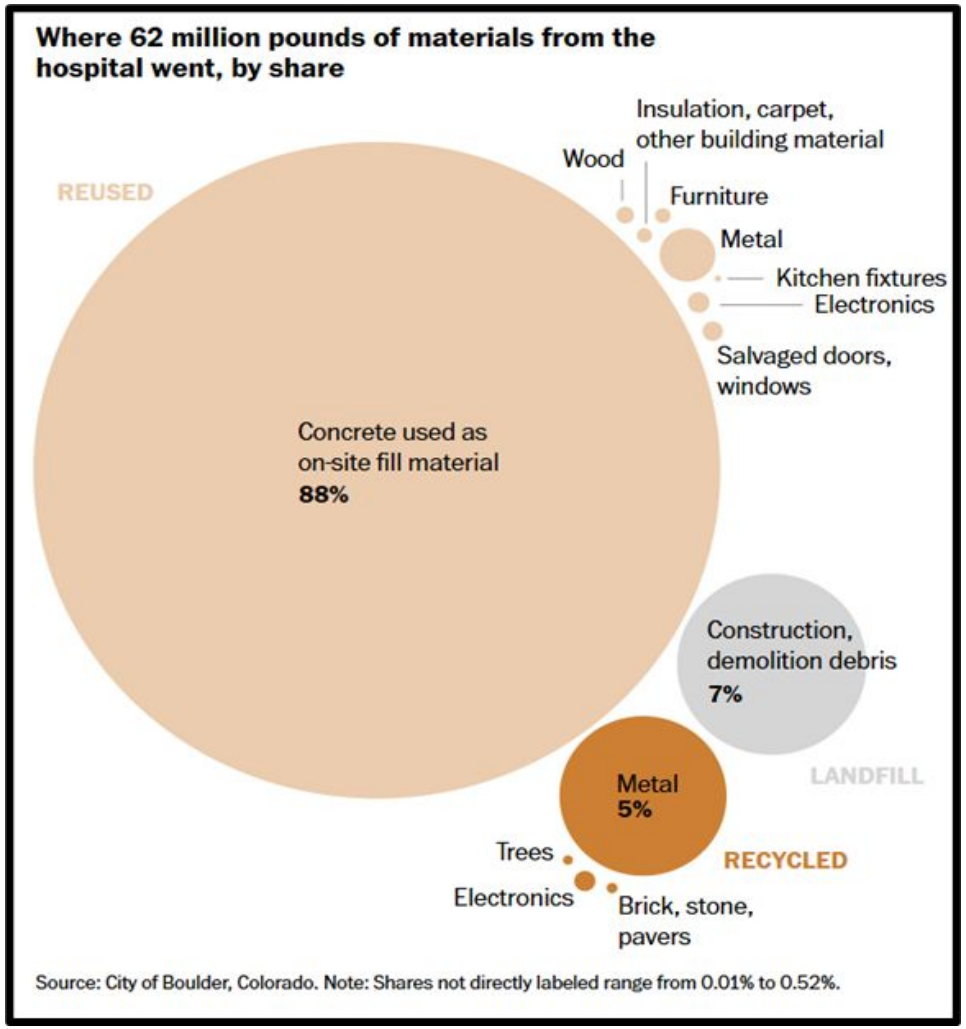
Achieved:

~93% diversion for entire building (including interiors)

~98% diversion for core and shell

Salvaged structural steel:

- 584 pieces, 161 tons of steel recovered
- < 30 (5%) pieces lost to damage
- 167,300 kgco_2eq saved = 39 cars on the road for 1 year
- 100% of the undamaged steel was reused



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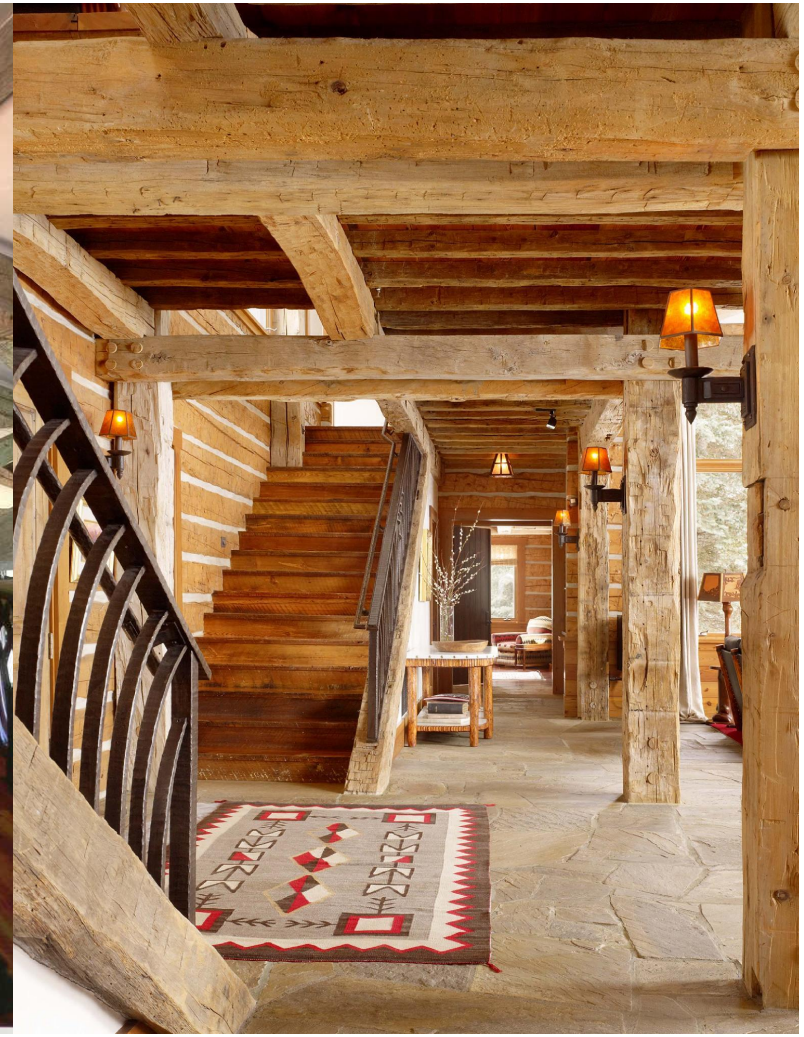
WOOD REUSE EXAMPLES

