CIRCULAR ECONOMY TRENDS

april 2019

GreenBiz insights

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introduction

BY LAUREN PHIPPS

Welcome to GreenBiz Insights. We're excited to share some of the most popular stories from across the circular economy landscape to give you a taste of what's going on in this ever-evolving market. We know, there's a lot to keep track of. This compilation of stories is designed to help you keep up with key trends and case studies.

Across industries, roles and regions, the circular economy is moving from buzz to business strategy. But to transition from here to circularity, we need proof points. We hope you enjoy these seven stories that show not what's possible, but what leading companies are already doing.

At GreenBiz, we are covering this topic across our full range of events and media: our GreenBiz, Circularity and VERGE event series, as well as our daily news, podcasts and more. (I hope you'll consider subscribing to my free newsletter, Circular Weekly, published every Friday, along with our four other weekly newsletters. More information here.)

C&A's not-so-secret recipe for circular jeans

The Dutch company aimed to tackle a "monstrous hybrid" problem.

BY LAUREN PHIPPS

Sustainability always has been in C&A's genes — and now it's in its jeans. Last week, the Dutch apparel company launched the first Cradle to Cradle (C2C) Certified Gold denim jeans, an impressive feat for a notoriously polluting product in the sustainability-challenged fashion industry. When I hear about product launches, my first instinct is typically to move on. I find that these proclamations are usually more about marketing than moving markets. But C&A's launch not only offers an affordable, circular option for consumers — the jeans will cost about $34 per pair — it provides companies with the roadmap to follow in its fashionable footsteps. You may have read about C&A's first piece of C2C Certified apparel, a biodegradable T-shirt that takes 12 weeks to decompose in a backyard compost pile. Jeans aren't as simple. It takes 49 separate ingredients to construct and process C&A's new offering — from the zippers, rivets and threads to detergents, softeners and stabilizers. Each ingredient individually was assessed for material health for to achieve the certification. Understanding the implications of C&A's certification requires getting back to circular economy basics and revisiting the two classes of material cycles: biological and technical. Biological nutrients (plant-based and biodegradable materials) are meant to cycle back into their environment, while technical nutrients (metals and plastics) are intended to circulate in closed-loop industrial systems. Think food waste becoming compost to return to soil versus recycling aluminum to make a new can. The challenge of effectively implementing circularity arises when products, such as jeans, combine both cycles."Many products result in what are called 'monstrous hybrids,'" said Jay Bolus, president of Certification Services at MBDC, one of C&A's key partners on this project. "They combine both techni-

cal and biological nutrients in a way that cannot be easily separated without degrading the material and rendering it non-recyclable or biodegradable." In order to tackle this monstrous hybrid, C&A partnered with Fashion for Good, a global platform that unites apparel producers, retailers, suppliers, non-profit organizations, innovators and funders in a pre-competitive environment to accelerate sustainability in the fashion industry. It's hard to imagine grocery shopping without nutrition labels, and it's easy to take for granted the level of legally obligated transparency in the food industry. The same is not so for fashion and textile toxicity: The apparel industry historically has been known for its secrecy and proprietary information. Calls for supply chain transparency often center on labor practices rather than material makeups. Going against industry convention, C&A and Fashion for Good released a free guide (PDF) that walks through the certification process, troubleshoots challenges and offers a framework for replicating its approach. The toolkit even includes the complete bill of materials, making the jeans' entire "nutrition label" available to other retailers." We are sharing all the lessons learned and our bill of material with the fashion industry to encourage and open up the way for all jeans to be made this sustainable way," said Charline Ducas, global circular economy lead at C&A, via email. "This means the industry has an open-source recipe for future success in evolving sustainable fashion for all and transitioning to circularity. We are

It's hard to imagine grocery shopping without nutrition labels, and it's easy to take for granted the level of legally obligated transparency in the food industry.

calling the fashion industry to join us in transforming the way we all make jeans." Time will tell if C&A's mass-market consumers close the loop and return used jeans as part of the company's "we take it back" recycling program or if they will buy the certified garments at all. Although the T-shirt and jeans account for a minute fraction of C&A's expansive catalogue, both are promising examples of corporate circular economy leadership — ones intended to leverage the company's scale. It's an ambitious call for transformation in a nascent market.

Lauren Phipps is Director & Senior Analyst, Circular Economy, at GreenBiz Group

3M embeds ‘sustainability value’ mandate into new product development

The 116-year-old company is embedding recyclability, reuse, energy and other sustainability considerations earlier into decisions.

