IKEA – Evaluating End-of-Life Strategies for Appliances, Mattresses, and Sofas in the United States

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Company Background

Overview of IKEA
IKEA was founded in 1943 by Ingvar Kamprad in Sweden, and is a privately-held company that designs, manufactures, and sells furniture, appliances, and household goods. Through August 2012, the consolidated IKEA Group employed 139,000 “co-workers,” and operated 298 stores (including 38 in the United States) across 26 countries.¹

The Company has continued to experience tremendous growth. In fiscal year 2012, the IKEA Group generated revenues of €27.6 billion, which represented a 9.5 percent increase over fiscal year 2011.² IKEA offers approximately 9,500 products, and attracts 690 million visitors to its stores annually. To support its operations, IKEA has contracted over one thousand home furnishing suppliers across 53 countries.

IKEA and Sustainability – People and Planet Positive
To align its sustainability strategies, IKEA developed the People and Planet Positive strategy aimed at establishing sustainability as an everyday element across all its operations. The initiative captures a range of specific global sustainability targets that IKEA commits to reach by fiscal year 2020 in three key areas:

1. **A more sustainable life at home:** A commitment to launch products and solutions that enable customers to adopt more sustainable lifestyles and to educate and inform customers about sustainability
2. **Resource and energy independence:** Securing access to sustainable raw materials and developing solutions to reduce the use of resources and to promote recycling
3. **Better life for people and communities:** Driving positive impact in communities, and ensuring that IKEA’s code of conduct is extended throughout its value chain

Among its sustainability initiatives, IKEA has also identified its role in contributing to a closed-loop society. As part of the three goals defined above, IKEA recognizes that its impact extends beyond its manufacturing and retail operations. Moreover, IKEA understands that measuring impact includes a full lifecycle analysis concerning the ultimate disposal of its products at end of life. Accordingly, as part of its ongoing partnership, IKEA collaborated with the World Wildlife Foundation to analyze the opportunities and challenges of recycling through its joint Closing the Loop (CtL) project.

Project Overview and Objectives
With the CtL project in mind, the MIT S-Lab team was engaged to support IKEA to study end-of-life solutions in the United States for key IKEA product categories. To date, IKEA has successfully implemented a number of these programs in select international markets, most notably in

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¹ IKEA Group. *IKEA Group Yearly Summary FY12. 2012*
² IKEA Group. *IKEA Group Yearly Summary FY12. 2012*
Europe. Given the success of its programs, IKEA is interested in understanding the feasibility of implementing similar programs in the United States.

Accordingly, in collaboration with IKEA, our project objective focuses on the evaluation of the challenges and opportunities in designing end-of-life solutions for mattresses, appliances, and sofas in the United States. Specifically, we are assisting IKEA to:

1. **Understand the landscape**: Identify and map strategic barriers, risks, and opportunities for recycling and reuse in the United States
2. **Evaluate potential end-of-life strategies**: Develop a framework to assist IKEA in evaluating the feasibility of potential strategies given strategic barriers, store-level constraints, and IKEA’s operating goals

**Pilot market selection**
To focus the scope of our study, the S-Lab team and IKEA chose three pilot markets based on the following criteria:

- **Geographical coverage**: To better understand regional challenges and opportunities across the United States, we selected pilot markets in different geographical locations
- **Adequate infrastructure**: We selected markets with a baseline level of recycling and reuse infrastructure in place to ensure that proposed strategies could be implemented. In addition to our independent research, we had discussions with the Business Development Manager, Sustainability Services at Waste Management to verify the viability of different markets
- **IKEA resources within the market**: In collaboration with IKEA, we ensured that each pilot market has adequate resources to support our study. Specifically, IKEA indicated that the operations vary by store, so for this criterion, we relied on IKEA’s insight

Using these criteria, we developed an initial list of nine markets:

- **West**: Burbank, CA; Emeryville, CA; East Palo Alto, CA; Seattle, WA; Portland, OR
- **Northeast**: Stoughton, MA (As a result of our fieldwork, both the S-Lab team and IKEA were comfortable with selecting Stoughton as the Northeast market. Accordingly, we did not consider additional stores in this region)
- **Southeast**: Atlanta, GA; Round Rock, TX; Orlando, FL; Tampa, FL
Based on the aforementioned criteria and IKEA’s guidance, the S-lab team elected to pursue the Burbank, Stoughton, and Tampa markets.

Project Methodology

Overview of Methodology
To address our project objectives, we divided our project methodology into two stages to evaluate the risks and opportunities holistically. Thus, our project methodology was carried out through the research and the analysis phases.

I. Research Phase
We used primary and secondary research to understand and map the current regulatory and infrastructure landscape in the United States, to capture the concerns and experience of IKEA coworkers, and to learn the perspectives of relevant external experts and organizations. This stage of the project was particularly critical as it allowed us to gain a deeper appreciation for the challenges that IKEA’s sustainability team faces, while providing us with a foundation to develop a framework to evaluate potential end-of-life solutions.

Internal Documents
We read IKEA presentations, correspondences, procedures and policies, and store-level key performance indicators (KPI) that were made available to us throughout the project. These resources were particularly useful in understanding the company-specific goals and challenges faced by IKEA and allowed us to tailor our analysis to fit the needs of the company.

Fieldwork
The S-Lab team visited the IKEA Stoughton store in April 2013. While on-site, we were given a detailed overview of the store and its sustainability operations. This visit allowed us to better...
understand the culture, priorities, and challenges that exist within an IKEA store. As part of this store visit, we had the opportunity to meet with co-workers across a variety of functions, including local marketing, operations, customer relations, recovery, goods flow, and sales functions.