JACKSON, WY PRIVATE RESIDENCE- 1996



JACKSON, WY PRIVATE RESIDENCE- 1996

				Load Data			TEST DATA													Design Values				Properties			Required			Demand/Capacity				
Piece#	Beam Des	Species	Grade	L	W	L/req	w	d	Test L	Test A	Test P	Test Delta	Test Sup1	Test Sup2	Bev Slope	Sup Rot	Calc Delta	Calc E	Calc Fb	Calc Fv	Cd	E	fb	fv	Area	Iw	Sw	Arec	IREQ	Sreq	D/C A	D/C Iw	D/C S	Steel Reqd?	Steel?
				ft	PLF																factor	ksi	psi	psi	in2	in4	in3							
	C3	Pine				240	11.5	11.5	22.0	7.0	###	1.29	0.31	0.34		#####	1.06	1551	1259	43	1.00	1551	1145.94	65	132	1457.5	##	0	0	0	0.00	0.00	0.00	NO	
	C4	Pine				240	###	###	22.0	7.0	###	1.10	0.25	0.27		#####	0.91	1351	1021	38	1.00	1351	1050.00	65	150	1953.1	313	0	0	0	0.00	0.00	0.00	NO	
	C4 BOT CHOI	Pine				240	###	11.0	22.0	7.0	###	0.96	0.22	0.22		#####	0.83	1832	1111	36	1.00	###	1050.00	65	116	1164.6	212	0	0	0	0.00	0.00	0.00	NO	
	C4 TOP CHOI	Beech				240	8.0	###	22.0	7.0	###	1.01	0.20	0.32		0.1019	0.85	2006	1134	34	1.00	###	1650.00	90	80	666.67	133	0	0	0	0.00	0.00	0.00	NO	
	C5 TOP CHOI	Pine		16	711	240	###	11.0	14.8	3.0	###	0.52	0.25	0.25		#####	0.31	1466	678	52	1.00	###	1050.00	65	110	1109.2	##	131	894	260	1.19	0.81	1.29	YES	Str
	C5 BOT CHOI	Oak				240	CRACKED									#####	#####	#####	######	#####	1.00	###	######	80	###	######	##	0	#####	###	###	###	###	#####	#####
	C6	Pine				240	11.0	11.5	13.7	7.0	###	1.00	0.42	0.28		#####	0.69	612	1109	38	1.00	612	1008.87	65	127	1394.1	##	0	0	0	0.00	0.00	0.00	NO	
29	FB1-1	Beech	Decay	15	711	240	9.5	11.0	15.6	5.0	###	0.35	0.09	0.15		#####	0.27	2138	877	40	1.00	###	1650.00	90	105	1053.7	192	89	491	145	0.85	0.47	0.76	NO	
26	FB1-2	Oak	Decay	15	711	240	9.8	###	15.6	5.0	###	0.44	0.14	0.16		#####	0.35	1822	895	40	1.00	###	1350.00	80	105	1009.4	188	100	593	178	0.95	0.59	0.95	NO	
90	FB11-1	Beech		15	323	240	9.3	9.8	13.5	3.5	###	0.54	0.17	0.30		#####	0.37	1716	1032	60	1.00	1716	1650.00	90	90	714.45	147	40	286	66	0.45	0.40	0.45	NO	
88	FB11-2	Oak		15	323	240	###	9.8	13.5	3.5	###	0.61	0.19	0.27		#####	0.44	1365	981	57	1.00	###	1350.00	80	98	772.38	158	45	359	81	0.47	0.47	0.51	NO	
96	FB11-3	Pine	Prem	15	323	240	7.5	9.5	22.0	7.0	###	1.40	0.21	0.23		#####	1.28	1203	968	27	1.00	###	1050.00	65	71	535.86	113	56	408	104	0.78	0.76	0.92	NO	
100	FB11-4	Pine	Prem	15	323	240	7.5	9.5	22.0	7.0	###	1.50	0.22	0.22		#####	1.41	1512	1340	38	1.00	1512	1219.65	65	71	535.86	113	56	325	89	0.78	0.61	0.79	NO	
71	FB13-1	Beech	Prem	9	638	240	9.5	6.5	10.0	3.0	###	0.29	0.11	0.11		#####	0.27	2528	1399	63	1.00	###	1650.00	90	62	217.41	67	48	83	47	0.77	0.38	0.70	NO	
81	FB13-2	Beech		9	638	240	9.5	6.5	10.0	3.0	###	0.37	0.13	0.13		#####	0.33	2068	1399	63	1.00	###	1650.00	90	62	217.41	67	48	101	47	0.77	0.47	0.70	NO	
83	FB13-3	Beech		9	638	240	9.5	6.5	10.0	3.0	###	0.32	0.12	0.12		#####	0.29	2353	1399	63	1.00	###	1650.00	90	62	217.41	67	48	89	47	0.77	0.41	0.70	NO	
70	FB15-1	Beech		9	425	240	9.5	9.5	13.5	3.5	###	0.82	0.24	0.26		#####	0.63	1055	1058	60	1.00	###	962.88	90	90	678.76	143	32	132	54	0.35	0.19	0.38	NO	
	FB2-1	Oak		17	711	240	###	###	17.3	5.0	###	0.61	0.14	0.17		#####	0.53	1738	960	40	1.00	###	1350.00	80	105	875	175	113	904	228	1.08	1.03	1.30	YES	Both
21	FB2-2	Oak	Prem	17	711	240	9.3	11.0	17.3	5.0	###	1.17	0.28	0.28		#####	0.98	1088	1222	56	1.00	###	1112.24	80	102	1026	187	113	1445	277	1.11	1.41	1.49	YES	Both
17	FB3-1	Pine		10	711	240	9.0	11.0	11.0	3.0	###	0.73	0.20	0.20		#####	0.56	478	754	58	1.00	478	685.88	65	99	998.25	182	82	670	155	0.83	0.67	0.86	NO	
14	FB3-2	Pine		10	711	240	###	###	11.0	3.0	###	0.44	0.18	0.18		#####	0.30	1077	821	57	1.00	###	875.00	65	100	833.33	167	82	297	122	0.82	0.36	0.73	NO	
22	FB5-1	Pine	Wall 40	21	620	240	11.5	###	20.2	6.5	###	0.45	0.27	0.23		#####	0.22	1497	477	28	1.00	###	1050.00	65	207	5589	621	150	1726	391	0.73	0.31	0.63	NO	
23	FB5-2	Oak	Insect	21	620	240	###	###	20.2	6.5	###	0.52	0.16	0.16		#####	0.41	1731	806	37	1.00	1731	1350.00	80	152	2667.5	##	122	1493	304	0.80	0.56	0.83	NO	
10	RB1-1	Beech	Decay	#	683	240	9.5	###	21.0	7.0	###	1.50	0.25	0.25		#####	1.35	1139	1161	35	1.15	1139	1215.42	104	97	852.54	166	99	2158	337	1.02	2.53	2.03	YES	Both
40	RB1-2	Beech	Decay	#	683	240	9.5	11.5	21.0	7.0	###	1.64	0.38	0.33		0.1112	1.40	1284	1524	52	1.15	###	1595.27	104	109	1204	##	99	1915	257	0.91	1.59	1.23	YES	Both
67	RB10-1	Beech	Decay	12	630	240	###	###	9.0	3.0	###	0.25	0.14	0.14		#####	0.14	1464	821	57	1.15	###	1610.00	104	100	833.33	167	55	335	85	0.55	0.40	0.51	NO	
77	RB10-2	Beech	Prem	12	630	240	9.0	11.0	13.5	4.0	###	0.44	0.13	0.14		#####	0.36	1467	1005	58	1.15	###	1610.00	104	99	998.25	182	55	334	85	0.55	0.33	0.47	NO	
78	RB10-3	Pine	Prem	12	630	240	7.8	9.8	13.5	4.0	###	0.60	0.18	0.17		#####	0.51	1641	1407	71	1.15	1641	1472.73	75	76	598.6	123	76	298	92	1.00	0.50	0.75	NO	
92	RB10-4	Pine	Prem	12	630	240	8.8	###	9.0	3.0	###	0.42	0.23	0.23		#####	0.23	1020	938	65	1.15	###	1006.25	75	88	729.17	146	76	480	135	0.87	0.66	0.93	NO	
9	RB11-1	Beech		#	315	240	11.0	11.5	22.0	7.0	###	1.60	0.25	0.43		#####	1.36	1204	1247	43	1.15	###	1305.22	104	127	1394.1	##	50	1253	175	0.40	0.90	0.72	NO	
54	RB11-2	Pine		#	315	240	###	11.5	22.0	7.0	###	1.09	0.13	0.19		#####	1.01	1319	1016	35	1.15	1319	1207.50	75	121	1330.8	231	70	1144	189	0.58	0.86	0.82	NO	