BY SARA E. MURPHY

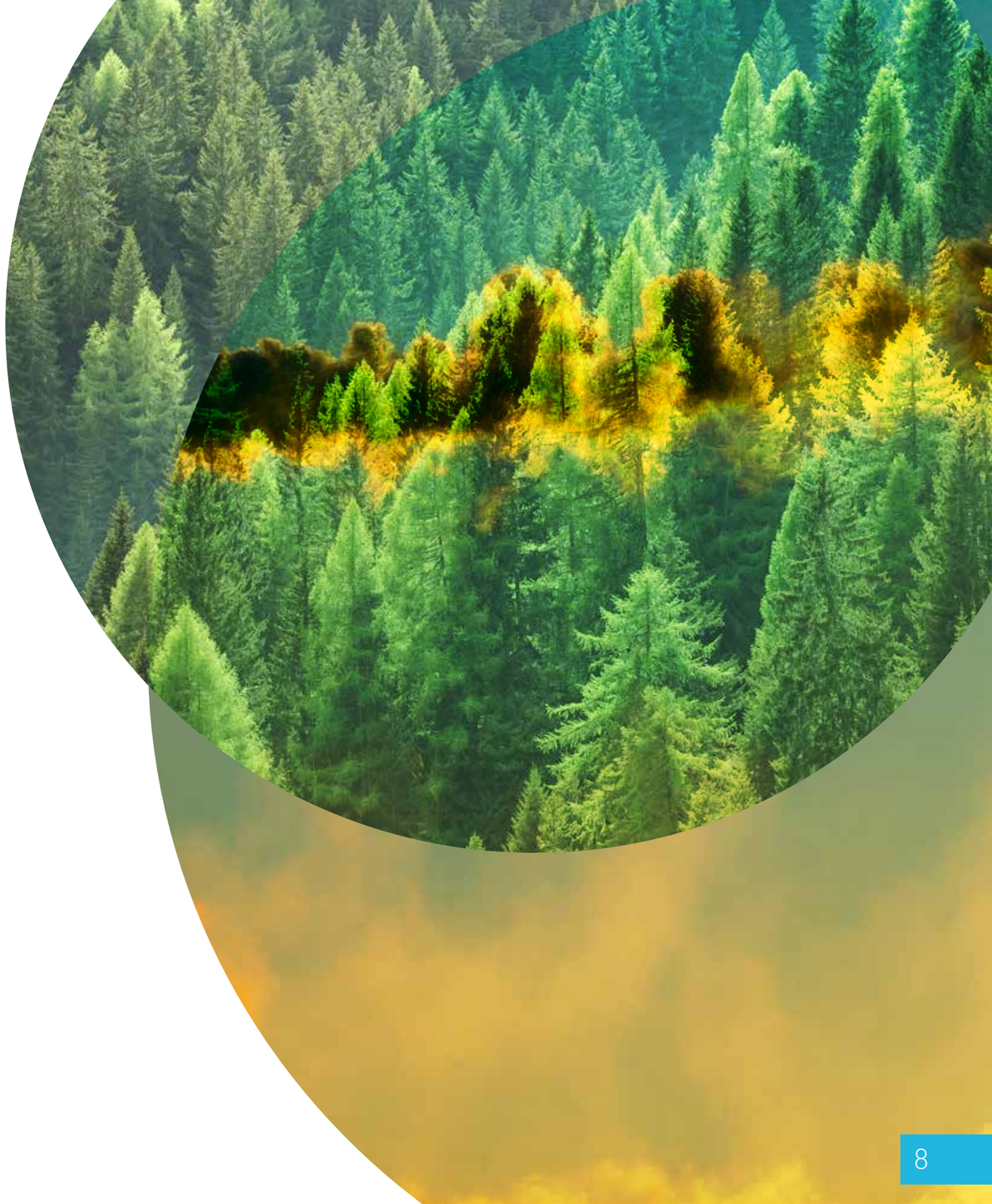
At last month’s 24th annual Conference of the Parties (aka COP24), 3M made this bold, but vague declaration: it formally will require a “Sustainability Value Commitment” for all new products starting in 2019. What does this mean? More on that in a moment. But here’s why it matters. While the St. Paul, Minnesota-based company may perhaps be best known for its Post-it Notes, 3M launches about 1,000 new products each year — everything from adhesives to cleaning fluids to wire and cable — with roughly one-third of its revenue generated from products released in the past five years. Increasingly, it will use sustainability considerations as a means of creating new revenue streams and of differentiating its offerings from those of competitors. The approach is still relatively rare, at least when it comes to linking a focus on corporate sustainability to new business opportunities. While information technology company HP Inc. last year said it could link at least $700 million in enterprise sales to its policies on circular production, energy efficiency and other considerations, few other organizations have made that same connection so explicitly. While the details of how 116-year-old 3M will deliver on this bold pledge are still sketchy, the strategy will force its employees — from researchers to designers to the manufacturing and supply chain teams — to consider concerns such as recyclability, reusability and energy consumption at the beginning of the development process. 3M’s leadership also believes the commitment will help the company’s business groups — including health care, consumer goods, electronics, industrial, and safety and graphics — prioritize products that could have a more positive

impact by solving an environmental issue, such as the urgent need to reduce greenhouse gas emissions, or a societal concern, such as worker safety."Sustainability is at the core of 3M — but we're looking to do more," said John Banovetz, chief technology officer of 3M, in a press release describing the new policy.

What is 'sustainability value'?

Gayle Schueller, vice president and chief sustainability officer at 3M, said every team will be tasked with thinking about how a new product "is serving a greater good than previously."Value can take various forms. For instance, the product might reduce the customer's greenhouse gas emissions footprint by

> **Sustainability is at the core of 3M — but we're looking to do more. The new product goal is an example of the aggressive targets we'll be setting in coming months as part our strategic focus on empowering science for circular, climate and community.**



using lower-emitting materials or manufacturing processes than the alternatives. Or a component being sold to another manufacturer might, in turn, help that customer replace a legacy material with one that allows it to do something better, such as producing a motor vehicle with improved energy efficiency. Alternatively, the product's design might open doors to new business models. For example, it might enable a new recycling stream which, in turn, could be incorporated into new manufacturing processes.In addition, 3M employees will be asked to consider attributes such as reusability, recyclability, energy efficiency, waste reduction, water savings, responsible sourcing and renewability from the beginning to the end of a product lifecycle, according to a company press release. On some level, Schueller noted, 3M has already been doing this. However, this new initiative forces employees to consider the environmental or social impact of a product earlier and deeper in the product development process. "It gives us the opportunity to highlight examples and fertilize innovative ideas across the company," she said

