



GREENBLUE®

FEATURE: CALIFORNIA CARPET STEWARDSHIP PROGRAM

Chemical Recycling
Making Fiber-to-Fiber Recycling
a Reality for Polyester Textiles



AB 2398 and the California Carpet Stewardship Program

Over 257 million pounds of carpet were estimated to go to California landfills in 2016.¹ Based on the recently released CalRecycle report covering 2016 disposal and recycling rates, this equates to less than 0.5% by weight of the 42.7 million tons of total waste and disposal-related materials landfilled in California.² The California Carpet Stewardship Program was created to improve opportunities for carpet recovery and recycling to catalyze a sustainable marketplace for collectors, processors and product manufacturers utilizing recycled carpet resins.

The goals of the program are to increase 1) recyclability of carpets, 2) market growth of secondary products made from post-consumer carpet, 3) reuse of post-consumer carpet, 4) recycling of post-consumer carpet, and 5) diversion of post-consumer carpets from landfills.

In 2010, California passed AB 2398 to increase landfill diversion and recycling of post-consumer carpet generated in California. The law creates a funding mechanism to meet its goals by levying

an “assessment” consumers pay on each square yard of carpet sold in California. As of January 1, 2017, the assessment is \$0.25 per square yard, five times higher than when the program began in July 2011 and expected to go up further. AB 2398 is designed to create market-based incentives to increase the amount of carpet that is reclaimed and recycled as opposed to landfilled or incinerated in the state of California.

The Carpet America Recovery Effort (CARE) serves as the stewardship organization administering the California Carpet Stewardship Program and its estimated 2017 budget of \$23 million. Stewardship organizations (or individual manufacturers that are not represented by a stewardship organization) are responsible for submitting a Carpet Stewardship Plan to CalRecycle for approval. Incentives paid by the CARE program to collector/sorter entrepreneurs (CSEs), processors, and manufacturers of recycled output include the following:³

The results of the program have been a mix of success and setbacks. Despite objections that AB

CSEs	Rate
CSE Reporting Incentive	\$1,000
Carpet Tile/Broadloom Carpet Reuse	\$0.10/lb
Whole Carpet Shipped and Sold for Recycling	\$0.02/lb

Processors	Rate
Carpet Tile/Broadloom Carpet Reuse	\$0.10/lb
Tile Recycled	\$0.10/lb
Type 1 Output (fiber and depolymerization only)	\$0.10/lb
Type 2 Output (filler and carcass only)	\$0.03/lb
Type 2 Calcium Carbonate	\$0.17/lb
Type 2 Carpet As A Fuel (CAAF)	\$0.03/lb
Type 2 Cement Kiln	\$0.03/lb
Growth incentive payout for pounds over 11,000,000 pound target	\$0.10/lb

Manufacturers	Rate
Non-nylon	\$0.25/lb
Growth incentive payout for pounds over 3,500,000 pound target	\$0.10/lb

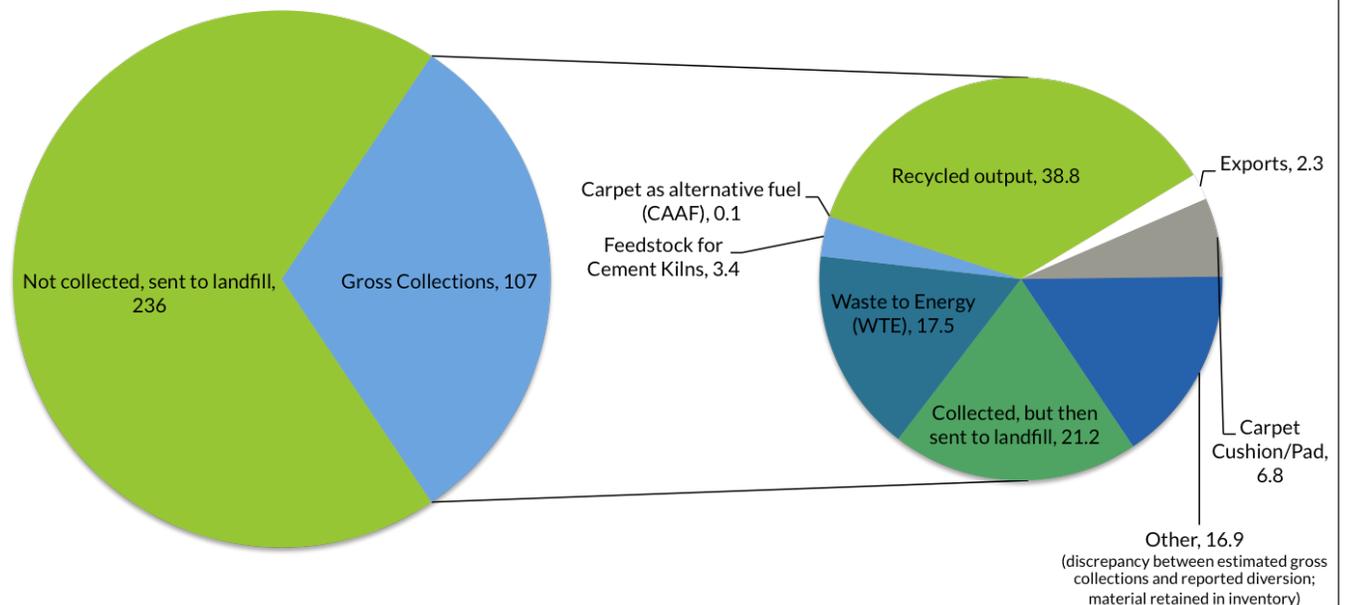
2398 includes incineration with energy recovery, carpet as fuel and exports materials outside the U.S. as “diverted” materials, there is little doubt that more carpet is being recycled now than prior to California’s legislative mandate