3	RB12	Beech		#	420	240	###	###	22.0	7.0	###	1.23	0.21	0.33		#####	1.08	1904	1437	45	1.15	###	1897.50	104	110	1012.9	193	67	1057	161	0.61	1.04	0.83	YES	Stiff
	RB13	Oak		16	840	240	###	###	20.3	6.5	###	0.81	0.27	0.27		#####	0.59	1403	907	41	1.15	###	1552.50	92	140	2286.7	##	110	1104	208	0.78	0.48	0.64	NO	
24	RB2	Oak		#	578	240	###	###	22.0	7.0	###	1.69	0.36	0.36		#####	1.42	1042	1226	46	1.15	###	1282.72	92	125	1627.6	##	94	1397	270	0.75	1.23	1.04	YES	Both
43	RB3	Pine	Prem	17	683	240	9.8	###	19.0	6.0	###	0.69	0.23	0.23		#####	0.52	1495	324	43	1.15	###	1207.50	75	132	1393.1	##	116	1010	245	0.89	0.51	0.83	NO	
48	RB4-1	Oak	Prem	17	578	240	9.5	###	19.3	6.0	###	1.43	0.29	0.38		0.1192	1.21	1441	1567	57	1.15	1441	1640.23	92	100	916.45	175	80	887	153	0.80	0.97	0.88	NO	
50	RB4-2	Beech		17	578	240	###	###	18.7	6.0	###	0.49	0.18	0.25		#####	0.33	2310	876	38	1.15	###	1897.50	104	150	1953.1	313	71	553	132	0.47	0.28	0.42	NO	
53	RB5-1	Pine	Prem	14	683	240	11.0	###	13.7	4.0	###	0.27	0.09	0.10		#####	0.20	1215	546	38	1.15	1215	1207.50	75	149	2255.3	##	96	694	166	0.65	0.31	0.50	NO	
53	RB5-2	Pine	Prem	14	683	240	###	###	16.0	4.5	###	0.41	0.19	0.17		#####	0.27	1470	643	40	1.15	###	1207.50	75	142	2152.8	319	96	574	166	0.68	0.27	0.52	NO	
55	RB6-1	Pine	?	14	578	240	###	11.5	14.0	4.0	###	0.62	0.25	0.15		#####	0.46	977	828	50	1.15	977	866.00	75	115	1267.4	##	81	730	196	0.71	0.58	0.89	NO	
55	RB6-2	Pine	?	14	578	240	###	11.3	14.0	4.0	###	0.67	0.28	0.28		#####	0.43	1122	865	51	1.15	1122	1006.25	75	113	1186.5	211	81	636	169	0.72	0.54	0.80	NO	
50	RB6-3	Beech	Prem	14	578	240	9.5	11.0	15.0	4.0	###	0.64	0.22	0.22		#####	0.48	1331	952	55	1.15	1331	1035.00	104	105	1053.7	192	59	536	164	0.56	0.51	0.86	NO	
47	RB6-4	Oak	Prem	14	578	240	###	###	15.5	4.5	###	0.40	0.19	0.19		#####	0.25	1830	713	40	1.15	###	1552.50	92	144	1728	##	66	390	109	0.46	0.23	0.38	NO	
119	RB7-1	Pine	?	16	315	240	9.5	###	19.0	6.0	###	1.40	0.26	0.28		#####	1.22	1020	1155	42	1.15	###	1208.59	75	100	916.45	175	51	569	100	0.51	0.62	0.57	NO	
2	RB7-10	Beech		16	315	240	9.0	9.0	12.5	4.0	###	0.71	0.29	0.29		#####	0.50	1534	1422	67	1.15	###	1610.00	104	81	546.75	122	37	378	75	0.45	0.69	0.62	NO	
2	RB7-11	Beech		16	315	240	9.5	9.5	18.8	5.8	###	1.12	0.33	0.33		0.1123	0.90	1780	1371	47	1.15	###	1897.50	104	90	678.76	143	37	326	64	0.40	0.48	0.45	NO	
109	RB7-12	Oak	Insect	16	315	240	7.0	###	18.3	6.0	###	1.24	0.27	0.27		#####	1.07	1369	1419	49	1.15	###	1552.50	92	70	583.33	117	41	424	78	0.59	0.73	0.67	NO	
4	RB7-13	Beech		16	315	240	9.5	9.0	12.8	4.0	###	0.63	0.24	0.24		#####	0.47	1723	1422	67	1.15	###	1897.50	104	86	577.13	128	37	337	64	0.43	0.58	0.50	NO	
4	RB7-14	Beech		16	315	240	9.5	11.0	13.8	6.5	###	1.40	0.30	0.31		#####	1.18	1067	1140	40	1.15	###	1192.98	104	105	1053.7	192	37	544	101	0.35	0.52	0.53	NO	
	RB7-15	Beech		16	315	240	9.5	###	12.5	4.0	###	0.93	0.22	0.22		#####	0.77	728	1152	60	1.15	728	1205.57	104	95	731.67	158	37	797	100	0.38	1.01	0.83	YES	Stiff
6	RB7-16	Beech		16	315	240	9.3	9.3	19.5	6.0	###	1.00	0.21	0.21		#####	0.85	1077	710	23	1.15	###	1035.00	104	86	610.08	132	37	539	117	0.43	0.88	0.89	NO	
118	RB7-17	Pine	Prem	16	315	240	9.0	###	21.8	7.0	###	1.24	0.23	0.20		0.1145	1.14	1674	1288	38	1.15	###	1347.89	75	90	750	150	51	347	90	0.56	0.46	0.60	NO	
118	RB7-18	Pine	Prem	16	315	240	9.0	###	21.8	7.0	###	1.24	0.23	0.20		0.1145	1.14	1674	1288	38	1.15	###	1347.89	75	90	750	150	51	347	90	0.56	0.46	0.60	NO	
118	RB7-19	Pine	Prem	16	315	240	9.0	###	21.8	7.0	###	1.24	0.23	0.20		0.1145	1.14	1674	1288	38	1.15	###	1347.89	75	90	750	150	51	347	90	0.56	0.46	0.60	NO	
84	RB7-2	Oak		16	315	240	9.5	9.5	10.0	3.5	###	0.5	0.2	0.2		#####	0.36	996	1117	63	1.15	996	1168.83	92	90	678.76	143	41	583	103	0.46	0.86	0.72	NO	
118	RB7-20	Pine	Prem	16	315	240	9.0	###	21.8	7.0	###	1.24	0.23	0.20		0.1145	1.14	1674	1288	38	1.15	###	1347.89	75	90	750	150	51	347	90	0.56	0.46	0.60	NO	
65	RB7-21	Beech		16	315	240	9.5	###	18.0	5.7	###	1.17	0.33	0.33		#####	0.93	1311	1203	44	1.15	1311	1259.18	104	95	731.67	158	37	443	96	0.38	0.56	0.61	NO	
	RB7-22	Pine		16	315	240	7.5	9.5	11.0	3.0	###	0.32	0.24	0.24		#####	0.14	3555	1213	80	1.15	###	1269.02	75	71	535.86	113	51	163	95	0.71	0.30	0.84	NO	
	RB7-23	Pine		16	315	240	8.0	9.0	11.5	3.0	###	0.41	0.17	0.17		#####	0.31	1957	1267	79	1.15	###	1325.57	75	72	486	108	51	297	91	0.70	0.61	0.84	NO	
119	RB7-3	Pine	?	16	315	240	9.3	###	19.0	6.0	###	1.36	0.32	0.31		#####	1.13	1123	1186	43	1.15	1123	1241.25	75	97	892.34	170	51	517	97	0.52	0.58	0.57	NO	
113	RB7-4	Beech	Prem	16	315	240	6.8	9.0	21.0	7.0	###	0.76	0.31	0.31		#####	0.57	3395	1291	35	1.15	###	1897.50	104	61	410.06	91	37	171	64	0.60	0.42	0.70	NO	
56	RB7-5	Beech		10	315	240	9.0	9.0	10.0	3.0	###	0.45	0.01	0.01		#####	0.50	797	1126	70	1.15	797	1178.28	104	81	546.75	122	23	178	40	0.28	0.33	0.33	NO	
107	RB7-6	Beech	Decay	16	315	240	9.0	9.0	19.7	7.0	###	1.43	0.25	0.28		0.1166	1.28	1384	1383	37	1.15	###	1447.01	104	81	546.75	122	37	420	84	0.45	0.77	0.69	NO	
5	RB7-7	Beech		16	315	240	9.0	###	21.8	7.0	###	1.06	0.22	0.20		0.1145	0.97	1973	1288	38	1.15	###	1897.50	104	90	750	150	37	294	64	0.41	0.39	0.42	NO	

