

CARE California Carpet Stewardship Program

CAPACITY SURVEY REPORT

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Executive Summary

This Capacity Survey Report is a direct result of CARE's 2018-2022 Plan Performance Goal to complete a capacity study/survey, initiate implementation of recommended program adjustments and set future goals based upon survey/study results. The objective of an in-depth capacity survey is to evaluate existing available capacity and need for future or expanded capacity to ensure achievement of California's recycling rate goals.

CARE began collecting capacity data via a formalized survey in 2016. In 2016 total maximum available U.S. capacity, as self-reported by Processors, was 326 million pounds per year. At the time this reflected approximately 95% of total California estimated 2016 discards of 343 million pounds. When adjusted for the closure of one facility in 2016, the revised available capacity was 242 million pounds, or 71% of the 2016 discards. For California-based Processors, the maximum capacity for the three processors was 156 million pounds, or 45% of 2016 discards.

As of year-end 2020, total maximum available U.S. capacity as self-reported by Processors over time, was estimated at 490 million pounds. With total projected California discards for 2020 currently calculated at 304 million pounds, the total available U.S. capacity reflects 161% availability. For West Coast Processors, located in Arizona and California, the maximum capacity for the four operationally active Processors was 132 million pounds, or 43% of total 2020 discards. Specific to California, the maximum capacity for the two active California Processors was 99 million pounds, or 33% of 2020 discards.

Based upon CARE's experience and Program learnings, including review of learnings from carpet Processor's past experiences, solidification of reliable end market outlets and supply of tear-out carpet feedstock materials are the primary stabilizing factors. As a direct result of the consistent and ongoing Product and Market Development work carried out by CARE, in parallel with Manufacturer subsidies on various recovered postconsumer carpet (PCC) materials, demand for PCC by Manufacturers has steadily been on the rise. This growing Manufacturer demand driven by both CARE, via subsidies, and Processors, via business development pursuits, directly supports the need for ongoing strategic PCC capacity expansion, especially with California Processors.

Overall, capacity expansion, especially within California and on the West Coast has been a key part of CARE's long-term objective. Mirrored closely with strategic market and product development, CARE strives to support stakeholders in creating a market situation that drives and supports both capacity expansion and broader collections.

As everyone is well aware, a variety of factors (including but not limited to wildfires, public utility bankruptcy, jurisdictional permitting delays, technical challenges, pandemic travel restrictions) contributed to capacity expansions being significantly delayed over the past 24 months.

PROCESSING CAPACITY INTRODUCTION

Based upon direct business development efforts by Processors, and their related Manufacturer end market outlets, the implementation of capacity expansion has been occurring in parallel and in advance of any recommendations included within this report. These efforts have the full support of CARE, both financially via grants and technical assistance and via feedback and advice.

Relatedly, a key factor for capacity planning is determination of actual carpet discards and understanding flooring trends which have increasingly favored various hard surface alternatives. At present time, it is known from preliminary research conducted independently for CARE by Cascadia Consulting Group that carpet sales nationally have declined approximately 40% between 1995 and 2017, or a decline rate of about 2% annually. Per industry reporting via [Floor Covering News](#), in 2009 the carpet/rugs category held 66.6% market share across flooring options has dropped considerably to 48.4% in 2020 (according to [Floor Covering News](#)). The rate of decline in California has been notably faster and accelerating. An overall important question is: has carpet deselection (in favor of hard surface flooring) stabilized or will market share continue to erode – thus, impacting carpet sales, overall Program funding and future capacity needs?

Carpet material construction over time has evolved, with an increasing percentage of the residential sector comprised of PET (polyethylene terephthalate). Once at around only 22% of gross collections in California, PET which once had few market outlets, now has strong market demand thanks in large part to subsidies and increased cost of virgin resin and has grown to around 45% of collections. Conversely Nylon gross collections, which once comprised a greater percentage of residential carpet has declined over the years with the shift to PET construction; however, with increased Nylon subsidies, more Nylon commercial broadloom is now being recovered despite the lower overall yield return.

Similarly, within the commercial office sector, airport, convention center and hospitality sectors, there has been a significant shift over time from commercial broadloom to carpet tiles, which over ten years' time necessitates consideration of east coast versus west coast processing capacity evaluation needs.