The measurement challenge

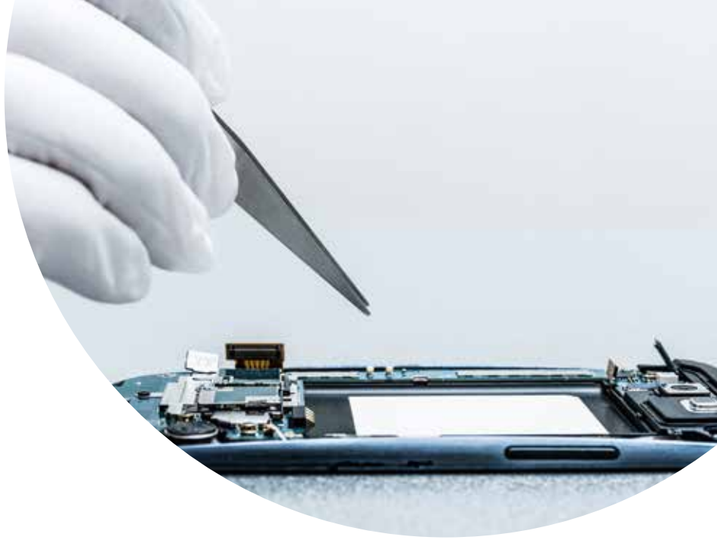
3M is still developing its approach to measuring the progress and impact of this new commitment. "We're learning as we evolve," Schueller explained. She said the company will evaluate every single project, tracking progress from a financial perspective, keeping count of the number of products that have been rolled out with a Sustainability Value Commitment and reporting findings in 3M's sustainability report. 3M long has reported publicly on its Scope 1-3 emissions, and it will continue to do so.Training and enforcement for this initiative will be an ongoing effort, Schueller emphasized. "We have more than 90,000 employees, including 10,000 involved in research and development, and every one of them has an expectation that sustainability is part of their job." Schueller highlighted the need for company-wide education when tackling a program of this nature but noted that 3M is not "starting from ground zero." The company has developed measurement tools at the corporate level, and it has refined its global training program to meet the demands of this nascent initiative.

Business transformation

3M invests about 6 percent of sales into research and development (R&D), and the funding for the new pledge is being incorporated into that budget — both in the form of the new training and through new staffing that will be accountable for following through and for measuring progress. The very nature of the Sustainability Value Commitment requires that R&D focus substantially on things that "make us and our customers more sustainable," Schueller said. "This was an intentional choice that shifts that investment in favor of greater sustainability, allowing us to transform our business by transforming our products." The new requirement will apply to all five of 3M's business groups in 200

countries: health Care, consumer, electronics and energy, industrial, and safety and graphics. Because products for each division are developed and released along very different timelines, the new commitment will be rolled out a bit differently for each."Our businesses are pretty diverse," Schueller explained. An electronics product that begins development in 2019, for example, may launch the same year, but a healthcare product could take many years to reach market. Ultimately, Schueller said, 3M expects the new Sustainability Value Commitment to contribute positively to top-line revenue, by helping 3M to differentiate its new products at a time when more businesses are seeking to strategically address the risks associated with climate change, including scarcer resources and the need for improved energy productivity. This initiative builds on other recent efforts at 3M to improve sustainability. According to its sustainability report (PDF), 3M's greenhouse gas emissions, energy use and water use as a percentage of net sales have all declined significantly in the last 15 years. In 2015, the company established its sustainability goals for 2025, which include investing in sustainable materials, increasing energy efficiency and water management, and doubling 3M's pipeline of diverse leaders. Since then, the company has increased the renewable percentage of its energy purchase from 0.5 percent to 17.9 percent, quickly approaching its 2025 goal of 25 percent. Its progress toward the other goals is slower but appears to be on track." As a large and diverse global science company with customers spanning many industries and global markets, we have the opportunity to make an even greater impact in sustainability," Schueller said. "We've made such significant progress on the 2025 Sustainability goals we set in 2015 that we're raising the bar. The new product goal is an example of the aggressive targets we'll be setting in coming months as part our strategic focus on empowering science for circular, climate and community."

Sara E. Murphy is a contributing writer at GreenBiz Group



Why Motorola is making it easier for you to fix your own mobile phone

The debate about "the right to repair" is shifting as consumer electronics companies explore circular models.

BY LAUREN PHIPPS

We've all been there: the frustration of a cracked phone screen, malfunctioning USB port or flickering laptop display leaves us at the mercy of a chipper so-called genius. A seemingly minor hardware problem often forces the choice between a pricey, time-consuming repair or simply replacing the device entirely. This decision between replace and repair contributes to the 50 million metric tons of e-waste that will be generated this year, according to the European Waste Electrical and Electronic Equipment (WEEE) Forum. Only about 20 percent of it will be recycled. The rest is landfilled, burned or illegally disposed of, despite about two-thirds of the world's population being covered by legislation for responsible end-of-life device handling of e-waste. Companies such as Dell, Best Buy and Apple have programs in place to increase product take-back, ensuring valuable materials contained in e-waste — copper, palladium and gold, to name three — can be reused in future products, or at least are properly recycled. Many also capitalize on secondary markets by remanufacturing or refurbishing used products and reselling them at a deep discount. But product repair and life extension — particularly when a consumer still owns the product — is a bit of an ugly stepsister for circularity in consumer electronics. It's no secret that manufacturers have an incentive to push new products, and planned obsolescence is nothing new in our society. OEMs have more innocent approaches such as upgrade programs and complex product design or proprietary repair tools, as well as more aggressive tactics, such as criminalizing and voiding warranties when unauthorized individuals make

Product repair and life extension — particularly when a consumer still owns the product — is a bit of an ugly stepsister for circularity in consumer electronics.

repairs, and actively lobbying against legislation that might increase product repairability. But some companies are beginning to rethink this linear model. Last week, telecommunications company Motorola expanded its product line from cell phones and laptops to include DIY repair kits for its mobile devices, marking a significant shift towards increasing its products' circularity. In a partnership with iFixit, a wiki-based site that teaches people how to fix almost anything, Motorola has begun selling replacement parts, tools and instructions directly to customers for all of its recent phones. This is a big deal. Independent repair is common within categories such as home appliance and automobiles, but not so much for consumer electronics. Many celebrate the leadership of Fairphone, a modular mobile phone with repair instructions pre-loaded onto the device. But Motorola is the first global smartphone company to offer

this service. “Motorola recognizes that this is a way to improve the experience for their consumers,” iFixit CEO Kyle Wiens told me. While customers may buy products with less frequency, Motorola is betting that increased repair options will build brand loyalty. According to Wiens, a recent survey of iFixit users found that 95 percent of consumers say that a successful repair makes them more likely to buy another product from that manufacturer. And let’s not forget: Motorola is making money selling the repair kits, too. ”Everybody should have the ability to repair their own things,” Wiens said. “Whether or not they choose to do so should be up to them. I think of it as a portfolio of options: You should be able to send your phone into Motorola and have them fix it, they should have local repair options in major cities, or you can do it yourself at home. Each of those options is going to cater to a different kind of person... Brands are going to have to meet customers where they’re at.” The debate around the “right to repair,” a movement that asserts companies should be legally obligated to offer the tools, parts, schematics and diagnostics necessary to fix things that customers own, is a touchy subject for manufacturers across industries. Regardless of whether Motorola’s move is a harbinger of repair’s rise, product life extension nonetheless will become a meaningful strategy for implementing circularity at scale.