BRASADA RANCH RESORT - 2006

Project Name: Brasada Ranch Resort, Powel Butte, Oregon

Project information: 1800 acre new community near Bend
Approximately 1,000 units upon completion
CCY designed center piece, 'Ranch Headquaters'

Building Size: 70,000 s.f. of non-residential space in 5 community buildings w/ 4 LEED Gold anticipated

Community Discovery Barn – 8,000 sf
Ranch House Bed & Breakfast – 17,000 sf
Post Office & General Store – 1,700 sf
Recreation Center – 13,000 sf
Golf Course Clubhouse – 29,000 sf

Primary Materials: Reclaimed wood siding, lava stone, board form concrete, reclaimed heavy timbers, steel, glass

Scope of Work All 5 buildings are designed to USGBC LEED standards. One recieved LEED Gold certification; 3 others are pending Gold certification. This is the first LEED certified resort in Oregon and only the fourth in the nation.

data

Reclaimed Lumber Inventory

Brasada Keeton-King

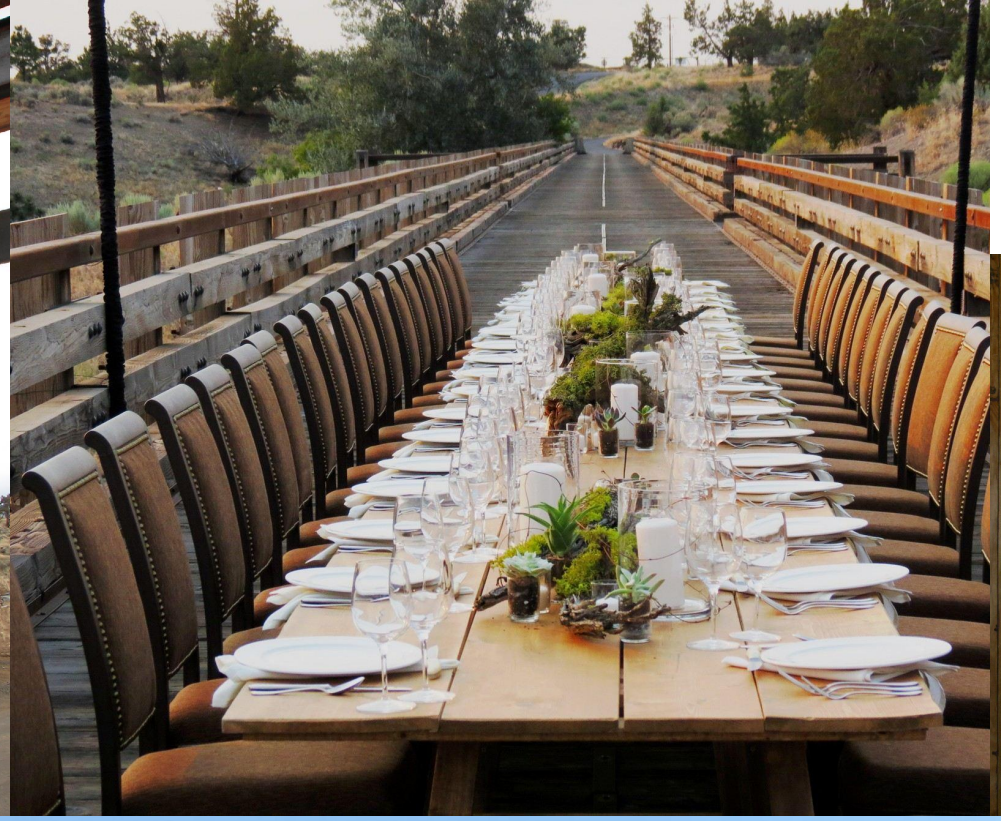
Northwest Containers, Inc.
John Hudson
PO Box 427
Toledo, WA 98591
(206) 938-4361 Cell (206) 228-8787

8"

Size	T/L	*Used*	Bal	Size	T/L	*Used*	Bal	Size	T/L	*Used*	Bal
8x8	1/6'			8x10	1/5'			8x11	2/9'		
8x8	3/7'			8x10	1/6'			8x11	2/10'		
8x8	20/8'			8x10	1/7'			8x11	2/12'		
8x8	20/9'			8x10	2/9'			8x11	1/16'		
8x8	7/10'			8x10	4/12'			8x11	9/18'		
8x8	7/11'			8x10	2/14'	*2/14'*	**2/14'**	8x11	2/19'		
8x8	22/12'	*11/12'*	**11/12'**	8x10	6/15'			8x11	3/20'		
8x8	5/13'	*2/13'*	**3/13'**	8x10	9/16'			8x11	1/21'		
8x8	33/14'	*21/14'*	**12/14'**	8x10	2/17'			8x11	2/24'		
8x8	13/15'	*9/15'*	**4/15'**	8x10	10/16'						
8x8	24/16'	*5/16'*	**19/16'**	8x10	1/20'			~~8x15~~	~~1/13'~~	~~1/13'~~	~~0/13'~~
8x8	7/17'	*1/17'*	**6/17'**					~~8x15~~	~~1/16'~~	~~1/16'~~	~~0/16~~
8x8	12/18'	*7/18'*	**5/18'**	8x12	5/6'			8x15	2/21'	*1/21'*	**1/21'**
8x8	23/19'	*5/19'*	**18/19'**	8x12	27/7'			8x15	2/25'		
8x8	10/20'			8x12	5/9'						
8x8	7/22'			8x12	4/10'			8x16	2/19'		
8x8	3/23'	*1/23'*	**2/23'**	8x12	4/11'	*1/11'*	**3/11'**	8x16	1/20'		
8x8	11/27'			8x12	8/12'	*3/12'*	**5/12'**	~~8x16~~	~~1/21'~~	~~1/21'~~	~~0/21'~~
8x8	28/28'			8x12	2/13'			~~8x16~~	~~1/23'~~	~~1/23'~~	~~0/23'~~
~~8x8~~	~~5/24'~~	~~0/24'~~	~~0/24'~~	8x12	2/14'			8x16	8/24'		
				~~8x12~~	~~0/16'~~	~~0/16'~~	~~0/16'~~	8x16	1/25'		
				~~8x12~~	~~0/18'~~	~~0/18'~~	~~0/18'~~	8x16	1/26'		
				~~8x12~~	~~3/20'~~	~~3/20'~~	~~0/20'~~				
				~~8x12~~	~~1/22'~~	~~1/22'~~	~~0/22'~~				
				~~8x12~~	~~1/24'~~	~~1/24'~~	~~0/24'~~				
				~~8x12~~	~~1/28'~~	~~1/28'~~	~~0/28'~~				

7", 9", 11", 13"

Size	T/L	*Used*	Bal	Size	T/L	*Used*	Bal	Size	T/L	*Used*	Bal
7x7	1/15'			9x9	1/6'			11x11	1/8'		
				9x9	1/7'						
7x16	1/14'			9x9	1/8'			11x13	3/11'		
				9x9	3/9'			11x13	2/8'		
7x9	1/10'			9x9	4/11'						
7x9	2/13'			9x9	4/12'			13x13	2/14'		
7x9	3/17'			9x9	1/14'			13x13	1/16'		
7x9	1/19'			9x9	2/15'			13x13	1/17'		
				9x9	1/16'			13x13	1/19'		
7x8	2/10'			9x9	1/17'			13x13	1/21'		
7x8	2/12'			9x9	5/18'			13x13	1/23'		
7x8	1/14'			9x9	2/19'			13x13	3/25'		
				9x9	2/20'						
9x10	2/6'										
9x10	1/11'			9x12	1/5'						
9x10	2/12'			9x12	1/10'						
9x10	1/13'										
9x10	2/14'										
9x10	1/15'										
9x10	5/16'										