Originally anticipated for a mid-2019 completion of this report, CARE pushed the date to 2020 in anticipation of several significant known factors:

- Delayed ability to release CARE Cycle 2 capital grants specifically targeted for capacity expansion
- A newly opened Arizona broadloom Processor working toward plant efficiency
- A new Arizona tile Processor with a delayed opening and working toward plant efficiency

- A new California broadloom Processor scheduled to open mid-2019
- The very long anticipated construction of a promised commercial broadloom carpet Processor
- Unanticipated sale of PET manufactured decking lumber company, and anticipated, yet delayed, market re-entry for the related new manufactured dimensional lumber manufacturer influencing PET market demand
- Announcement of a large new volume PET market demand contract.

Capacity for carpet processing, in conjunction with strong reliable manufacturer demand commitments, is a critical foundational cornerstone to recycling goal achievement. And, as learned through the most recent world-wide COVID-19 pandemic related supply chain and transportation impacts, in-state and local region processing locations are also critical to reliable ongoing Program success. Capacity, as noted regularly in CARE's Annual Reports, is defined as the estimated volume of carpet discards that can be processed by participating Tier 1 Processors in the marketplace.

Since Program inception processing methodologies for broadloom carpet in California have evolved from the very labor-intensive and expensive shearing of carpet face fiber which left the carcass to be disposed, to the now mechanized full demanufacturing of carpet. The carcass, generally upwards of 70% of broadloom carpet weight, generally consists of a polypropylene (PP) fiber backing, calcium carbonate and binding adhesives. The demanufacture of carpet via shredding, mechanical separation and expanded screening systems allows for the recovery of face fibers, PP backing and post-consumer carpet calcium carbonate (PC4). Due to the strategically combined subsidy support and dedicated market development efforts by CARE, overall yield on the recovery of carpet materials has increased significantly from 28% at Program inception to a Program high yield of 77% in Q1 2021.

Via the strategically aligned market development and subsidy support efforts, capacity investments for yield improvements have afforded the Program the opportunity to maximize landfill diversion for dollars invested in captured carpet materials while increasing overall Recycled Output toward achievement of legislated recycling rate goals.

CAPACITY OVERVIEW

Annually, as a part of CARE's Annual Report to CalRecycle, a capacity survey is sent to all Processors registered with the Program. For that reporting year, Processors are asked to report on their maximum available capacity, percent of capacity actually utilized, percent of capacity utilized to process California carpet or carpet tile and anticipated changes for the following year. As of year-end 2020, it has been understood that most Processors may be operating at either one or two shifts and some are planning for 3rd shift implementation in Q3 or Q4 2021.

CARE began collecting capacity data via a formalized survey in 2016. In 2016 total maximum available U.S. capacity, as self-reported by Processors, was 326 million pounds per year. At the time this reflected approximately 95% of total California estimated 2016 discards of 343 million pounds. When adjusted for the closure of one facility in 2016, the revised available capacity was 242 million pounds, or 71% of the 2016 discards. For California based Processors, the maximum capacity for the three processors was 156 million pounds, or 45% of 2016 discards.