Lauren Phipps is Director & Senior Analyst, Circular Economy, at GreenBiz Group

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How Yerdle helps Patagonia, REI and Eileen Fisher do ‘recommerce’

Can a scrappy startup teach big brands new tricks in the age of circularity?

BY JOEL MAKOWER

Nearly six years ago, two pedigreed sustainability professionals launched yerdle, a trust-based online platform to find or exchange underused goods — the ski boots, exercise equipment, baby clothes, kitchen appliances and more that take up space in so many of our attics, basements and closets.Yerdle was a mash-up of eBay and Facebook, a way to leverage your trusted network of friends, and friends’ friends, who wanted what you no longer needed, and vice versa. As I described it back in 2012:

> Yerdle sees itself as a new kind of retailer — a budding, next-gen Walmart, if you will — but rather than storing things in warehouses and stores, like Walmart and others do, yerdle’s warehouses are your friends’ closets, attics, and garages.

The service had a modest following, but never gained sufficient traction to create a profitable company. Along the way, the founders — Andy Ruben, who had served as Walmart’s first sustainability director, and Adam Werbach, an activist turned entrepreneur who sold his marketing-communications firm to Saatchi & Saatchi — started tinkering with the model. Changing consumers’ consumption habits turned out to be more complicated than simply setting up a swap shop. And warehouses, it turns out, are a necessary evil. Today, Yerdle has grown up. (Among other things, the company has shed the lower-case Y in its name and now sports a capital letter, like most other proper nouns, and has appended “Recommerce” to its name.) Ruben has taken the reins; Werbach has moved on to other pursuits. The business model has shifted to accommo-

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Buying used isn't always easy: 'Friction gets in the way.'

date the times. Yerdle's pivot is to a "white label" service for apparel retailers such as Eileen Fisher, Patagonia and REI, enabling those companies' customers to return used goods for store credit. Yerdle then repairs and refurbishes those goods so that the apparel companies can sell them again as refurbished under their own brands, complete with warranties, customer service and return policies.In some ways, it was a natural progression. The original peer-to-peer swapping model had convinced Yerdle's founders that something very powerful was going on, especially when it comes to a handful of higher-end brands."People aspire to certain products and brands," Ruben told me recently during a conversation in Yerdle's warehouse in Brisbane, California, about five miles up Highway 101 from San Francisco International Airport. Many of these products are priced out of reach for many customers, especially young consumers, he noted. "Buying used is a great solve for that."Yerdle is hardly the first company to traffic in refurbished apparel. Other retailers include The Real Real, which sells high-end brands of mostly women's apparel; Rent the Runway, which offers a rental service for clothing; thredUP, "the largest consignment and thrift store"; and Renewal Workshop, which, like Yerdle, handles returns and refurbishing for a select few brands. And don't forget eBay, Pinterest and Etsy, all of which offer recycled and repurposed fashion, some of it tricked out with embroidery or other user-created enhancements. But buying used stuff isn't always easy, said Ruben: "Friction gets in the way." He explained: "Can you trust who you buy it from? What are their return policies? Is it going to be worth your time to even go on their site?" All of these things can make or break any online retailer, especially one peddling previously owned goods. Yerdle's strategy is to enable apparel brands to develop their own online recommerce marketplaces under their own names, without having to build a whole new website or warehouse. On the day I visited the Yerdle warehouse, a couple dozen employees were engaged in a wide variety of tasks: At one end, workers were opening crates of clothing returned to Eileen Fisher, Patagonia and REI, Yerdle's three current partners. Each item is inspected, inventoried, cleaned, repaired, photographed and placed on the partner's website. Eventually, it will be picked, packed and shipped to a customer. All of this is done by Yerdle under the partner's brand. The end consumer never sees the Yerdle name. Yerdle's recommerce play was launched in the middle of last year and ended up generating "several million dollars of revenue" in 2017, said Ruben, who wouldn't provide exact figures. "We will be five to six times that this year. The growth is pretty significant and is just growth coming from our existing partners." As Yerdle adds new part-

ners and more consumers catch on, revenue stands to grow exponentially. The young company's growth mirrors the growing acceptance of refurbished merchandise. "The resale space is growing at 25 times traditional retail and five times ecommerce," said Ruben. "And it's doing that predominantly because people aspire to these brands that are inaccessible based on their price point." Eating their own? So far, only a handful of apparel brands are cottoning to recommerce. For many, there's a natural fear that by making refurbished versions of their products available, they'll cannibalize sales of new ones. Ruben believes that's shortsighted. "The used business is happening whether a brand promotes it or not. So, the real question is, does a brand want to partake in what is happening in a consumer-driven economy? There is a different customer for these used products than for new products. A brand participating in this space gets access to a group of customers that weren't necessarily shopping them before." Patagonia is a case in point. Its Worn Wear service, which Yerdle operates, repairs and refurbishes used gear, or recycles it if it doesn't meet quality standards. "They're loving it," said Nellie Cohen, the Worn Wear program manager, when I asked her recently about consumers' response to buying used. "We're attracting a lot of new customers to the brand. Obviously, for Patagonia, a barrier to entry for a lot of people is price. So, the opportunity to bring people into our brand who may be able to afford Patagonia, but not through us — through