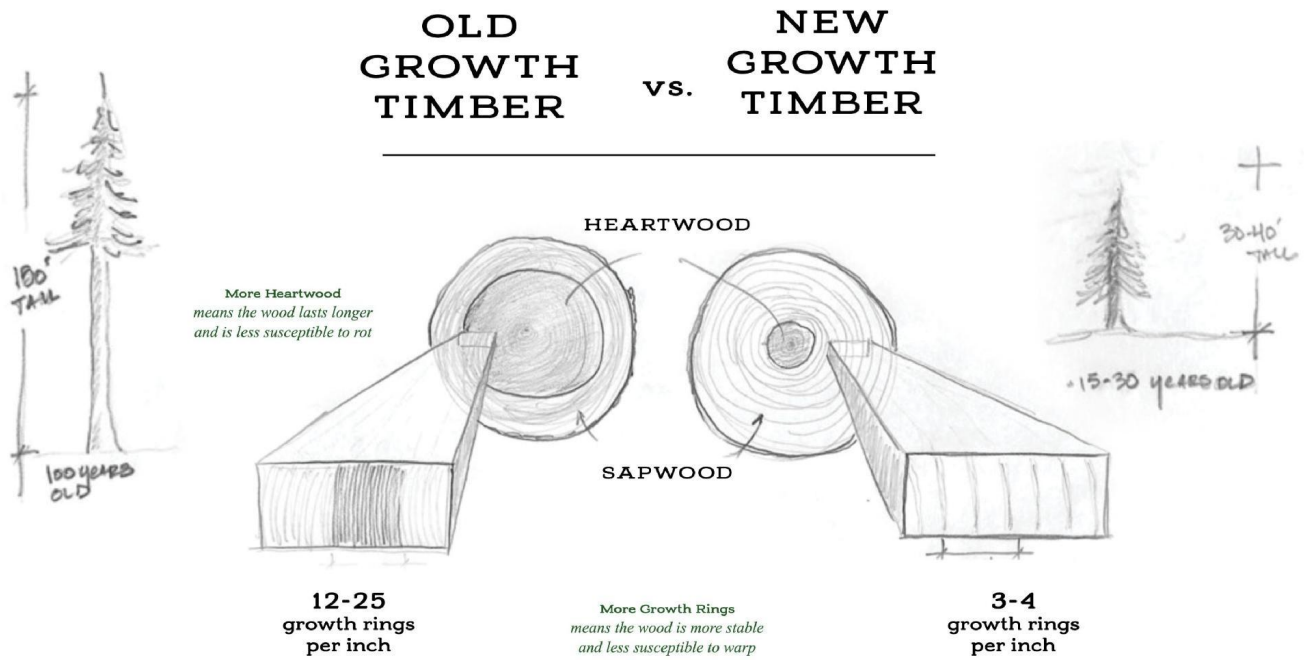



2007
BRASADA RANCH

JACKSON, WY PRIVATE RESIDENCES- 2004 & 2007

DENVER CENTRAL MARKET- 2016

DIMENSION LUMBER



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WHAT'S NEXT

2027 CODES

2027 International Building Code language change (same for International Residential Code)

IBC Chapter 23 "Wood"

2303.1.1.3 Salvage lumber in structural applications.

Salvage lumber shall be permitted to use not greater than 90% of the design values assigned to the species and grade of sawn lumber in the AWC NDS provided an *approved* entity, including but not limited to a grading or inspection agency or a *registered design professional*, inspects the *salvage lumber* to confirm all of the following conditions are met:

1. The *salvage lumber* is identified by a *grade mark* conforming with 2303.1.1; or is accompanied by a certificate of inspection issued by a lumber grading or inspection agency conforming with 2303.1.1.1 detailing the species and grade; or is accompanied by a technical opinion and report prepared by a qualified professional with experience in evaluating and interpreting visual grading

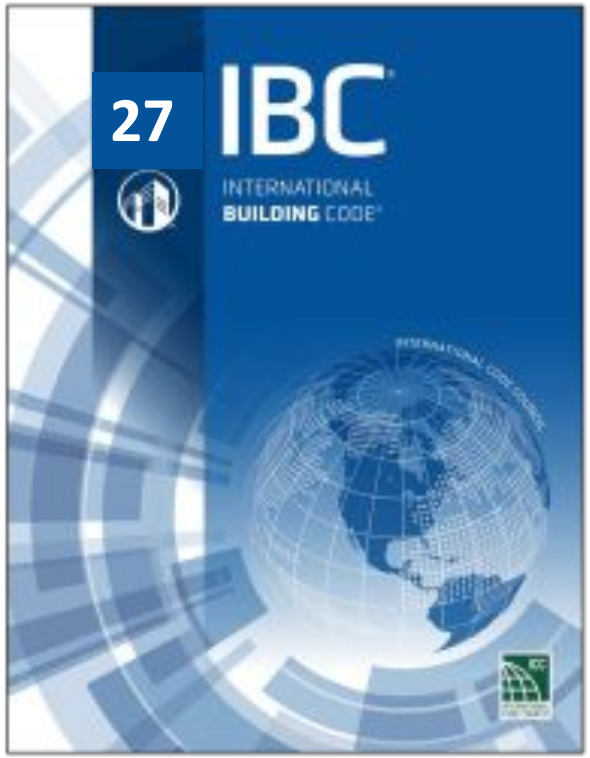
2. The *salvage lumber* is free of net section reductions.

3. The *salvage lumber* is free of areas of decay, fire damage, or insect damage.

4. The *salvage lumber* shows no signs of failure nor strength reducing characteristics as a result of structural loading, deconstruction, or other causes.

5. The *salvage lumber* has not been subjected to temperatures continuously above 100°F (38°C), both day and night, for a period exceeding six months.

6. The word "Salvage" and the name of the *approved* entity confirming compliance with Items 1 through 5 shall be legibly applied in indelible ink.



PROCESS

Assess existing building stock
-> Are there salvageable materials?

Assess deconstruction/salvage feasibility
-> Who, what, when, and how?

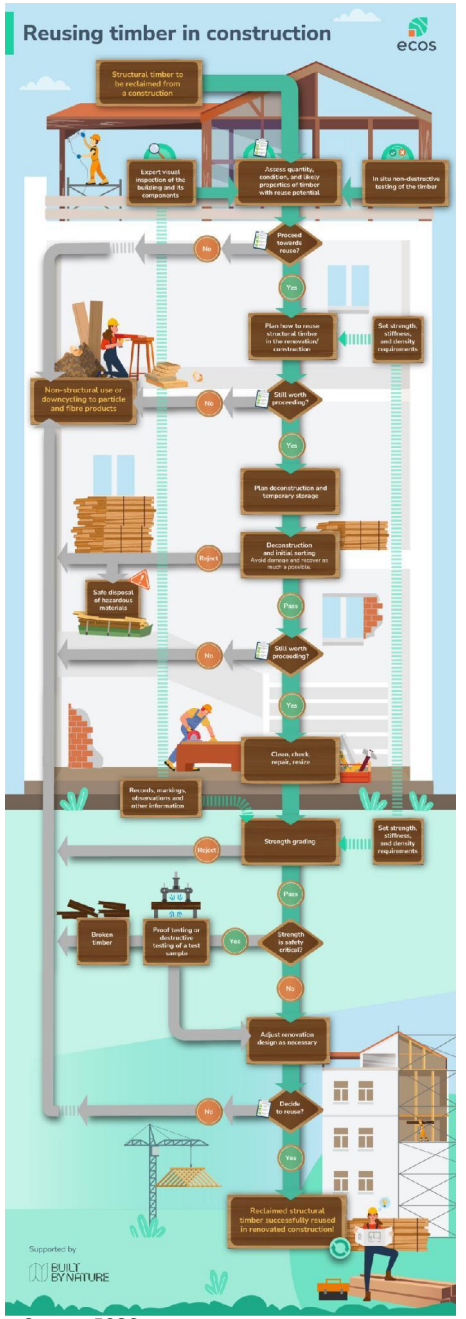
Identify end uses
-> Emphasis on incorporation in early design. Avoid constantly stockpiling.