**Interviews with IKEA Co-Workers**
Throughout the project, we had the opportunity to interview a number of IKEA co-workers. These discussions allowed us to better understand the perspectives of key stakeholders at both the corporate and store levels. Our discussions were held with co-workers across a variety of roles and geographies, including:

- Business Development Manager (global)
- Project Manager, Resource Chain (global)
- Operations Manager (store)
- Store Manager (store)
- Local Marketing Specialist (store)
- Kitchens Shopkeeper (store)
- Customer Relations Manager (store)
- GFO (Goods Flow) Manager (store)
- Recovery Team Lead and Recovery Manager (store)
- Quality Co-worker (store)
- US Sales Leader, Upholstery
- US Corporate Attorney
- Customer Logistics Manager (US)
- Service Office Business Manager (US)
- Strategic Purchase Manager (US)
- Sustainability Manager

**Interviews with External Parties**
In addition to IKEA co-workers, we reached out to a number of non-profits, trade associations, corporations, and government agencies to supplement our research and allow us to better understand the current and anticipated landscape for potential end-of-life solutions. These organizations included the following:

- Waste Management
- Product Stewardship Institute
- Environmental Protection Agency’s Responsible Appliance Disposal Program (EPA RAD)
- Retail Industry Leaders Association
- Association of Home Appliance Manufacturers
- International Sleep Products Association (ISPA)

**II. Analysis Phase**
In the analysis phase of our project, our key objectives were to translate insights captured during the research phase and develop an analytical framework to evaluate different end-of-life solutions.
Waste Management Hierarchy

To guide our analysis, we utilized the traditional waste management hierarchy to provide a baseline framework for evaluating the most and least desirable solutions. The framework provided us with a general guideline to rank the environmental impact of potential end-of-life solutions. However, we recognize that the hierarchy is a heuristic and cannot be applied uniformly. Specifically, when ranking different strategies by environmental impact, it is critical to put into context how the products are being used. Thus, the ranking of strategies may change, particularly when a more holistic lifecycle analysis is performed.

![Waste Management Hierarchy Diagram]

Figure 2: The EPA’s Waste Management Hierarchy
Source: US Environmental Protection Agency: Solid Waste Management Hierarchy

- **Source Reduction and Reuse** focuses on reducing waste at the source. Relevant preferred solutions with respect to our project include the reuse or donation of old products, rather than disposal through other means
- **Recycling/Composting** includes a range of different activities that process disposed products into raw materials that can later be used to remanufacture new products
- **Energy Recovery** is the process converting waste into useable energy (e.g., electricity or heat), generally through incineration
- **Treatment and Disposal** is the least preferred option on the hierarchy, and it is typically associated with the disposal of waste in landfills

In collaboration with IKEA, we narrowed the range of possible end-of-life solutions to those that fit within the first two categories, reuse or recycling.

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Case Studies

The S-Lab team analyzed a number of case studies, including programs that have been successfully implemented internationally, to better understand the spectrum of potential end-of-life solutions available.

**IKEA UK – “We Want Your Old Furniture” take-back scheme**

IKEA UK has implemented a formal program whereby it collects old sofas, beds, mattress, and kitchen appliances as part of its home delivery service. Customers that use the program are charged a flat £15 fee (per unit), and the service must be booked in conjunction with IKEA’s home delivery service for orders of an equivalent product. Operationally, collected products are then consolidated by local charities, which repair and repurpose the items for use by individuals or families in need. If collected products are deemed unfit for reuse, they are disassembled and recycled in an environmentally responsible manner.

**IKEA Sweden – The Buy & Sell Site**

In partnership with the classified website Blocket, in 2010 IKEA Sweden launched a service for IKEA Family Members (IKEA’s loyalty program) to sell second-hand products online. Strategically, IKEA has not designed the program to provide any incremental revenue to the company. Rather, the program is free for Family Members. It aims to facilitate the buying and selling of used IKEA products. While the Family Members program is also offered in the United States, and is free to join, the Buy & Sell site does not exist today for IKEA in the United States.
IKEA France – Seconde Vie (“Second life”)
IKEA France offers a service to take-back “second-hand” furniture from customers, which it then resells “as-is.” The “as-is” department, which is also offered in the United States, is a specific area within an IKEA store that sells discounted products that may have blemishes (e.g., “scratches and dings”). Typically, these products were on display or have been returned and cannot be placed back onto the floor. These products are inspected and recertified by IKEA’s in-store recovery team and sold in the “as-is” section.

Under the Seconde Vie program, customers fill out a form and submit information to describe the condition of qualifying used products. These are then inspected by IKEA staff, and if approved, they are accepted for re-sale. The customers returning products receive gift cards at pre-stated amounts (typically capped at 50% of the catalogue price), based on the relative condition of each item.

The Seconde Vie section of the website also includes tips on repurposing or donating used products and a link for customers to sign up for in-store workshops on similar topics.

IKEA Canada – Mattress Recycling Programs
IKEA Canada launched a pilot program aimed at encouraging mattress recycling in the Greater Toronto Area in Canada in 2012. Under the program, customers that purchase a new mattress have the option to get an old mattress removed for recycling for $10.
Operationally, the IKEA stores currently running the program maintain a trailer on-site, which can store up to 180 mattresses. Co-workers are trained to safely handle the used mattresses, which are consolidated and hauled away for recycling once the trailer has been filled.

**Competitor Programs in the United States**
Currently, there is a wide range of end-of-life services offered by competitors across various product categories. We highlight several of these programs below as reference to the competitive landscape for such services.

**Best Buy**
Best Buy is a national retailer of appliances and consumer electronics. The company offers a free service to remove an old appliance when a replacement Best Buy product is purchased and delivered. Additionally, the company offers a standalone haul away service that costs $100 for the pick-up of two standard appliances and $200 for each additional appliance. As a member of the EPA RAD program, Best Buy outsources the disposal of the used appliances that it collects to third party recycling services. The company has established internal guidelines to ensure that only “qualified, respected recycling companies” are engaged.

**Sears and Macy’s**
Sears and Macy’s are both mid-range department stores in the United States. Sears’ take-back program is in connection with its “Big Switch” campaign, which encourages customers to replace older appliance models with more efficient, ENERGY STAR products. Sears offers haul away service at the time of new appliance delivery for a $10 fee. Similar to Best Buy, Sears is also part of the EPA RAD program. Sears discloses that it recycles the discarded refrigerators and freezers that it collects. Additionally, Sears offers a California-specific recycling program, in which the company picks up and recycles one old appliance (even without a qualifying purchase from Sears) for $75 for the first unit and $25 for each additional unit.