The used business is happening whether a brand promotes it or not. So, the real question is does a brand want to partake in what is happening in a consumer-driven economy.

super-discounted or used at a thrift store — can now buy directly from us."Patagonia began working with Yerdle way back in 2013, when the newly minted startup tested a swap service in the front of Patagonia's flagship San Francisco store. (The company is an equity investor in Yerdle.) "We're celebrating with them the fact that products should be rated by how many great experiences they have for you over the years, not just how much it costs," Werbach told me at the time.It was a prescient move.According to Ruben, the average age of a customer buying used is 20 years younger than the conventional customer. Millennial consumers often prefer experiences over stuff. They don't view something being refurbished or previously owned as a barrier; indeed, it can be a badge of honor, the sign of a savvy shopper. They are also digital natives, for whom shopping is commonly done on phones and other gadgets. As such, they value having all the information they need at their fingertips, literally. Recognizing this, Yerdle has stocked its clients' pages with product specs and reviews and conveniences like two-day shipping that people have come to expect with buying online."This is an entirely new way to think about these items," said Ruben. "It's akin to car ownership or having your music in the cloud. It's a freedom, a different way to operate. If you look at Rent the Runway and the idea of having the world's largest closet, you start to think about access to the brands and the items you want when you want them."Whither sustainability?Interestingly, the sustainability part of Yerdle's value proposition is muted, to say the least. You won't find the S-word on Patagonia's Worn Wear, Eileen Fisher's Renew or REI's Used Gear websites, or any overt references to environmentalism, sustainable consumption or anything of that sort. That's the way it should be, said Ruben. "While recommerce is the biggest thing I know of for sustainability, I love the fact it doesn't have to lead the proposition." Indeed, recommerce brands are trying to get a handle on the reduced environmental footprint of reused goods. "The data has been hard to get at," said Ruben. "It's messy. And it's hard for a brand to really influence the customer usage. Rather, companies like Eileen Fisher and Patagonia are saying that you don't need to buy a new one if there is a perfectly good one because we've made a well-made item. We can pull it back if you're not using it and get it to the next person who

will." That is: Quality is the new sustainability. Nellie Cohen echoes that sentiment: "Having a reuse business doesn't necessarily make sense for every company. You have to be a company that builds quality products to begin with. We've made that commitment and that is what has enabled Worn Wear to exist. If we didn't have the designers and materials developers and production sourcing teams that work so diligently behind each product we make, we couldn't do it." Regardless whether sustainability resonates, recommerce is destined to grow in appeal among the environmentally aware, and not just in apparel. Consumer electronics, kitchen appliances, sporting equipment — almost any durable item can participate. We already buy used cars by the millions. As it spreads to more product categories, and as enabling technologies facilitate tracking of these goods and materials, there will be a new business mindset, said Ruben." Brands that are following every item they sell realize that if they do their job right, every time they make a first sale, they can be setting up the next movement of that item. I would expect in two to three years to see a lot more technology helping brands follow their items — not just upstream in the supply chain but through consumer use as a way to service customers better." And in the process, maybe sell the same item twice, thrice or more.

Joel Makower is Chairman and Executive Editor at GreenBiz Group


PROCTOR & GAMBLE

P&G's circular economy strategy now includes water and (yes) diapers

Will the giant consumer packaged goods company place itself head and shoulders above the rest?

BY HEATHER CLANCY

Procter & Gamble, which last year introduced the first consumer-grade bottle made from plastic collected from beaches and oceans, is stepping up its circular economy initiatives as part of new corporate sustainability goals for 2030 (automatic PDF download) disclosed Monday. Of particular note, considering the heightened focused on corporate water stewardship: P&G has pledged to embrace recycling and reclamation processes for about 5 billion liters of the water it uses annually for manufacturing, which amounts to about 10 percent of current consumption. That effort will leverage technologies, design and operational processes that last year helped a beauty products manufacturing facility in a water-stressed region near Shanghai, China, reach a 95 percent water reuse rate. The site in Taicang is known as the "Chinese Water Garden," because it is surrounded by a park that both employees and the general public can visit. The plant makes the Head & Shoulders, Pantene and Vidal Sassoon brands. It was P&G's first site in China to achieve "zero waste to landfill" status, and it was also the first to switch over to wind power, consuming about 6 million kilowatt-hours per year. Among the water features there are wetlands, permeable paving, bioswales and vegetated roofs that capture water and reduce the "heat island" effect at the facility. "Water is cheap, so to invest in water treatment, you need more than just the financial," Virginie Helias, vice president of global sustainability at P&G, told me. "You really need the passion to believe in the end that it is the right thing to do. And in the end, there was a lot of savings, which is often what happens. When it starts, you don't know what

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How can we find outlets for our waste that are useful for others?

you'll wind up with. And here, it turned into a great investment." P&G's circular model for this approach uses a system for treating washwater that includes dissolved air flotation methods, biological tanks and reverse osmosis technologies. This approach also helped reduce the amount of water needed for cleaning production and packaging equipment. Part of the treated water is directed into the cooling towers (which accounts for about 60 percent of the recycled water), while the rest is vaporized and redirected into other on-site processes.

According to a case study published about the project, the investment delivered helped reduce:

- Costs for purified water
- Heating expenses related to steam equipment
- Overall fees for cleaning and sanitization, and for water disposal via trucks

P&G has engaged World Resources Institute to help it assess what locations to prioritize based on an analysis both of its largest consumer brand market and its corporate operational footprint, Helias said. So far, it has determined that about 30 percent of its industrial sites (40 locations) are in water-stressed areas. A master committee will share some processes pioneered in Taicang with other manufacturing locations, as it makes sense for the local teams. "That's really the lighthouse. This is what we'd like to have on all our sites," she said, pointing specifically to the plant's water reclamation systems.

A second life for soiled diapers?