Plan deconstruction and storage
-> Stockpiling and inventorying

Clean, repair, resize timber products
->remove fasteners, planing, resawing

Assess salvaged material quality
-> Lumber grading

In-situ lumber grading



Source: ECOS

LESSONS LEARNED

1. Reuse works, but changing mindsets is the challenge.
2. A motivated owner is key.
3. Feasibility requires connecting to an end-use or market.
   - Prior to deconstruction
   - Marketing strategy
   - Balance on-site efforts vs re-fabrication
   - Storage
4. Structural elements for reuse is unique
5. Success depends on the onsite deconstruction team.
6. Documentation, sizes, and testing results should be available to new construction projects prior to design.

KL&A'S DECONSTRUCTION AND REUSE SERVICES

1. Building Audit / Feasibility Assessment
2. Qualified Lumber Grading
3. Structural Deconstruction Specification and Management
4. Material Testing Protocol
5. Inventory Creation – digital list and cut sheets
6. Inventory Management – connecting end use
7. End-use Design Guidance

KL&A Engineers & Builders

Project: City of Boulder Community Hospital
Proj #: 20058
Engineer: AJF
Date: 4/11/2025

Reclaimed Source Steel Inventory: Wide Flange Columns - Source A

Shape	Mark	ASTM Material	Length (ft)	"Usable Length (ft)	Measured Length (ft)	Intermediate Connections	Building	Base Level	Grid Location	Estimated Weight (lb)	Measured Weight (lb)	Claimed	Material Testing	Site Location
							OB/GYN							
W10x49	A-257	A36		05.9			Remodel	LEVEL 2	6/B					
				05.96			OB/GYN							
W10x49	A-253	A36	11.52	~~09.5~~			Remodel	LEVEL 2	6/B	564.48	330.00		A370/A751	24 PP
							Laborator							
W10x49	A-218	A36	08.93	06.93			y Addition	BASEMENT	7/D	437.57	610.00		-	11 A
							Laborator							
W10x49	A-207	A36	08.94	06.94			y Addition	BASEMENT	1.5/F	438.06	410.00		-	11 E
							OB/GYN							
W10x49	A-237	A36	09.19	07.19			Remodel	LEVEL 2	1/E.8	450.31	430.00		-	11 E
							OB/GYN							
W10x49	A-239	A36	09.19	07.19			Remodel	LEVEL 2	2/C	450.31	430.00		-	7 A
							OB/GYN							
W10x49	A-256	A36	09.32	07.32			Remodel	LEVEL 2	7/D	456.68	440.00		-	11 B
							OB/GYN							
W10x49	A-238	A36	09.34	07.34			Remodel	LEVEL 2	1.5/F	457.66	450.00		-	11 D
				08.08			OB/GYN							
W10x49	A-254	A36	10.34	~~08.3~~			Remodel	LEVEL 2	7/A.3	506.66	420.00		-	11 F
							Laborator							
W10x49	A-230	A36	10.27	08.27			y Addition	LEVEL 1	7/D	503.23	710.00		-	11 A
							Laborator							
W10x49	A-222	A36	10.29	08.29			y Addition	LEVEL 1	1.5/F	504.21	500.00		-	11 E
				08.75			OB/GYN							
W10x49	A-252	A36	11.52	~~09.5~~			Remodel	LEVEL 2	6/A	564.48	420.00		-	11 B
~~W12x65~~ W10x49	A-243	A36	09.32	07.32			OB/GYN Remodel	LEVEL 2	3/D	605.80	450.00		-	11 H
~~W12x65~~ W10x49	A-248	A36	09.32	07.32			OB/GYN Remodel	LEVEL 2	4/D	605.80	480.00		-	11 C
~~W12x65~~ W10x49	A-251	A36	09.34	07.34			OB/GYN Remodel	LEVEL 2	2/F	607.10	430.00		-	11 B
~~W10x49~~ W10x54	A-255	A36	09.33	07.33			OB/GYN Remodel	LEVEL 2	7/B	457.17	430.00		-	11 F
~~W10x49~~ W10x54	A-231	A36	10.34	08.34			OB/GYN Remodel	LEVEL 2	1.6/C	506.66	350.00		-	11 G
~~W10x68~~ W10x54	A-236	A36	10.34	08.34			OB/GYN Remodel	LEVEL 2	1/E	703.12	420.00		No Test Backup	7 A
							OB/GYN							
W12x26	A-261	A36		10.2		W CONNX	Remodel	LEVEL 3	5-7.2/B		270.00			24 PP
							OB/GYN							
W12x65	A-244	A36	09.34	07.34	8.9		Remodel	LEVEL 2	3/E	607.10	580.00		-	15 A/B

KL&A
Engineers & Builders

Thank you!

Reach out to Team Carbon with any questions at teamcarbon@klaa.com

From Policy to Pour:

What It Takes to Build Reuse Infrastructure

Panelists:

Submit questions here:

Hayden van Andel
SustainableBreck

Rachel Irons
Nude Foods Market

Susan Fecko
Black Dog Studio

Meredith "MK" Katz
Retrocycle
Moderator

retrocycle

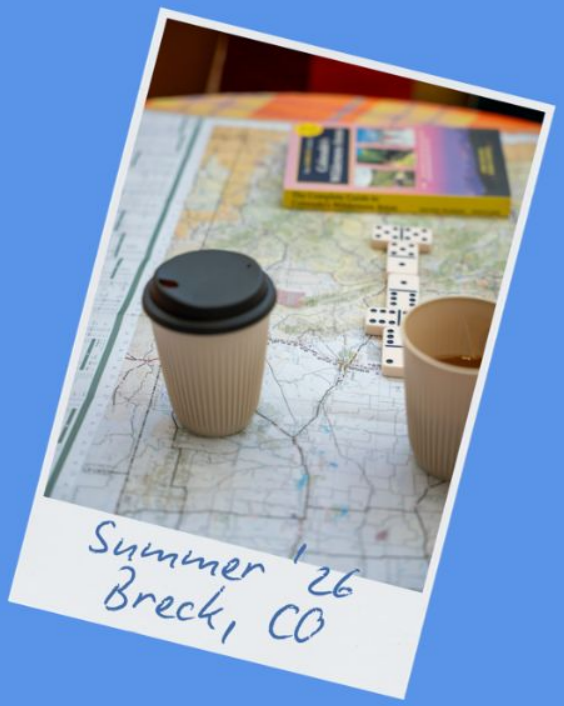
Keep the Conversation Going!

Meredith "MK" Katz
meredith@retrocycle.org

Hayden van Andel
haydenv@townofbreckenridge.com

Rachel Irons
rachel@nudefoodsmarket.com

Susan Fecko
sfecko@blackdogstudiopr.com



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RECYCLE COLORADO

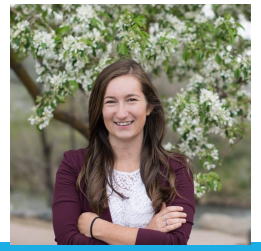
Preventing Waste with Food Service Providers: It's Good Business

Brian Loma
GreenLatinos CO
Moderator

Becky Goyton
CASR - Denver
Panelist

Amber Barbella
Diversion Designers
Panelist

Marissa Major
CET
Panelist



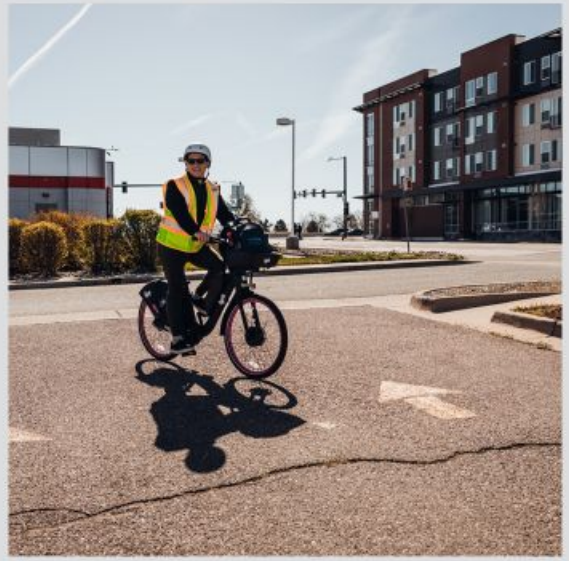
Zero Waste Support for Food Service Providers

Who We Are

Denver's Office of Climate Action, Sustainability and Resiliency, established 2020, is answering the community's call for climate action with urgency and a focus on equity.