Macy’s similarly offers a disposal service, limited to old mattresses, for a fee of $20 per unit. Macy’s does not disclose the manner in which it disposes of the mattresses.

**Sleepy’s**
Sleepy’s is a mattress retailer with 800 retail locations in the United States. The company does not advertise a mattress take-back service.

**IKEA US – Background and Current Practices**

**IKEA US take-back service background**
Customers that use IKEA’s home delivery service for a new appliance or mattress may also schedule the removal of an old appliance or mattress.
The US program is more fragmented than its UK counterpart, as each individual store is responsible for determining the price of the service, which typically costs $25 to $50 per unit. When we discussed the wide range of prices with IKEA’s Customer Logistics Manager and Strategic Purchase Manager, we learned that the variation across markets is caused by cost differences to dispose of the used products and level of competition for comparable services. One extreme example of this discrepancy is in the Tampa market, where haul away services are offered for free. In our discussions with the Tampa store, we learned that the price sensitivity of its customers and the intense competition in the area makes it difficult to charge for these services.4

Another key difference in the US program is the manner in which the appliances and mattresses are disposed. While the UK program actively markets the manner in which collected products are donated or recycled, this is more difficult in the US since disposal practices vary by market. Moreover, while IKEA’s contracts with its five home delivery providers contain standard language requiring used appliances and mattresses be collected and disposed of in a “environmentally-friendly manner,” this language is very vague. This vagueness of contract terms, coupled with a lack of a formal verification process, has resulted in limited transparency regarding how these products are disposed of across geographies. Specifically for mattresses, there is also a lack of formal regulations on disposal in nearly all jurisdictions in the United States, which contributes to this issue. However, federal mandates do exist for the disposal of refrigerators (Section 608 of the

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4 IKEA Tampa indicated, as an example, that competing stores are able to “throw in” incentives, such as free bedding and pillows, which IKEA does not do.
Clean Air Act on refrigerant recycling\(^5\), which we believe should be explicitly discussed within the contract.

Adding to the complexity is the highly fragmented reuse and recycling infrastructure in different markets across the United States. As a result, consistency and best practices vary by market. For example, IKEA indicated that only two stores in the United States provide plastic bags to customers to pre-bag used mattresses prior to pick-up. By requiring the delivery agent to bag used mattresses, it increases the risk of transmitting bed bugs, or outright refusal to pick-up. On the other hand, we learned that the Canadian pilot program offers all customers plastic bags as part of its mattress recycling program.

Finally, we note that IKEA’s haul away services are limited to appliances and mattresses. The third product category that we are currently evaluating – sofas – do not fall under the scope of the current program.

**Understanding the Landscape**

**Regulatory landscape**

In the United States, regulation differs greatly from city to city, even within a given region, for disposal of “bulky items,” which in some cities, includes all of the goods under consideration in this project.

In general, there are many more regulations for appliances than for mattresses or furniture, mostly because many appliances contain hazardous materials (such as mercury and refrigerants). Furthermore, manufacturers and recyclers have not pushed for regulation in furniture and mattresses. For one, solid waste management is highly fragmented at the local level. Additionally, these products are generally made up of lower value materials than appliances. Lastly, while there are generally fewer manufacturers of appliances, there are hundreds of manufacturers of furniture, making it more difficult and costly to enforce any specific furniture regulation.

In Tampa, sofas, appliances and mattresses are all collected in the same way: one week a year, the city will pick up any bulky items free of charge to residents. This Solid Waste Enhanced Environment Program (SWEEP) has collected 13,489 tons of bulk trash and debris from Tampa’s neighborhoods. The city does not specify what they do with any of these materials. Any resident of Hillsborough County are also allowed to bring 10 cubic yards of solid waste -- including furniture, mattresses, and appliances -- per year to a community collection center. After this point, residents would have to pay tipping fees directly at the landfill.

**Sofas**

Sofas fall under the category of bulky items, which are lumped together for regulation and financing at a city level. In the selected market areas, regulations around bulky items are summarized as follows:

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Within the greater Boston area, Somerville limits the amount of furniture you can leave on the street to 2 pieces per week (with limited regulation), while Cambridge, a neighboring town, has no limit to furniture discards. By comparison, in Charleston, South Carolina, renters or permanent residents who leave furniture at the curbside are fined.

Within Los Angeles County, bulky item disposal ranges from city to city. Lancaster residents are limited to 4 bulky item pick-ups per year with up to 4 bulky items each time, while Palmdale residents are allowed 4 bulky items each week. Unincorporated county residents can drop off their own bulky items (one per year) at the Lancaster landfill. In the city of Los Angeles, the city encourages citizens to donate bulky items to charitable organizations and thrift stores, but they offer free bulky item pick-ups with one day’s advance notice.

In Burbank, the city will collect any bulky item disposed of, including appliances (even refrigerators), mattresses, and sofas, as long as the city is given a minimum of two business days of advance notice. The collection of refrigerators is subsidized by Burbank Water and Power to encourage residents to upgrade to more efficient appliances. If the city cannot pick up a given item on the appropriate trash day, the collection will happen on the following Friday.

Mattresses

The states of Connecticut and California are furthest along in developing mattress recycling regulation. In California, the state legislature is reviewing a bill proposed by Senator Loni Hancock, which would require mattress manufacturers to recycle 75% of used mattresses by 2020 (SB 254). Manufacturers would be allowed to charge fees to retailers or consumers (preliminary estimates are for a fee of ~$25 per mattress). This bill passed the Senate Environmental Quality Committee unanimously in April 2013 and is now being considered by the state Senate. Importantly, this bill would require retailers to offer free pick-up of used mattresses when delivering new mattresses starting July 1, 2014 (although again, these fees could legally be built into the price of the new mattress).