¹ CARE California Carpet Stewardship Program Annual Report, January 2016-December 2016. Carpet America Recovery Effort, 2017. <http://www.calrecycle.ca.gov/carpet/AnnualRpts/2016/CARE2016.pdf>.

² CalRecycle, California’s 2016 Per Capita Disposal Rate Estimate, <http://www.calrecycle.ca.gov/lgcentral/goalmeasure/DisposalRate/MostRecent/default.html>.

³ CARE California Carpet Stewardship Program Annual Report, January 2016-December 2016. Carpet America Recovery Effort, 2017. <http://www.calrecycle.ca.gov/carpet/AnnualRpts/2016/CARE2016.pdf>.

California Post-Consumer Carpet Diversion, 2016



All data in millions of pounds.

Source: CARE California Carpet Stewardship Program Annual Report, January 2016-December 2017. Carpet America Recovery Effort, 2017. <http://www.calrecycle.ca.gov/carpet/AnnualRpts/2016/CARE2016.pdf>.

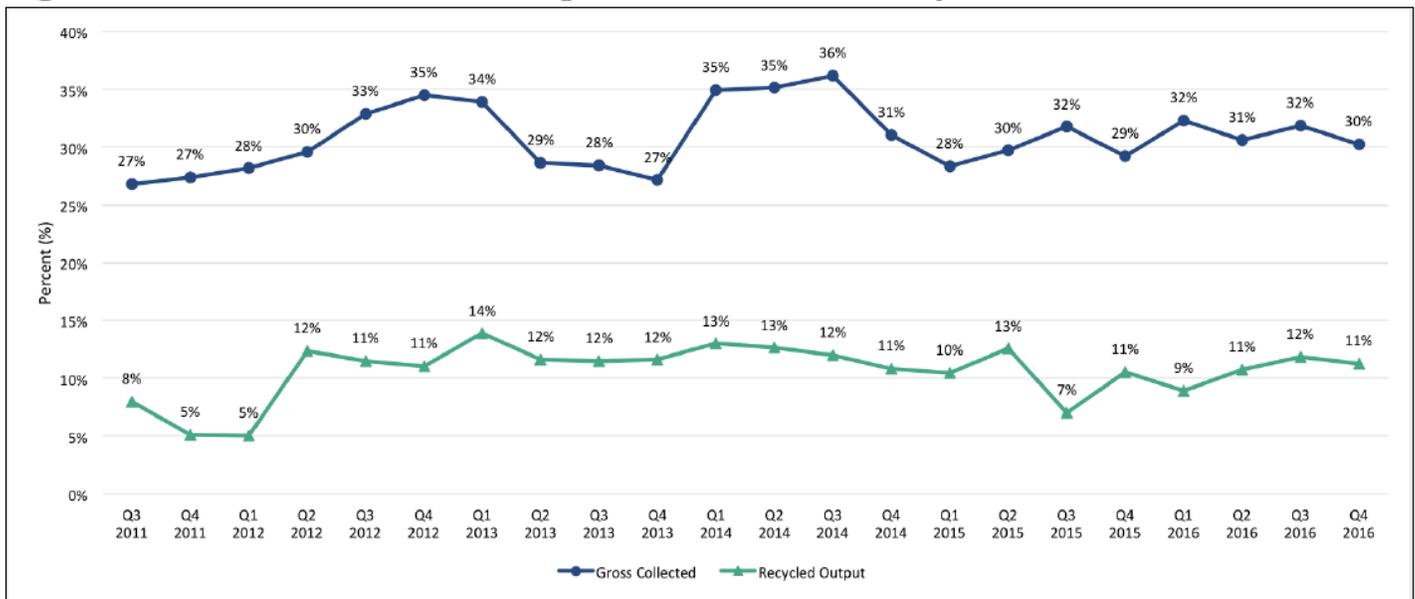
and the stewardship program to implement it. CARE claims that subsidies or incentives have never been paid for landfilling, incineration or waste to energy diversion.