The climate crisis is solvable. Together, we are the ones to solve it.

Denver is eliminating pollution and waste while investing in clean energy and resiliency to protect all our communities for future generations.



Our Program Partner

Diversion Designers is a female-owned Waste Consulting Agency, established to tackle the global waste issue. We specialize in resource stewardship and waste consulting to identify problems within waste systems, create innovative solutions, and save businesses money in the process.

DIVERSION DESIGNERS
Waste Consulting

Reuse Denver Incentives

Switch from Disposable to Reusable Service Ware

Reuse Denver Incentive Goals

- Transition food service providers to reusable service ware for dine-in customers.
- Help small businesses save money and create a better dining experience for customers.
- Offer technical assistance and up to $1000 worth of reusable service ware that meets each participant's operational needs and aesthetic.
- Encourage any business with washing capabilities and disposables for dine-in service in Denver to apply.
- Collect data on cost savings and reduction in disposables.

2024 Reuse Denver Results

- 27 participants collectively:
  - Prevented 957,322 disposable food service ware items from being purchased and entering the waste stream annually.
  - Saved $97,304 from avoided purchases of disposables.
- Reduced an average of 36,456 disposables items and saved $3600 annually per participant.

Case Study: Hamburger Mary's Denver

- 150-250 Daily Customers
- Initial investment = $552.81
- Replaced disposable plates and ramekins with ceramic plates and metal and glass ramekins.
- Reduction of 160,400 units of disposable items annually.
- Reduce trash volume by 40%.

Impacts: Hamburger Mary's Denver

Annual Cost Savings from Disposables Reduction*	Annual Costs for Reusables**	Payback Period***	Annual Net Cost Savings After Payback Period****
$7,402.32	$110.56	.9 months	$7,291.76

* Savings from no longer purchasing disposal service ware items that have been replaced with reusables. In some cases, savings also included reduced waste hauling costs.

** A 20% loss/replacement rate was automatically included to calculate annual costs for reusables. In some cases, cost also include increased labor for ware washing.

*** The time it takes to recoup the initial investment through the cost savings of disposables reduction.

**** Represent the annual next savings achieved after the payback period.

Case Study: Los Molinos Auraria

- Fast Casual
- More than 350 Daily Customers
- Triple Compartment Sink
- Initial Investment = $595.52
- Replaced paper plates and foam bowls with stoneware
- Reduction of 27,006 units of disposable items annually

Impacts: Los Molinos Auraria

Annual Cost Savings from Disposables Reduction*	Annual Costs for Reusables**	Payback Period***	Annual Net Cost Savings After Payback Period****
$4,726.55	$3,411.30	1.51 months	$1,315.25

* Savings from no longer purchasing disposal service ware items that have been replaced with reusables. In some cases, savings also included reduced waste hauling costs.

** A 20% loss/replacement rate was automatically included to calculate annual costs for reusables. In some cases, cost also include increased labor for ware washing.

*** The time it takes to recoup the initial investment through the cost savings of disposables reduction.

**** Represent the annual next savings achieved after the payback period.

Compost Incentives

Add Composting to Back-of-House Operations

Compost Incentive Goals

- Help food service providers begin composting food scraps from back-of-house operations.
- Offer technical assistance and up to $3,600 worth of compost collection service for up to one year.
- Collect data on waste diversion and evaluate reusable service ware impact on composting efforts.
- Encourage businesses to apply that offer dine-in service and meet one of the following criteria:
  - Participated in Reuse Denver 2024
  - Applying for Reuse Denver 2026 Incentive
  - Participated in the Denver Restaurant Challenge (2025 or 2026)

DENVER
CLIMATE ACTION, SUSTAINABILITY & RESILIENCY

Learn More & Apply Today

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Denver Food Matters Restaurant Challenge

Recycle Colorado Summit 6.2.26

1 in 6 Denverites experience hunger

Denver restaurants generate **25%** of the city's food waste [1]

The Denver Restaurant Challenge aims to **make restaurants part of the solution** through:

- ✓ Food waste education
- ✓ Friendly competition
- ✓ Expert technical guidance
- ✓ Behavior change support

[1] https://www.nrdc.org/sites/default/files/food-waste-city-level-report.pdf

The Restaurant Challenge

- 12 week challenge
- 15 participants over 2 cohorts
- Support from experts in food waste reduction
- Points-based competition; points for progress
- Focus on **food waste prevention & reduction**, as well as diversion
- Clear and manageable steps to progress

FOOD MATTERS
SOLUTIONS FOR FOOD WASTE PREVENTION
DENVER PUBLIC HEALTH & ENVIRONMENT

with

Diversion Designers
Participant Support

CET
Technical Assistance

Drexel Food Labs
Food Upcycling

We Don't Waste
Food Donation Partner

FOOD MATTERS
SOLUTIONS FOR FOOD WASTE PREVENTION

RESTAURANT CHALLENGE '25

PARTICIPANT

Restaurant Olivia

Total 33.6 tons of lifetime carbon savings

- Modified their pasta recipes to use whole eggs rather than egg whites
- Created a new bread formula to easily match prep to demand
- Combined savings of $16,000+ per year

FOOD MATTERS
SOLUTIONS FOR FOOD WASTE PREVENTION

RESTAURANT CHALLENGE '25

PARTICIPANT

Blue Sparrow Coffee

Total 3.6 tons of lifetime carbon savings

- Created a double-steeped chai recipe to maximize yield from the spices
- Saved 70 pounds of sugar annually
- Savings of $2,500 per year

FOOD MATTERS
SOLUTIONS FOR FOOD WASTE PREVENTION

RESTAURANT CHALLENGE '25

PARTICIPANT

Pit Fiend BBQ

Total 17.7 tons of lifetime carbon savings

- Created a new lentil dish out of upcycled lamb scraps and quit coring cucumbers
- Re-established a donation partnership with a local non-profit
- Combined savings of $2,500+ per year plus revenue from new menu item

FOOD MATTERS
SOLUTIONS FOR FOOD WASTE PREVENTION

RESTAURANT CHALLENGE '25

PARTICIPANT

Chook Chicken

Total 18.9 tons of lifetime carbon savings

- Began using broccoli and cauliflower stalks in soup
- Created a new agua fresca from upcycled cucumber ends
- $3,300 in added profit from new menu item

Thank you!