In 2012 Connecticut introduced Senate Bill 89, which passed 32-4 in the state Senate before it was replaced by Bill 6437. Bill 6437 was introduced to the House in January 2013 to create a Mattress Stewardship Program, which, similar to California, would mandate that each producer be responsible for the free collection of discarded mattresses across the state at transfer stations and other “participating covered entities”. The fee to cover such a program would be set by the Mattress Stewardship Council (producers), but it would not exceed the cost of running the program and it would maintain fiscal reserves to run the program for in a “fiscally prudent and responsible manner.”


10. Connecticut General Assembly Bill 6437
version of this bill but was able to add language into the Connecticut bill that such a program be “technically feasible and economically practical” and now supports the proposal.

Overall, ISPA recognizes that Extended Producer Responsibility (EPR) will likely be created on a state-by-state level. One major concern expressed by ISPA is that small states such as Connecticut and Rhode Island, which are both considering EPR regulation, are so small that they may have leakage of mattress discards: manufacturers, retailers, or customers would travel across state borders to either buy or discard mattresses to avoid fees, depending on whether the retailer charges the customer at point of sale or take-back. Larger states such as California have less risk in this regard, as it is difficult for most consumers to travel outside of the state and more expensive for retailers or producers to travel outside to discard mattresses without recycling.

While ISPA and others feel that national regulation would be preferable to state-by-state regulation because of consistency and scale, they recognize that US Congress is very unlikely to pass EPR laws. State laws in a few key markets, including California, would likely set the stage for other national or federal regulation. The Product Stewardship Initiative has indicated they believe EPR regulations are more effective than landfill bans, particularly when there is no existing infrastructure for recycling.

**Appliances**
In the greater Boston area, there are quite a number of differences by city. In Cambridge, appliances cannot be discarded with the trash without a “White Appliance” permit, which costs between $20 and $25, while it is free to collect in Boston or Somerville, as long as a resident has a permit. Even with a permit, many cities limit the size of an appliance that can be discarded at the street and some regulate that appliances must be taken to a municipal transfer station.

In Burbank, appliances are collected with general waste, as long as they have 2 days notice. Burbank Water and Power will pay $100 for the recycling of a second non-primary refrigerator or freezer.

Tampa has no appliance recycling financial incentives or costs, as citizens can have their appliances and bulky waste collected for free.

**Infrastructure**

**Sofas**
In the United States, diversion of sofas typically comes from the donation/resale of used products. Charitable organizations, thrift shops, and university furniture exchange programs are readily available in all of the markets in which IKEA operates. However, given that the market is focused on the reusability of old products, take-back standards associated with the quality, condition, and cleanliness of products tend to be higher than with products that have a higher propensity to be recycled for material recovery or disposed of outright (e.g., mattresses and appliances). Accordingly, fewer viable options to sustainably dispose of sofas in poor condition exist, and many of these items are simply discarded in landfills.
In the pilot markets that we analyzed, both highly recognizable and local organizations will takeback sofas. However, smaller operations may not have the operational scale necessary to engage in a wide-scale program, such as that with a major retailer like IKEA. Additionally, through our discussions with IKEA’s US Corporate Attorney, we know that IKEA requires partner organizations to take on specified levels of insurance coverage prior to engagement, and many smaller organizations do not have the means to afford this level of insurance.

Utilizing Earth911, the notable organizations with a presence in each of our three pilot markets that accept sofas include Goodwill, St Vincent de Paul, and the Salvation Army. Each of these organizations is highly visible and credible and has significant experience partnering with large companies. Partnerships with these types of organizations have the potential to support an end-of-life program and build brand equity within local communities.

The large resale and reuse demand for old furniture has also resulted in the growth of swap meets and formal secondary markets. One of the best-known markets in the United States is Craigslist, which provides a web-based classified service to buy and sell used furniture and other goods/services. In the Boston area, for example, Craigslist features more than 5,000 furniture postings a day, with individuals assuming all risk of purchasing a product “as sold” online. Additionally, the Boston area has a well-developed swapping and furniture exchange market, with regular swap meets and online “reuse” list hosts at MIT, Harvard, and Boston University.

Given the high proportion of IKEA’s market that is made up of college students, university take-back programs are also relevant and significant. For example, Harvard’s Habitat for Humanity collects furniture at drop-off points outside of its undergraduate dormitories that are serviced by Harvard’s recycling contractor. These goods are collected by a short-term, student staff base, and stored in a warehouse on campus. In the fall, the same products (couches, tables, lights, hangers, and storage containers) are brought back to the main quad for the annual “Stuff Sale” where incoming students purchase these used goods to benefit Habitat for Humanity’s annual operations. Products that are not sold are donated to local non-profits, including the Massachusetts Coalition for the Homeless.

Near Burbank, the University of California at Santa Barbara (UCSB) runs something similar. During UCSB’s move-out period in June, more than 100 volunteers (both students and local residents), receive and organize donations. At the end of June, over the span of one weekend, volunteers manage a huge GIVE Sale, which in 2012 generated more than $26,000 donated to local programs.

*Mattresses*
The operational risks associated with handling used mattresses make disposal particularly challenging, given the susceptibility of bed bug infestation and the negative sanitary perception of used mattresses.

While 40 million mattresses and box springs are sold in the United States annually,$^{11}$ Waste Management informed us that the majority of mattresses ultimately end up in landfills or are disposed of via illegal dumping at end of life. Furthermore, in addition to the environmental impact, the disposal of mattresses in landfills also poses significant operational challenges, as mattresses can often damage landfill equipment and take up to 23 cubic feet of space.$^{12}$

Presently, there are no nationally recognized dedicated mattress recycling services in the United States, which makes implementing a

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Case Study – Building a business case for recycling capital investments: Goodwill Industries and Olaf Industries

As with any major capital project undertaking, generating a positive net present value (NPV) remains one of the most salient factors in go/no-go decisions. In an April 2013 article by the Duluth News Tribune, it was reported that a Duluth (Minnesota)-based company, Olaf Industries, has developed a new technology that successfully recovers recyclable materials on old mattresses.