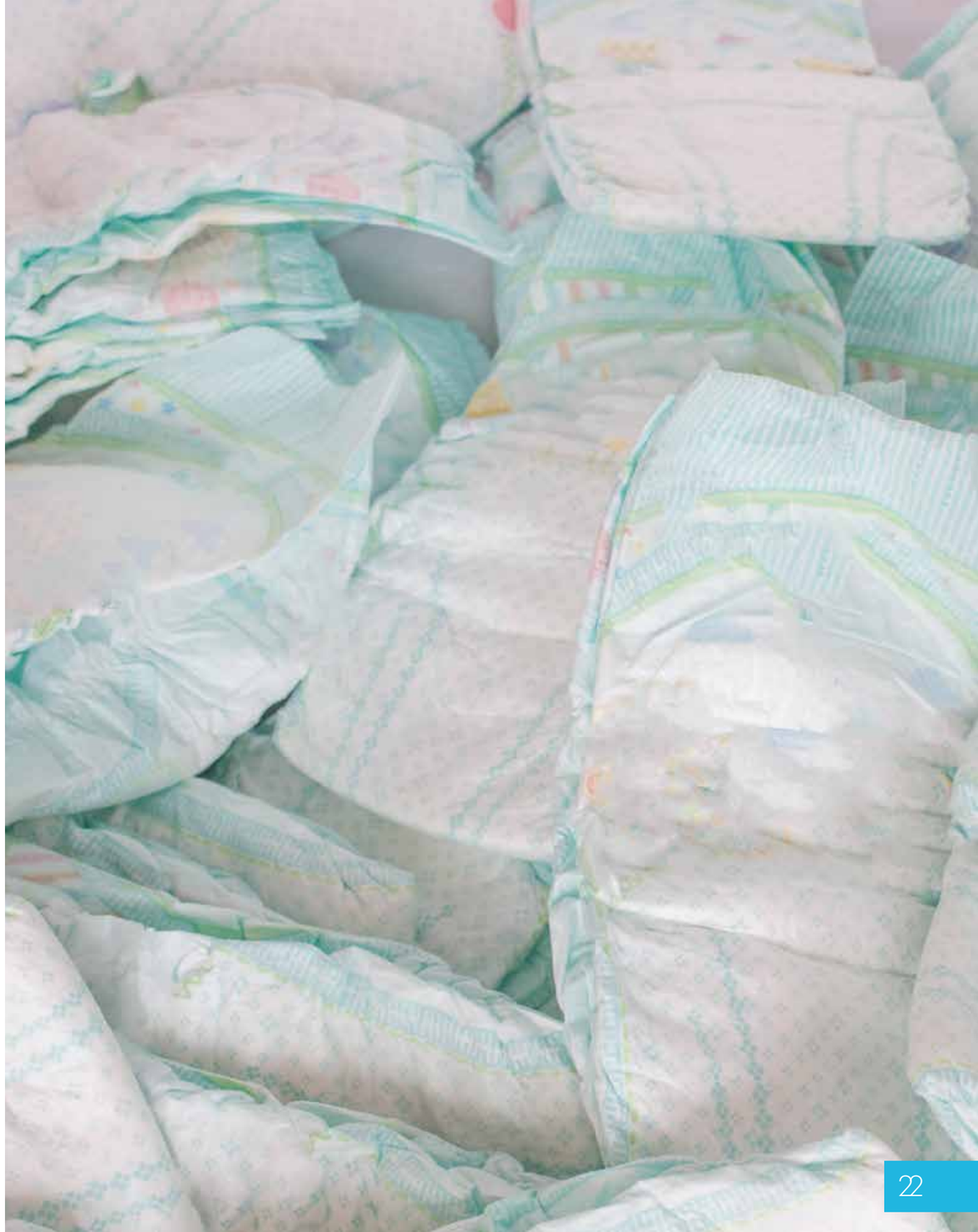
The company is also ramping up its plans to tackle another area for which there are few solutions today: developing and scaling the recycling infrastructure for soiled disposable baby diapers, feminine sanitary napkins and adult incontinence napkins."We have invented a technology that can turn 100 percent of diapers into valuable material, like plastic cellulose and absorbent material," Helias said. The first place P&G will introduce this system near Venice in Italy, where the company has set up a joint venture with Gruppo Angelini, a large Italian health care products company. The organization, Fater, has built an industrial-scale plant at a waste management operation that collects and processes material for more than 50 municipalities.The technology sanitizes the diapers, then separates the various materials used in their construction. Each ton of used hygienic material produces about 150 kilograms of cellulose, 75 kg of mixed plastic and 75 kg of absorbent material, according to a press release issued in October. The facility can handle about 10,000 tons of collected material annu-

ally, it estimates. That covers about 1 million people. The aspiration is to be up and running with "full diaper recycling" in 10 major cities. The next facility will be in Holland, and P&G is discussing the model with municipalities in India and other places where diaper littering is a huge health issue. P&G will work with cities to encourage the development of scalable collection systems. It is working with a consortium of about a dozen other companies, founded by a European Union grant, which are exploring ways to increase the value of the raw materials. "We have qualified the business model; we are ready to scale," Helias said.

Turning waste into worth

P&G's exploration of waste-related circular economy models is shaped by two high-level commitments:

- By 2020, it aims to send zero production waste to landfill. Right now, it's at a rate of about 80 percent worldwide with sites in certain countries, such as China and Japan, reporting in at the 100 percent level.
- By 2030, the company's 20 "leadership" brands such as Head & Shoulders, Febreze, Pampers, Pantene and Tide will use 100 percent recyclable or reusable packaging. Today, an estimated 86 percent of its packaging is recyclable.