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RECYCLE COLORADO

Designing Circular Operations That Support People and Scale Impact

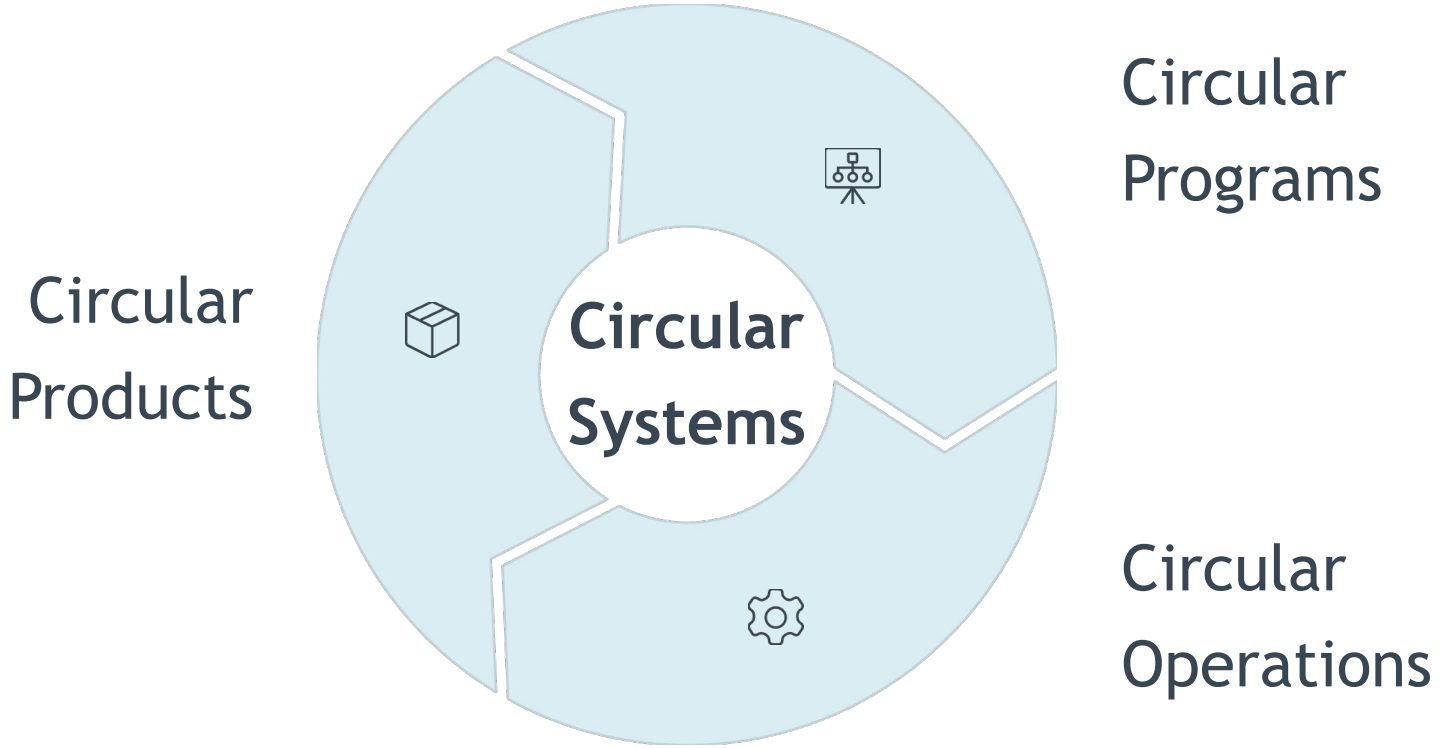
Kimberley Duarte, Circular Supply Chain Network

What is a Circular Supply Chain?

Circular Supply Chains reduce and maximize resource use by using secondary and renewable inputs to generate value through **interconnected systems**.

CIRCULAR SUPPLY CHAIN NETWORK
BEND THE FLOW

Interconnected Systems decide outcomes



What we'll do together

Reflection

Name the complexity

Patterns already at scale

Take something meaningful with you

What did this day mean for you?

You imagined a future Colorado.. What did it look like?

What does it take for reuse to be resilient?

Reuse is uniquely complex

While every circular loop needs collection, logistics, and partners…

Complexity in reuse is in the lack of transformation

- The consumer never “lets go,” the relationship never ends
- Must come back intact, on time, in condition, every turn
- No industrial process to absorb variability

Industries at Scale

Uniform and Workwear

Borrow this:

Volume-justified routes, single-swap back-of-house, corporate campus anchors

Returnable Packaging

Borrow this:

Standardization creates certainty, certainty enables coordination at scale

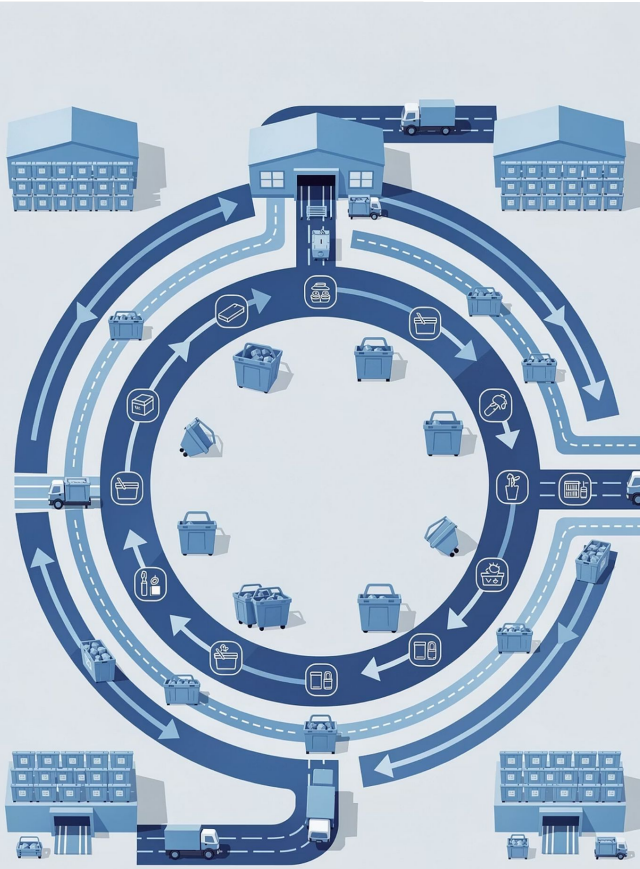
Institutional Food Services

Borrow this:

Anchor institution design, stable volume, and success metrics for circulation

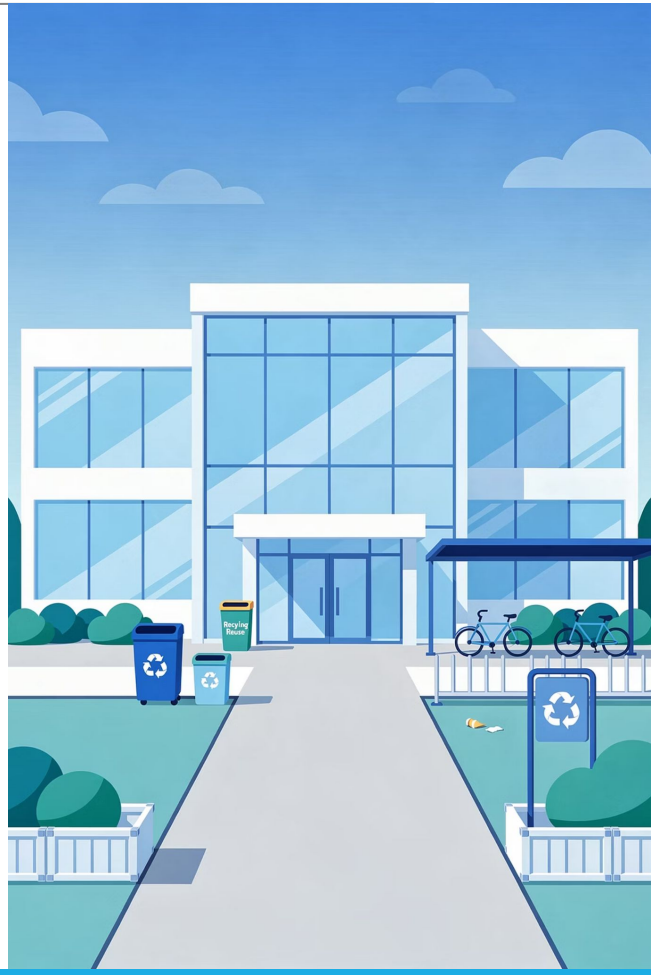
Design for Volume first

- ★ **Adoption follows infrastructure**
  - Focus on volume > behavior change
  - Low volume breaks trust for partners
- ★ Logistics has to be designed to volume that’s worthwhile
- ★ What does **the system** need to meet **the change**?



Find your Anchors

- ★ **Reuse need partners who hold the relationship reliably**
- ★ Anchor institutions: K–12 schools, corporate campuses, universities, sporting venues
- ★ Returns require habit



Back-of-House commitment

- **Go all in**
  - Decision fatigue is a real operational cost
- Design doubt out of the system entirely
- People enablement - what does the floor see?
- **Simplicity is a design principle**

What's Possible?

You came in today with something you're building

You leave with stories of designs with intention

What would your program look like with circular operations that are resilient and scalable?

Stay connected

Website: https://www.circularsupplychain.network
Contact: kimberley@circularsc.net

The conversation doesn't end here.
Thank you for being in this room today. What you're building matters.

RECYCLE COLORADO