To date, one unit of the Coil Spring Compactor machine, carrying a cost of $120,000, has been sold in the United States. The purchaser, Goodwill Industries, successfully recovered 215 tons of steel in 2012 worth an average price of $316 per ton. Additional material, including cotton, foam, and wood are also recoverable, which are also sold on the commodity market, or turned into waste energy.

![Figure 4: Olaf Industries' Coil Spring Compactor](image)

Additional considerations are necessary if a recycling program is brought in-house. For example, the company may need to forecast incremental labor (or employee time), transportation, and storage costs, and financial program analysis and sustainability must also consider the stability (and demand) in the commodities markets. Furthermore, considerations need to be given to alternative investments, which may provide quick payback periods and/or have a greater influence on lessening environmental impact.


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<http://productstewardship.us/displaycommon.cfm?an=1&subarticlenbr=747>

<http://www.enn.com/pollution/spotlight/33796>
consistent, wide-scale program particularly challenging. As a result, the industry is highly fragmented and underdeveloped in the United States. While a number of credible services have recently emerged, these programs only serve specific regions. Over the course of the project, we have learned that IKEA already works with a number of these providers, including St. Vincent de Paul, based in Northern California and the Pacific Northwest, and Conigliaro Industries, based in Massachusetts. These organizations, including Goodwill Industries’ Mattress Recycling Program in Northern California and Minnesota, partner with retailers and institutions to ensure higher volumes and typically charge a per unit fee for their services.

Presently, the most well known resource to identify mattress recyclers is made available by ISPA. However, we noted that there is currently no certification process for mattress recyclers, and ISPA does not formally audit the mattress recyclers that they identify. Through ISPA, we noted that Stoughton and Burbank have access to one (Conigilaro) and two (LFP Recycling and Blue Marble Recycling) providers, respectively. While the Tampa market was not represented in the database, we know from our discussions with the IKEA Tampa store that they have engaged a provider (Lucky Monkey) to recycle returned mattresses that cannot be resold.

Much like the regulatory landscape, the direction of the mattress recycling continues to be uncertain. And, while many of the materials in mattresses are recoverable and have some scrap value (St. Vincent de Paul estimates that nearly 85% of a typical mattress is recyclable), the relative low value of mattress material limits the appetite for innovation and growth in this area.

**Appliances**

Unlike the landscape for mattresses and sofas, the infrastructure for appliance recycling is significantly more developed in the United States. Through our discussions with Waste Management and the EPA RAD program, we learned that this is largely because of more stringent regulation around the proper handling and disposal of refrigerants and other hazardous materials and the high commodity value of materials found in household appliances (e.g., metals, glass, plastics) that recyclers can recover. Additionally, with an estimated 9.4 million refrigerators and freezers disposed of in 2011 alone, there is growing demand for such services.

**The EPA RAD Program**

To support and encourage the recycling of appliances in the United States, the EPA established the RAD program in October 2006 as a voluntary partnership with utility companies, retailers, and appliance manufacturers. The program was born out of a growing need to ensure the safe disposal of refrigerators, freezers, air-conditioning units, and dehumidifiers in the United States. The program establishes and implements industry best practices to limit the environmental impact resulting from the recovery, recycling, and disposal of refrigerants, foam, metals, plastics, glass, and other ozone-depleting materials. To date, the EPA has enrolled 43 utility company partners, four retail partners (including The Home Depot, Best Buy, and Sears), one manufacturer partner, and two state affiliates (New York and Virginia). In 2011 alone, the RAD program

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14 The Environmental Protection Act. EPA RAD 2011 Annual Report. 2011
reported that its partners had processed nearly 900 thousand units, representing an annual growth of 21 percent.\(^{16}\)

Most importantly, the program encourages its partners to go above and beyond the minimum regulatory requirements for the safe disposal of appliances. For example, while US federal regulation requires the proper disposal of refrigerants, universal waste, and other specific chemicals and oils, there are currently no standards requiring the recovery of foam insulation, which potentially carries even more ozone damaging material than typical refrigerants. Under the RAD program, partners would be encouraged to also ensure foam recovery.

Admittedly, the program does have several shortcomings. Given that it is a voluntary program, there are no audits or consequences for non-performance. Participating companies have significant latitude to autonomously establish the scope and breadth of its programs. Accordingly, a major goal of the program is to “get companies in the door” and raise awareness of appliance disposal issues.

\[^{16}\text{The Environmental Protection Act. EPA RAD 2011 Annual Report. 2011}\]
Case Study – EPA RAD Program Best Practices: GE and ARCA

In 2011, GE became the inaugural and sole manufacturer to partner with EPA RAD program as part of its Ecomagination initiative. In collaboration with ARCA and The Home Depot, GE had recycled 100,000 refrigerators and freezers through September 2012.

The recycling program utilizes ARCA’s Advanced Processing center based in Pennsylvania, which houses North America’s only UNTHA Recycling Technology System (URT). The URT system processes appliances at a rate of one unit per minute, and boasts a 95 percent recovery rate.

Figure 6: ARCA’s URT System

Under the program, which has been extended to customers of The Home Depot, qualifying customers in 12 participating states that purchase a new GE refrigerator unit will have their old units picked up and sent to ARCA for processing. In addition to the environmental impact of the program, the initiative has also created more than 50 green jobs in the state of Pennsylvania.

Source: EPA RAD and GE Appliances

National Recyclers
At present, there are two recognized national providers specializing in appliance recycling that operate in the United States. JACO Environmental and Appliance Recycling Centers of America (ARCA) serve 28 and 17 states, respectively, and have established themselves as leaders in appliance recycling. Both organizations have established proprietary technological methods that result in significant recovery rates (>90 percent) of insulating foam and other materials in recycled refrigerators and freezers.

Local Programs
In addition to the large national providers, our research found that local operations exist in each of the pilot markets. There are also a number of municipality-run services that exist (e.g., the City of Burbank Recycling Center), these tend to be restricted to residential areas.