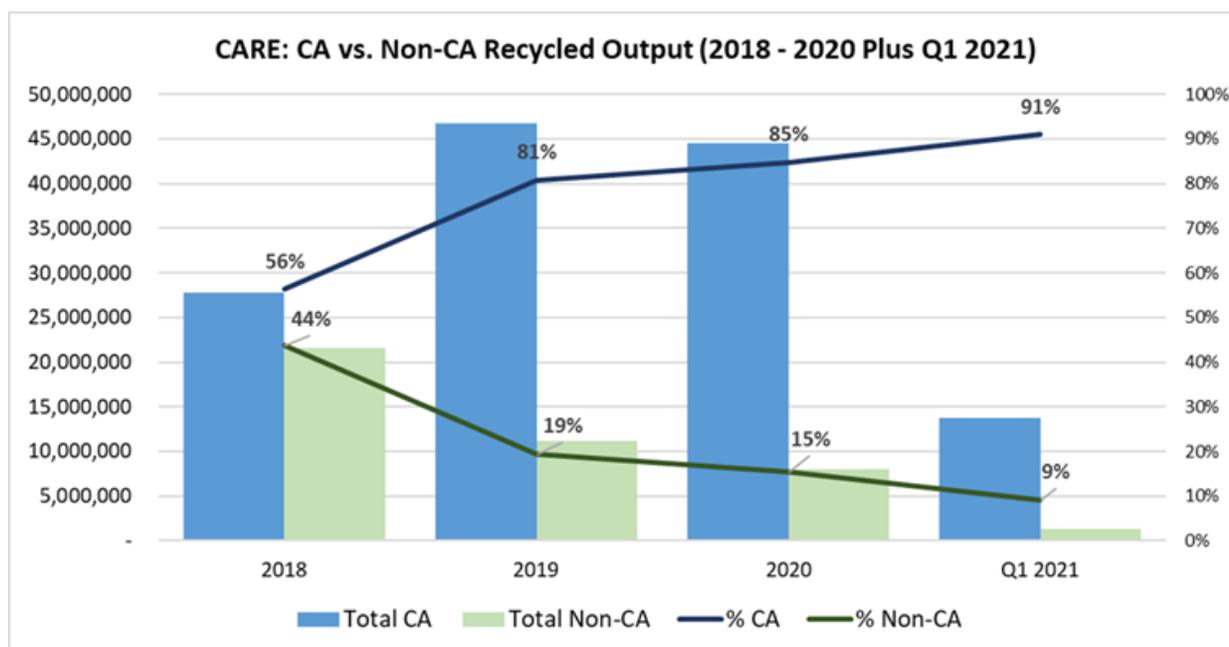
As of year-end 2020, total maximum available U.S. capacity as self-reported by Processors over time, was estimated at 490 million pounds. With total projected California discards for 2020 currently calculated at 304 million pounds, the total available U.S. capacity reflects 161% availability. For West Coast Processors, located in Arizona and California, the maximum capacity for the four operationally active Processors was 132 million pounds, or 43% of total 2020 discards. Specific to California, the maximum capacity for the two active California Processors was 99 million pounds, or 33% of 2020 discards. It is important to note that an additional 28 million pounds of California capacity had been anticipated to come online in 2020 which would have resulted in 42% of 2020 discards.

It should be noted that due to the need to identify carpet fibers, presently done by hand identification devices, not all carpet may be considered recyclable for any of the following reasons: overly soiled or damaged, too worn to reasonably recover face fibers, too many non-similar pieces that are too labor intensive to identify, mixed fibers, black color, backing type that is not yet recyclable, material type that is not yet recyclable (e.g., wool carpets which currently represent 1% or less of overall carpet sales and/or tear out).

Figure A, below, reflects the comparative breakout of total Program Recycled Output pounds of PCC between California Processors (shown in blue) versus Non-California Processors (shown in light green). In 2018, 56% of total recycled output was processed by California Processors and 44% by out-of-state Non-California Processors. Between 2019, 2020 and through Q1 2021, the percent of recycled output handled in-state by California Processors increased significantly to 81%, 85% and 91% respectively.

Factors contributing to this change have been decrease in demand by two east coast Processors, previously unanticipated increase in pandemic related transportation costs (upwards of 1.5 to 2 times pre-pandemic rates), and buffered, fortunately, by increased in-state processing capacity, especially for expanded fiber types.

Figure A. Breakout of Recycled Output, California vs Non-California Processors



For 2021, with the opening of Aquafil’s Woodland facility supported by CARE grant funding and grant funded capacity expansions for both Circular Polymers and Los Angeles Fiber Company, it is projected that maximum available California capacity will be approximately 130 million pounds. For West Coast Processors, estimated maximum available capacity is projected at 163,400,000 million pounds, and 505,660,000 million pounds for total U.S. Processors.

Carpet Tile vs. Broadloom

Review of 2020 data shows that of the over 56 million pounds of carpet and carpet tile collected and shipped by CARE’s Collector/Sorters (also known as CSEs), 5% was carpet tile and 95% was broadloom. Review of available capacity from survey respondents and known Processors actively engaged in carpet tile recycling, shows that 4% of capacity supports tile while 96% supports broadloom carpet processing. West coast carpet tile processing began in 2019 exclusively for the recovery of PVC backing on carpet tiles, and in 2020 tile processing research on polyurethane foam back tile, inclusive of fiber separation, was completed. CARE believes West Coast carpet tile processing will expand by Q4 2021.

PROCESSORS REGISTERED WITH CARE

As of year-end 2020, there were 14 Processors registered with CARE, nine of whom actively submitted reports and/or requested funding for the processing of carpet.