While the company isn't talking much about its plans to reuse packaging, Helias hints that news on that front is on the horizon — it's researching and piloting the idea now; cleaning the returned containers is one of the largest challenges. Meanwhile, it's focusing not just on whether materials have a second life but on plugging gaps in the collection system and creating market demand for recovered materials. For example, P&G is working toward doubling the amount of recycled materials that are in its packaging by 2020. One example of what it is already doing is the ocean-plastics bottle that it created in collaboration with TerraCycle and recycler Suez. Developing a market for recycled materials is the responsibility of the P&G Global Asset Recovery Purchases team, which imagines new applications for production scraps and other industrial waste. For example, in China, waste from one facility is being used to as a material for bricks, while in India some scraps are used for creating residential and commercial wall partitions. "How can we find outlets for our waste that are useful for others?" Helias mused.

Heather Clancy is Editorial Director at GreenBiz Group

Home Depot is coming full circle

The home improvement giant is designing the circular economy into the built environment.

BY HOLLY SECON

Earlier this month, home improvement retail giant Home Depot quietly released its updated annual sustainability report. Like many other major U.S. corporations in the post-Paris Agreement era, the retailer has set ambitious targets for achieving better energy efficiency, more responsible sourcing and managing waste. Home Depot's blueprint for meeting those goals, however, is relatively unique among large retailers. That's because the company's low-key approach to constructing a more sustainable future relies heavily on employing circular economy principles throughout its operations. Designing circular economy ideals into a conventional big-box store is a pretty complex task. While the circular economic model aims to eliminate waste, cut emissions, keep materials at play and regenerate natural systems, retailers traditionally have acted pretty linearly: extracting resources; manufacturing products; and selling to customers to dispose of as they see fit. While Home Depot is no exception to that historical model of consumption, the construction supplier sees itself in a unique position to reduce the environmental impact of the products it sources while helping customers create more resilient environments themselves. Ron Jarvis, vice president of environmental innovation and a 20-plus-year veteran at the company, said the decision made sense for where the company (and the planet) were headed. "Circular economy is the next phase of recycling that puts more thought into the design and end of life stages of a product's lifecycle," he said. "We hope the expansion of circular economy products will create a decrease in natural resource depletion and raw materials demand." Not to mention, new research suggests that the rise of the circular economy could unlock $4.5 trillion in new economic growth by 2030. Thinking about sustainability is nothing

new for Home Depot, according to Jarvis. After the company's inception in the late 1970s, subsequent considerable expansion and ensuing criticism by environmental activists, the retailer began to work on transparency across its supply chain and product labeling in the early 1990s. It officially formed its sustainability strategy in 1999, under the direction of co-founder Arthur Blank, and enlisted The Natural Step process to help merchants procure more sustainable merchandise. (If Natural Step sounds familiar, that's because it was also the sustainability framework used by the likes of carpet company Interface, athletic clothing corporation Nike and furniture retailer IKEA.) After examining Home Depot's full supply chain, the sustainability team realized that with more than 174,000 products in about 2,200 stores across the United States, almost all of the company's environmental concerns came from what it was selling. Still, in the late 1990s and early 2000s, there was minimal U.S. consumer demand for green construction supplies.

Standards and audits

Forging ahead, the company set standards for its suppliers, only sourcing from those that complied and conducting internal audits to ensure that the benchmarks were met. Jarvis pointed to efforts to cut harsh chemicals in paint and paint thinners, as well as to establish sustainable wood sourcing guidelines for everything from its lumber to the knobs on pull chains in its ceiling

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fans. In 2007, Home Depot implemented a sustainable products classification program called Eco Options. Consumers could choose to buy environmentally friendly goods — and even if they didn't, that's still what they were getting, Jarvis said. More recently, though, both climate change concerns and market changes have shaped new sustainability efforts and priorities for Home Depot. The company is planning fewer new store openings these days, but it is launching more distribution centers across the country; meanwhile, stakeholders have become more interested in setting and meeting science-based targets. The most accessible way retailers typically flirt with circular economy principles is through packaging, and that's how Home Depot started, too. By recycling plastic packaging along with wood scraps, the company sold its waste back to a supplier to create composite — keeping both materials in play. Reverse logistics can create

some convoluted loops in the circular economy but navigating them manages to save valuable virgin material, especially in the midst of the war on plastics, said GreenBiz analyst Lauren Phipps. It also saves on extra transportation emissions. Home Depot also has focused on cutting suspect chemicals out of its products, especially for paint, carpet, insulation, vinyl flooring and household cleaning product, according to communications manager Yang Yang. That helps products last longer without endangering the health of customers and other building inhabitants. Home Depot has had some of its products certified by Cradle to Cradle Products Innovation Institute (C2CPII), a third-party certifier active in the circular economy field. C2CPII President Lew Perkins said in a statement: "Cradle to Cradle Certified offers a pathway for Home Depot and its suppliers to work together on improving the human and environmental health and safety of products for the built environment." There are special concerns for buildings' great impacts on climate change, but also, climate change's impacts on buildings. And therein lies another opportunity for Home Depot. As natural disasters continue to affect communities, residents needing to rebuild will need safer and healthier materials. Jarvis also spoke about the need to keep Home Depot stores open for these emergencies and pointed to new energy independence and storage projects, as well as light and HVAC in-store retrofits. (It doesn't hurt that these initiatives also should help the company meet its goals to cut absolute emissions by almost 40 percent by 2030.) In the past, Home Depot has met criticism for its chemical use and sourcing policies. The company is under investigation by the U.S. Environmental Protection Agency for alleged lead paint removal mishandling (although this did lead to announcements of more toxics bans). And Home Depot only recently (PDF) withdrew from sourcing lumber from a few key conflict areas. Jarvis also acknowledged that while Home Depot does what it can to mitigate the end-of-life impact of products, like offering battery recycling, it can't guarantee that every product will find a loving home at the end of its life. That said, he supports building out more recycling infrastructure for all consumer products and actively encourages consumer awareness campaigns.

Most retailers flirt with the circular economy through creating more circular packaging, and that's how Home Depot started, too

Holly Secon is Associate Editor at GreenBiz Group

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How REMADE could drive innovation in circular manufacturing techniques

Think of it as a multi-disciplined proving ground.