Government run services in the pilot markets we investigated included bulk material acceptance at the City of Burbank Recycling Center and buy-back programs of older, energy-inefficient refrigerators and freezers through local utilities (The City of Burbank Water and Power in the Burbank market, and MassSave in the greater Boston market; no program currently exists in the Tampa market). These buy-back programs vary in form and scale by jurisdiction but typically provide new ENERGY STAR approved appliances in exchange for older models or rebates.

The private organizations accepting appliances for recycling typically seek to recover (for sale) the large volume of commodity scrap materials found in stoves and refrigerators. Additionally, as
in the case of sofas, many well-established local non-profits accept appliances for donation, with restrictions to ensure that these products can be resold or reused. However, it should be noted that while these programs support the goal of diverting appliances from landfills, a large secondary market (the EPA estimates 25% of disposed refrigerators and freezers are resold)\textsuperscript{17} also results in the continued use of less energy efficient models.

Framework and Analysis

End-of-Life Solutions under Consideration
Based on best practices from IKEA stores around the world, we identified a set of potential end-of-life solutions to evaluate for implementation here in the United States for one or more of the product categories. Additionally, each of these programs is compared to the “Business As Usual” base case for end-of-life solutions, which represents the current take-back program of appliances and mattresses previously discussed.

Facilitate Donations
Based on IKEA UK’s program, this strategy is structured such that IKEA would facilitate donations to third-party charity partners, such as the Salvation Army or Goodwill, by charging a fee for collection at the time of delivery of a new IKEA product. Facilitating donations would help build brand equity, and better connect IKEA to the local communities in which they operate.

Flea Market On-Site
Based on IKEA Sweden and Amsterdam’s Swap Meets, the next consideration would be for IKEA stores to host periodic swap meets or flea markets onsite, driving foot traffic to an IKEA store, but also giving rise to potentially greater liability exposure. Essentially, under this scenario, IKEA would be providing a forum to facilitate the re-sale of used products.

Flea Market Off-Site
Similarly, IKEA could also support or sponsor flea markets or swap meets offsite, minimizing potential liability risk but also reducing foot traffic to the stores. In this scenario, IKEA would seek a partner (such as not-for-profit) to host the flea market.

IKEA “Family” Online Market
Following in the line of IKEA Sweden, IKEA US could create an online marketplace for IKEA “family” members. While the Swedish operations leveraged its partnership with an established classifieds site (Blocket), IKEA US would likely need to develop their own backend system and enable some higher level of quality control.

Pick-up for Certified Recycling
This option would expand on the current “Business As Usual” scenario, offering customers a fee-for-service for collection of items at the same time as delivery to be recycled, but would add the guarantee of certifying and tracking how and where items were being recycled.

\textsuperscript{17} The Environmental Protection Act. EPA RAD 2011 Annual Report. 2011
Buy-back for Resale “As-Is”
Based on the “Seconde Vie” program in IKEA France, IKEA US could take back used IKEA items in stores, repurpose and certify the products, and resell the products in the “As-Is” section of the store. Similar to the French program, IKEA would provide a gift card in exchange for the used product.

Website to Educate Customers
This solution would be similar to the educational component of the “Seconde Vie” program, which is represented by a dedicated website offering solutions and in-store workshops to customers seeking to donate, sell, or repurpose used products.

Approach
In order to evaluate the potential end-of-life solutions we have identified for mattresses, sofas and appliances, we utilized a framework of key program criteria assessment and prioritization. Therefore we worked with IKEA to create a list of key program attributes and then interviewed co-workers at the IKEA stores in Stoughton, Burbank and Tampa to rate these criteria on level of importance. Using these data we are able to help IKEA prioritize potential solutions based on its strategic priorities. Further, IKEA can use this approach to evaluate future solutions and initiatives.

Key Program Criteria Development and Assessment
We worked with IKEA to develop the list of program criteria in order to evaluate potential end-of-life solutions for mattresses, sofas and appliances. Then, IKEA co-workers in various functions, including operations, logistics, customer service and sales, were asked to rate each criteria on a scale of 1 to 5, where 1= “relatively less important” and 5= “most important.” Co-workers were asked:

When designing an appliance, sofa, and/or mattress recycling, re-use or take-back program, how important is it that the potential program...
- Can be rolled-out nationally (that the program can be implemented in most/all IKEA stores)
- Fits with IKEA’s mission and brand image (People and Planet Positive)
- Can generate incremental sales / does not cannibalize existing sales (for example, selling used products could potentially have such an impact)
- Limits legal and liability risk (e.g., litigation, insurance claims)
- Is cost effective (i.e. the project at least breaks even)
- Aligns with potential future regulation
- Has available infrastructure / partners (i.e. recycling centers, non-profits)
- Is simple / easy to implement (i.e. it has limited impact on store space, additional training, employee time)
- Has maximum positive environmental impact
- Is comparable in scope and price to competitor programs
- Has progress and success that can be easily measured

Using this data, we were able to assess the relative importance of each attribute for IKEA. Interestingly, some of these results did vary by geography. However, co-workers from all three
stores agreed that limited liability risk and fit with IKEA’s brand and mission are the most important criteria to consider for potential end-of-life programs. Going forward, additional relevant stakeholders should be included to continue refining the results. However, we also believe that the results can be directionally used to draw key inferences about the priorities of various markets and the difficulties IKEA may face when developing a U.S. strategy for these product categories. We believe much of the difference in ratings for criteria such as the importance of alignment with future regulation or ability to roll-out a program nationally is due to variability in store sales, surrounding infrastructure and regulation, and strength of local competition.

Using this criteria assessment, we began to consider the potential end-of-life solutions we identified through our research and discussions with international IKEA co-workers. In order to complete this evaluation, we first considered how each potential end-of-life solution ranked on the most important criteria for IKEA. Although some programs may be more feasible than others, if they do not perform well on the most important criteria (such as, legal liability risk), then they are likely not going to be the best solution for IKEA to implement in the U.S.