Following are the list of Processors who were actively engaged in processing, and the carpet materials recycled:

Aquafil Carpet Recycling #1	N6 and PC4
Circular Polymers	N6; N6,6; PET; PP and PC4
Columbia Recycling	N6; PP
Gold Pond Corporation	PP
Los Angeles Fiber Company	N6; N6,6; PET; PP and PC4
Planet Recycling	Carpet Tile (PVC backing)
Shaw Industries Group, Inc.	Carpet Tile (polyolefin-backed, complete tile)
Tarkett USA	Carpet Tile (PVC-backed, complete tile)
PRET Advanced Materials, LLC	N6,6

Following are the Processors who were registered in 2020, yet had not submitted requests for subsidies on the processing of carpet/carpet tile during 2020:

Cedar Plastics (out of business)	N6 and N6,6
GISCA	Mixed – specialty hotel application
Interface, Inc.	Carpet Tile (backing only)
Wetsel Oviatt Recycling	PET
Carpet Recycling Resources	Proposed: N6 and N6,6

It should be noted, that while Cedar Plastics was registered with CARE in 2020, they declared bankruptcy in late 2019 and are now out of business.

OVERVIEW OF PROCESSOR TYPES AND PCC OUTLETS

Processor business success is built upon end market demand for the PCC material commodities they create. End market outlets for PCC materials may consist of in-house or tolled pelletization, fibers pelletized by others, fibers into fiber products (e.g., carpet cushion, underlayments, building insulation), consumer products, automotive products, carpet fibers, carpet backing, geotextiles, building materials, bedding, absorbency products, lightweight aggregate and cement-related products. End market volume demand and their related quality standards support and drive the type of processing conducted by Processors.

As noted previously, most all carpet recycling begins with the demanufacture of the carpet via shredding and various processes to further separate the face fibers from the backing material and/or open tufts. This separation process may be done mechanically in a “dry process” or in a more technologically advanced “wet process”. Understandably each type of process affords Processors exposure to different types of end market demand, with higher commodity prices paid for lower ash content fibers and, for those Processors who may also be registered as a Manufacturer, the manufacture of pellets broadens their market opportunities.

Specific end market opportunities include Aquafil’s internal processing of Nylon back into pellets for use in textile markets, Circular Polymer’s internal processing of PET into agglomerated pellets which can now be utilized via various new PET depolymerization processes which returns PCC PET to virgin quality resin.

CARE’s work to create a subsidy structure which incentivizes Manufacturers to displace another feedstock material (e.g., virgin resins, post-industrial resins, postconsumer bottle flake, etc.) in favor of PCC materials has been both an incentivizing and stabilizing factor for Processor business growth and related capacity expansion. Such expansion which thereby supports Processor demand for more carpet collections, either most generally self-collected, purchased from Collector/Sorters who identify and sort carpet, or received from CARE facilitated public Drop-off Sites.

CONCLUSION & RECOMMENDATIONS

An important component in capacity evaluation is having a solid understanding and verifiable calculation methodology to determine available PCC feedstock discards, type of feedstock materials (including face fiber and backing type), and secure end market demand prior to next stage capacity expansion investment. Across the Program, discards generation has steadily decreased from 357 million pounds in 2012 to 304 million pounds in 2020.

Efforts to fully determine the exact amount of tear out carpet discards have been an ongoing point of discussion. While CARE has deployed a detailed discards calculation for annual performance tracking, and generally uses a rough quick calculation of 10 pounds per person per year, a Cascadia Consulting Discards Study conducted for CARE reviewed jurisdictional waste characterization studies from around the United States which reflected a wide spanning range including a low end of 9 pounds per person per year to as high as 79 pounds per person per year. Throughout the Program CARE has utilized a detailed discards calculator which accounts for new carpet sales (S), replacement rate (R), average weight of carpet per square yard (pounds or P), pounds of carpet from demolition projects not replaced (D), and pounds of carpet removed but not replaced by carpet (%) which is known as Deselection (DS). Presently the discards formula calculation utilized is: $S * R * P * (1 + D + DS)$ and the reader is referred to [CARE’s Annual Reports](#) for California for further detail. While this methodology has consistently been used throughout the Program, and specific recycling rate legislation has been enacted around this discards calculation, the discards