BY RP SIEGEL

The challenges involved in converting the global economy from linear to circular processes and consumption habits are massive, multi-faceted and multi-dimensional. Considering the technological, policy, marketing, logistical and infrastructural innovations that will be required, it is clear that the solutions will be bigger than any one player — or even any one group of industry-specific collaborators — can orchestrate. Such a monumental challenge requires a monumental effort. The REMADE Institute is one such effort, funded with $70 million from federal funding sources and $70 million from its various members. Composed of 26 universities, 44 companies, seven national labs and 26 industry trade associations and foundations, it's the largest and most comprehensive effort (at least in the United States) focused primarily on addressing the changes required to retool remanufacturing processes for the circular economy. That includes finding ways of expanding the list of recyclable materials and improving the efficiency with which they can be extracted and reprocessed, as well as improving processes for remanufacturing products from recycled cores, which is what the products are called when they are returned at the end of their life. REMADE is also looking for ways to reduce industrial greenhouse gas emissions, which today comprise 21 percent of the global total, making it the third largest sector. While many of these issues are being addressed by individual companies as well as consortia such as Project Effective in Europe, the REMADE Institute intends to engage a broader scope of players in its endeavor to "dramatically reduce the embodied energy and carbon emissions associated with industrial-scale

The early-stage research could provide a proving ground that ultimately can grow these new disciplines and capabilities to levels commensurate with conventional manufacturing practice.

materials production and processing." Participating companies include Caterpillar, John Deere, Alcoa, Davies Industries, Unilever, Nike, First Solar and Michelin. The institute (the name derives from the phrase Reducing EMbodied-Energy and Decreasing Emissions) is specifically charged with finding new and less expensive ways to reuse, recycle and remanufacture metals, fibers, polymers and electronic waste. Here are some of its specific targets:

- Systems analysis and integration
- Design for reuse/disassembly
- Manufacturing material optimization
- Remanufacturing and reuse
- Recycling and recovery

In a sense, this is a new industry with new processes and requiring new equipment and new skills. So, the early-stage research prioritized by REMADE is intended to provide a proving ground that ultimately can grow these new disciplines and capabilities to levels commensurate with conventional manufacturing practice. At the administrative level, the institute operates as a grant-maker, soliciting proposals from within its membership that are focused on offering solutions relevant to each of the five functional areas listed above. Selected proposals receive funds, as well as oversight resources. Twenty selections from the first round of 106 proposals recently were chosen to receive funding. A few examples help to illustrate the kinds of efforts that REMADE is supporting:

- **A framework for managing end-of-life solar technologies:** Given that the first solar installations will be approaching the end of their useful life in the near future, it's not too soon to consider how these materials will be managed when those installations are replaced or deconstructed. A project backed by University of Pittsburgh, University of California, Irvine, First Solar and the National Renewable Energy Laboratory is exploring a new solar design framework that will incorporate material recovery from the outset.

- **New approaches for removing contaminant:** Many metals require high levels of purity to meet performance requirements. The presence

of contaminants seriously can erode the value of recycled metals. An initiative led by Ohio State University, Alcoa and CompuTherm intends to advance new methods for contaminant removal.

- **Establishing more efficient sorting methods for plastic packaging:** American Chemistry Council, Resource Recycling Systems and Idaho National Lab are spearheading a project to "examine barriers along every stage of the recovery process. [This effort's] goal is to gather data on the efficacy of new types of sortation equipment, the impact that equipment has on quality of other commodities processed in the materials recovery facility (MRF), the market potential for recovered film and flexible packaging, and more."

The use of collaborative teams from academia, industry and the national labs improves the chances of developing solutions with broad applicability. "Local optimization does not always lead to global optimization," Nasr said. "Here, we're comprehensively looking at the whole system and defining broad goals. Before this, you wouldn't see people working in recycling technology, and manufacturing and design, all working on the same projects."

What's in it for the companies?

Caterpillar has been in the business of remanufacturing for over 20 years. Today, it remanufactures some 2 million components annually, which equates to some 148 million pounds of iron across a broad range of parts ranging from flywheels to fuel injectors to complete engines, according to the company's website. Caterpillar recognizes that a lot more recoverable value can be gained from an old engine by tearing it down and rebuilding it, and adding new components where needed, than in simply melting it down and starting over from scratch. The result is considerably less resource usage and better value all the way around. Over the 20-plus years, the company's ability to recapture value from remanufactured items has continued to grow. One of REMADE's funded projects — in which Caterpillar is participating along with RIT and CoreCentric, a company that specializes in "reverse logistics supply chain service solutions"— is called "Condition Assessment of Used Electronics." The aim of the project is to expand upon the ability to assess electronic parts being returned for their remaining useful life, using automation. This could help Caterpillar expand the portfolio of parts that it effectively can recover. SunnKIng, a western New York company that specializes in collecting, processing and redistributing electronic equipment at its end of life, is also working REMADE to rethink its business model. Matt Plummer, environmental, health and safety compliance manager for SunnKing, said the company began life by identifying usable items and selling them on eBay. From there, the organization evolved into a repair facility with extensive sorting capabilities. Today, SunnKing recycles 25 million pounds a year, including a significant amount of

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toxic metals and other dangerous substances. It's a private company performing a largely public service. The business model is a challenging one, especially given the continually fluctuating prices of commodities such as metals. SunnKing's REMADE project is called "Evaluation of Logistics Systems for Collection, Reprocessing, and Production of Secondary Feedstocks from e-Waste." Under the initiative, SunnKing will partner with Idaho National Lab, which has done extensive work on e-waste recovery. The processes they develop could allow companies such as SunnKing to operate far more efficiently, according to the institute. Through projects such as these, REMADE is poised to make substantial contributions to the science and art behind the circular economy. With four years remaining in its DOE grant (after which the organization intends to become self-sustaining), you can expect to see much more.

RP Siegel is a contributing writer at GreenBiz Group

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