To evaluate these programs, we developed a “heat-map” framework to outline compatibility with the aforementioned criteria based on the recycling/reuse and regulatory infrastructure in the United States:
We evaluated each potential end-of-life solution on the key program criteria – Appliances

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Pick-up for certified recycling</th>
<th>Facilitate donations</th>
<th>Flea market offsite</th>
<th>“Family” online market</th>
<th>Buy-back &amp; sell in stores</th>
<th>Website to educate customers</th>
<th>Flea market on-site</th>
<th>Business as usual</th>
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<tr>
<td>Limits legal and liability risk</td>
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<td>Fits IKEA’s mission &amp; brand</td>
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<td>Avail. infrastructure / partners</td>
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<td>Does not cannibalize existing sales</td>
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<td>Ability to roll-out nationally</td>
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<td><strong>Overall Criteria Consideration</strong></td>
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We evaluated each potential end-of-life solution on the key program criteria – Sofas

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<thead>
<tr>
<th>Criteria</th>
<th>Facilitate donations</th>
<th>Flea market offsite</th>
<th>“Family” online market</th>
<th>Buy-back &amp; sell in stores</th>
<th>Website to educate customers</th>
<th>Flea market on-site</th>
<th>Pick-up for certified recycling</th>
<th>Business as usual</th>
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<td>Limits legal and liability risk</td>
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<td>Fits IKEA’s mission &amp; brand</td>
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<td><strong>Overall Criteria Consideration</strong></td>
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Using these results, we then categorized these different programs in our hierarchy/criteria matrix to demonstrate the relative positioning of different programs by product category:
Finally, using this framework, we are able to provide an overall program assessment for each of the top end-of-life solutions considered for each product category. It should be noted that these solutions are not meant to be mutually exclusive, and that a combination of different programs may in fact have the greatest impact.

**Appliances:**
At the current moment, Appliances has a large number of potentially viable options for end-of-life and should be a particularly high priority, given both the favorable regulatory and competitive landscapes and the existing infrastructure available.

1. **Pick-Up for Certified Recycling:** In the case of appliances, the “end-of-life” hierarchy must be used as a guideline for general practice rather than an absolute scale. Since most appliances currently in use are lower efficiency than those being purchased, a broader lifecycle analysis would likely show that the reuse of these energy-efficient appliances has a lower environmental benefit relative to recycling them. Recycling appliances is feasible across the country given more widespread regulations and a well-developed recycling infrastructure. Should IKEA pursue this strategy, it should refine the wording in its contracts with its third party logistics providers to ensure that they meet an explicit standard for recycling appliances (as opposed to the vague language that currently exists to “dispose of in an environmentally-friendly way”). This will provide more transparency for IKEA, allow IKEA to hold its partners to higher standards, and help IKEA communicate this benefit to customers. To ensure this is carried out, IKEA should either 1) be allowed
to name the recycler, or 2) be provided direct access to the selected recycler to ensure that defined standards are followed.

2. **Facilitate Donations:** Most national charities do accept appliances and test them before putting them up for sale or before donating them to those in need. Furthermore, these national organizations have significant insurance and arrangements could be made that would remove liability from IKEA for donations of any faulty appliances from its customers. The main implementation challenges relate to IKEA’s internal policy regarding partnerships with faith-based organizations and insurance requirements, which could exclude smaller organizations from participating. However, it ranks very well on the waste management hierarchy, could be relatively inexpensive to operate (depending on agreements with non-profits) and could really positively impact IKEA’s brand profile in the communities, particularly with regards to the People & Planet Positive mission. Although this strategy would not be ideal for older, less energy efficient refrigerators, it would rank higher than recycling to the extent that newer models were collected (i.e. those meeting ENERGY STAR standards).

3. **Flea Market Offsite:** A flea market offsite could enable citizens to hold each other accountable for the quality of goods, and would minimize IKEA’s liability, as it would likely be run by an independent entity. Resale of used products at IKEA stores, IKEA-run online sites, or otherwise onsite potentially puts IKEA at greater risk for liability, as damaged appliances can be physically dangerous. Many organizations exist across the country that regularly host flea markets and swap meets for antique and used furniture, hosted at universities, non-profits, community groups or charity organizations. While such partnerships could make implementation easier, they might require some clarification around IKEA’s guidelines on partnerships with faith-based organizations and they would limit IKEA’s ability to direct the program. This program would be relatively inexpensive to implement and is aligned with IKEA’s People & Planet Positive mission through its community connection. It also has relatively good potential for national roll-out and would not impact store operations, which is helpful for implementation. However, since these programs would not be IKEA-run, progress would also be more difficult to track, and such programs face the similar concern of potentially extending the life of energy inefficient refrigerators.

**Sofas:**
For both sofas and other large furniture, programs that enable reuse rank significantly higher on both environmental and IKEA’s criteria as compared to recycling.

1. **Facilitate Donations:** This program ranks highest for a sofa end-of-life strategy, as it does not expose IKEA to significant risk and raises IKEA’s profile in local communities through partnerships with not-for-profits. Implementation challenges would be similar to with appliances, specifically regarding IKEA’s partnerships with faith-based organizations. There currently exists a high demand and large market for the donation and reuse/resale of sofas and other furniture, particularly given the limited risk of transferring such products (unlike appliances with electrical components, and mattresses for sanitary reasons).

2. **Flea Market Offsite:** As discussed, a flea market offsite rather than on IKEA property is more appealing to IKEA from a liability standpoint, as IKEA would be less likely to be held
accountable for goods exchanged offsite at an event hosted by a third-party organization. As described regarding appliances, offsite flea markets could be implemented easily with third-party partners, as long as it abides by IKEA’s faith-based partnership guidelines. Flea markets offsite would also help to improve the perception of durability of IKEA furniture products, perhaps enabling IKEA to tap into a higher market segment. It would also improve IKEA’s position within the community as an active member and supporter.