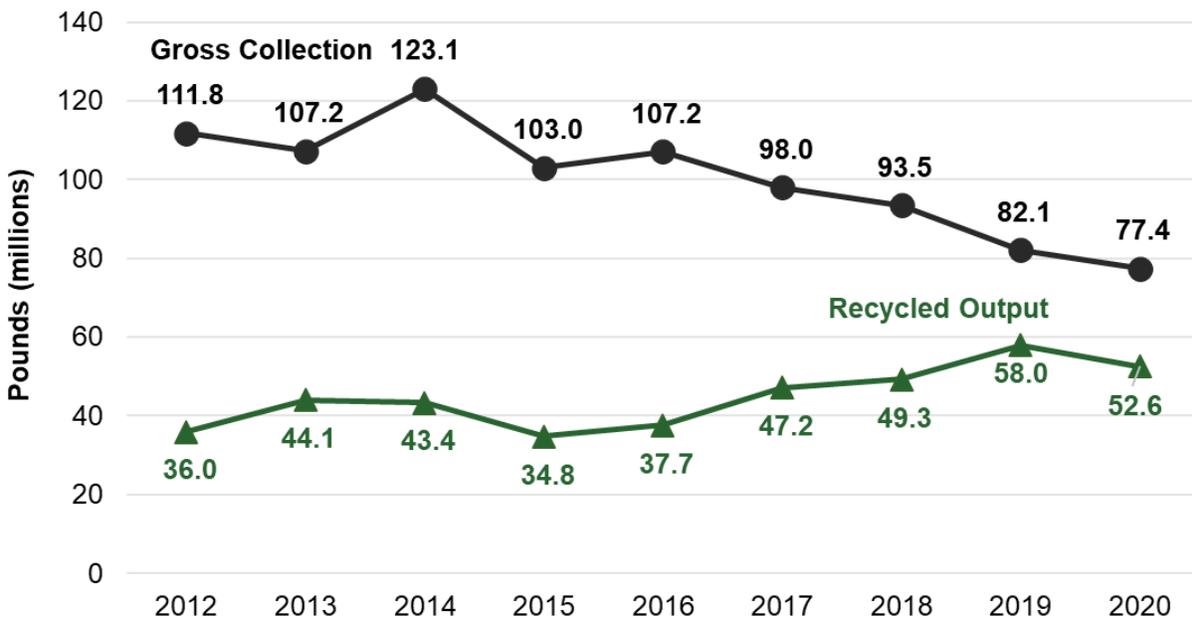
calculation and its related components are presently under rigorous extended study and review in consultation with Cascadia Consulting.

While CARE reasonably believes that the California marketplace may have experienced “peak carpet tear out” between 2009-2015, which somewhat reasonably follows the increase and subsequent decline in gross carpet collections since Program inception (see [Figure B](#)), hard surface flooring (most specifically resilient luxury vinyl tile or LVT) sales continues to rise and expand their market sector percentage of all flooring sold. Specific examples of such a shift continues to be seen in the multi-family and hospitality (hotel) sectors in which larger flooring areas are converted from carpet to hard surfaces which afford property owners/managers a longer life than carpet, less costly ongoing maintenance costs, and avoidance of the carpet assessment.

Relatedly, a critical component for Program success is ensuring and solidifying end market demand from Manufacturers, many of whom are being incentivized to displace another commodity material – for example post-industrial PET, postconsumer bottle flake PET – in favor of a PCC commodity material such as PET fiber. The stability and growth of end market demand for Processors considerably facilitates expansion of collection efforts by CSEs.

Figure B further exemplifies the beneficial impact of PC4 subsidies and Processor facility upgrades for the sifting and separation of PC4 from fiber. While the upper Gross Collections line (shown in black with circles) has been on a downward trend year over year, the lower Recycled Output line (shown in green with triangles) reflects the beneficial impact of PC4 recovery and diversion from landfill.

Figure B. Gross Collections and Recycled Output by Processors Overtime



Based upon CARE’s experience and Program learnings, including review of learnings from carpet Processor’s past experiences, solidification of reliable end market outlets and supply of tear-out carpet feedstock materials are the primary stabilizing factors. As a direct result of the consistent and ongoing Product and Market Development work carried out by CARE, in parallel with Manufacturer subsidies on various recovered postconsumer carpet (PCC) materials, demand for PCC by Manufacturers has steadily been on the rise. This growing Manufacturer demand driven by both CARE, via subsidies, and Processors, via business development pursuits, directly supports the need for PCC capacity expansion, especially with California Processors.