CARE's 2016 Annual Report⁴ cites the following as indicators of progress:

- In 2016, CARE's California Program invested \$14.5 million in subsidies, grants and other incentives to accelerate recycling and diversion efforts in California (\$36 million invested since inception of the program in 2011).
- 107 million pounds of post-consumer carpet was collected, a 4% increase over 2015.
- 37 million pounds of recycled output was produced, a 6% increase over 2015.
- 11% of total estimated California post-consumer carpet discards were recycled in 2016, though this fell short of the 16% recycling goal established in CARE's five-year plan.
- CARE drop-off sites increased 43% from 2015-16. The number of pounds collected at these sites also increased by 74% over 2015.
- The number of California vendors offering products made from recycled carpet materials increased significantly, to 25 in 2016, up from 10 in 2015.
- Consistent with a market-based approach, CARE launched the DoubleGreen™ designation for products that use recycled California post-consumer carpet material plus at least one other post-consumer recycled material.
- CARE added a second subsidy for calcium carbonate in 2015 to incentivize the recovery and use of calcium carbonate in the manufacture of secondary products. 2.4 million pounds were processed in 2016, up from just 61,000 pounds in 2015.

⁴ CARE California Carpet Stewardship Program Annual Report, January 2016-December 2016. Carpet America Recovery Effort, 2017. <http://www.calrecycle.ca.gov/carpet/AnnualRpts/2016/CARE2016.pdf>.

Figure 1: CA Post-Consumer Carpet Collected and Recycled



California’s legislation and the stewardship program serve as an interesting approach for building an effective infrastructure for the recovery and recycling of potentially valuable materials to industry. Despite CARE’s total subsidies of up to \$0.37 per pound of PET, the value of the material on the open market is still the primary determinant of whether PET carpet fiber gets recycled into equal or lower value products or is diverted for its energy value or sent to landfills or incinerators with zero recovery of material value. For example, the program is more effective at recycling carpets made from nylon 6,6 because it is more profitable to recycle as engineering grade resins. However, the subsidies have not yet created as valuable end markets for recycling PET

or nylon 6 carpets. Nylon 6 has been adversely impacted by excess production capacity of caprolactam in China over the past five years. Markets for PET have also been impacted by excess supply of virgin resin from large producers. According to CARE’s 2016 collector/recycler survey, most PET carpet outside of California is going to energy recovery facilities or landfill. In previous years, exports to China provided an important end market for carpet collectors, but China’s introduction of policies like “Green Fence” and more recently “National Sword”⁵ have resulted in a significant decline. Today less than 3% of all collected post-consumer carpet is shipped to Asia.⁶ CARE noted that 2016-17 has been one of the worst markets for recycling carpets for almost

all polymer types. CARE’s California subsidy program under AB 2398 is making progress, albeit very slowly, but at the expense of hurting recyclers in the rest of the US. CARE estimates that it may lose 20 or more post-consumer carpet recyclers this year.

In September 2017, the California state legislature passed AB 1158, amending the current carpet stewardship program. If signed by Gov. Jerry Brown, the new law will set a goal of a 24% recycling rate by 2020 and allow CalRecycle to set subsequent recycling goals.⁷

Chemical recycling could change market dynamics by helping recyclers to increase the quality and value of end products they offer to end users. The flexibility

⁵ Staub, Colin. “How National Sword is upending exports.” *Plastics Recycling Update*, 24 May 2017. <https://resource-recycling.com/plastics/2017/05/24/national-sword-upending-exports/>.

Paben, Jared. “China announces ‘Sword’ crackdown on illegal recyclable material imports.” *Resource Recycling*, 21 February 2017. <https://resource-recycling.com/recycling/2017/02/21/china-announces-sword-crackdown-illegal-recyclable-material-imports/>.

⁶ Interview, Bob Peoples, CARE, 2017.

⁷ Paben, Jared. “Carpet stewardship bill clears legislature.” *Plastics Recycling Update*, 27 September 2017. <https://resource-recycling.com/plastics/2017/09/27/carpet-stewardship-bill-clears-legislature/>.



of chemical recycling to accept a wide variety of PET materials, combined with the ability to deal with much higher levels of contamination without impacting the quality of the end product would seem to bode well for increasing the amount of PET carpet fiber that gets recycled – potentially helping the state meet ambitious recycling goals. CARE subsidies for California vendors offers an excellent opportunity for chemical recyclers to test their technologies, gain experience recycling this particular feedstock, and to build business models that may allow them to operate in non-subsidy states. 