Following are the recommended capacity expansion areas in which CARE believes future business development efforts and ongoing support, via grants and subsidies, are needed:

- Establish and Maintain a Minimum West Coast Processing Capacity
- Commercial Broadloom Recycling
 - Currently underway with Aquafil, Circular Polymers, Los Angeles Fiber Company, and Pret Advanced Materials
- Expanded PVC Back Carpet Tile Processing – West Coast
 - Currently under evaluation by Aquafil Carpet Recycling, LLC– Phoenix and Circular Polymers - Lincoln
- Foam Back Carpet Tile
 - Currently under a capacity expansion after successful trials in 2020.

Recognizing the significant capital investment costs, and project timeline for execution, related to the development of carpet processing operations, which depending upon

processing technology deployed can range from \$10 million to well over \$30 million, CARE is careful to point out that securing and maintaining self-collected pounds of PCC feedstock from reliable large volume generating sources is critical.

Additionally, CARE continues to execute Phase 2 of a 2 Part strategy (capacity then collection) to help facilitate ample supply for the growing demand for PCC polymers. Simultaneously, CARE is working to balance a critical “Grow-the Pie” initiative in a concerted effort to avoid cannibalization – a scenario where prices erode and growth can stagnate. The Program has at least twice experienced this, whereby a CSE deeply undercuts the price of a competitor to expressly gain foundational large volume PCC generators. The resultant effort experienced at least twice in Program history, of this unsustainable pricing cut approach, effectuated a “race to the bottom” which ultimately led to at least two initiating CSE/Processors going out of business and causing significant economic damage to the remaining stakeholders. With past experience as an invaluable guide, CARE endeavors to help lead the way and prevent repeat economic damage and potential capacity loss to the Program.

APPENDIX

APPENDIX A.
LIST OF PROCESSORS MEMBERS - 2021

Processor	Location	City	State	Status
Aquafil Carpet Recycling 1	3555 West Washington Street	Phoenix	AZ	Active
Aquafil Carpet Recycling 2	550 North Pioneer Avenue	Woodland	CA	Active
Aquafil Recycling, LLC (formerly Planet Recycling, tile only)	1600 South Central Avenue	Phoenix	AZ	Active
Carpet Recycling Resources		Santa Clara	CA	Inactive
Circular Polymers	3390 Venture Drive	Lincoln	CA	Active
Columbia Recycling Corporation	1001 Chattanooga Avenue	Dalton	GA	Active
GISCA	Mobile Sites	On-site Hotel Locations	CA	Inactive
Gold Pond Corporation	1001 Chattanooga Avenue	Dalton	GA	Active
Interface		Atlanta	GA	Inactive
PRET Advanced Materials, LLC	520 Kingsburg Highway	Johnsonville	SC	Active
Los Angeles Fibers	4920 South Boyle Avenue	Vernon	CA	Active
Shaw Industries Group, LLC	7195 Adairsville Highway 140	Adairsville	GA	Active
Tarkett USA	1104 Willowdale Road Northwest	Dalton	GA	Active
Wetsel Oviatt Recycling		Elk Grove	CA	Inactive

APPENDIX B. DATA SOURCES FOR REPORT FIGURES IN ACCESSIBLE FORMAT

Note that Figure numbers in the Appendix are matched to those in the main report body for ease of reference.

Figure A. Breakout of Recycled Output, California vs Non-California Processors

The figure reflects the comparative breakout of total Program Recycled Output pounds of PCC between California Processors versus Non-California Processors.

Category	2018	2019	2020	Q1 2021
Total California	27,746,406	46,787,472	44,555,134	13,730,385
Total Non-California	21,560,998	11,219,605	8,059,923	1,368,702
Percent California	56%	81%	85%	91%
Percent Non-California	44%	19%	15%	9%

Figure B. Gross Collections and Recycled Output by Processors Overtime

The figure shows the change over time in Gross Collection of carpet and Recycled Output, which includes tile reuse, broadloom reuse, tile recycled, fiber, depoly, filler, carcass and calcium carbonate (PC4).

Category (millions of pounds)	2012	2013	2014	2015	2016	2017	2018	2019	2020
Gross Collected	111.8	107.2	123.1	103.0	107.2	98.0	93.5	82.1	77.4
Recycled Output	36.0	44.1	43.4	34.8	37.7	47.2	49.3	58.0	52.6