3. **Buy-back and Sell “As-Is” In Stores:** Such a buy-back program could have positive impact on IKEA’s brand and foot traffic. Customers could sell a used piece of IKEA furniture back to their store for credit, which would be used towards their next purchase, creating and maintaining brand loyalty. As with a flea market offsite, sale of used IKEA products in the store could increase IKEA customer’s knowledge regarding IKEA products’ durability. While limitations of this program include the need for heavy evaluation of any product resold and the limitations of space in IKEA stores, it could increase revenues per customer and generate additional goodwill with existing customers. Furthermore, since IKEA’s Recovery team has already become accustomed to evaluating products for resale in the “As-Is” area, this program could leverage expertise that currently exists at the store level. Should IKEA adopt this strategy, specific metrics that leverage the analysis that already takes place at the store and national level could be implemented and aligned with business metrics, without imposing too high a hurdle. These metrics would help IKEA to measure the progress of its program, and include the following:

- Gift card redemption rates
- Average ticket on sales with gift cards
- Inventory turnover metrics

**Mattresses:**
Given the high liability for any bedbug infestation of a customer (real or implied) based on the purchase of used materials from a program associated with IKEA, there were fewer options considered. Furthermore, given a more limited resale market and a fragmented recycling infrastructure, end-of-life solutions in the United States for mattresses remain challenging.

1. **Pick-up and Certified Recycling:** Utilizing IKEA’s existing haul away services, the company could expand its take-back program to certify what percentage of a mattress is really being recycled and to better advertise existing collection services at every point of sale. A consistent structure across all markets would be difficult due to the aforementioned fragmented infrastructure for mattress recycling, but this is likely to expand over time. As with appliances, IKEA should refine the wording in its contracts with recyclers to ensure they meet an explicit standard for recycling mattresses (as opposed to the vague language that currently exists to “dispose of in an environmentally-friendly way”). This will provide more transparency for IKEA, allow IKEA to hold its partners to higher standards, and help IKEA communicate this benefit to customers. Participating in these programs may also have a larger social benefit, as many mattress recyclers are operated by not-for-profits that employ underprivileged staff. Engaging these organizations is a major component of supporting the mission of these programs. As with facilitating donations, IKEA should provide all customers with plastic bags for end-of-life.

2. **Facilitate Donations:** Many national charities do collect and resell or donate mattresses, as long as they can certify that there are no bedbugs. This can be done through product
treatment or basic standards of checking for rips, tears, or holes in the mattress. Given the high hurdle for mattresses to be recovered for reuse, one major concern is the relative scale of this strategy. Even if it is only established regionally, we would recommend for IKEA to adopt the best practice of providing mattress customers with plastic bags so that delivery staff are more likely to pick up the used good, as it lessens the bed bug risk for haulers.

**Lower-Ranking Options on All Product Categories:**

3. **Flea market at IKEA:** This program would likely not be feasible for mattresses or large appliances (both for logistical and sanitation reasons) and may be limited to sofas and furniture. While a flea market onsite would drive traffic to the store and could reduce any negative sales impact of resale, IKEA’s Legal team identified that this program would expose IKEA to significant legal risk by directly facilitating the sale of used products on its property (we defer the evaluation of legality and risk measurement to IKEA’s general counsel). Since IKEA could not feasibly test all of these goods before sale, it cannot guarantee quality. Therefore, while a flea market onsite performs well along other key criteria, this is likely too large of a hurdle for implementation.

4. **IKEA “family” online marketplace:** This program would likely not be feasible for mattresses or large appliances (both for logistical and sanitation reasons) and may be limited to sofas and furniture. Similar to the flea market at IKEA, this program would not be feasible, as it would expose IKEA to the same risks of directly facilitating the sale of used products. Even though IKEA currently operates with this model in Sweden, the U.S. is much more litigious, and therefore it would be difficult to operate in the same way.

5. **Website to educate customers:** This program would leverage the second life program implemented in France, which provides resources to customers on how to repurpose and extend the life of old products. IKEA could also offer workshops on or off-site to further reinforce these principles and actively engage customers. The program is relatively inexpensive to implement, and could be supported by consumer-focused environmental NGOs or blogs such as the Environmental Working Group, Treehugger, or the Grist. However, actual impact is extremely dependent on customer review and action, and the demand for this type of information is uncertain. Program success would be very difficult to measure, because while web traffic could be tracked, it would be very challenging to quantify actions taken because of the site: only the most passionate would actually post and share their stories. National implementation is possible although certain markets are likely to adopt it better / earlier than others based on local store resources, personnel, advertising budget, and general customer interest. Overall, our assessment is that IKEA should consider building this website in the United States as a centerpiece to its end-of-life strategies (much like how France has established the Seconde Vie campaign), but that this program would be insufficient on a standalone basis.
## Appendix I: Landscape Summary

<table>
<thead>
<tr>
<th>Infrastructure</th>
<th>Regulation</th>
<th>Organizations Analyzed</th>
</tr>
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<tbody>
<tr>
<td><strong>Appliances</strong></td>
<td>The infrastructure for appliances is well-developed, highlighted by two major recyclers (JACO and ARCA).</td>
<td>• EPA RAD program</td>
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<td></td>
<td>Given the high value of materials found in appliances, many local solutions also exist within each of the pilot markets that we selected.</td>
<td>• Association of Home Appliance Manufacturers</td>
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<td></td>
<td>Federal regulation dictates stringent guidelines around the proper handling and disposal of refrigerants and other hazardous materials.</td>
<td>• Retail Industry Leaders Association</td>
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<td></td>
<td>However, categorization of appliances as a solid waste differs city by city</td>
<td>• JACO</td>
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<td></td>
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<td>• ARCA</td>
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<tr>
<td><strong>Sofas</strong></td>
<td>Recycling facilities for sofas is effectively non-existent in the United States, given the low value of material found in such products. However, there exists a well-developed secondary market, including nationwide charitable organizations (i.e. Goodwill and The Salvation Army) and local not-for-profits.</td>
<td>• Waste Management</td>
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<td></td>
<td>Legislation associated with sofas is largely lumped into &quot;bulky item&quot; disposal laws, which vary dramatically across municipalities.</td>
<td>• Product Stewardship Initiative</td>
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<tr>
<td></td>
<td>Thift shops and university furniture exchange programs also exist throughout the nation. Examples include swap meets and online “reuse” listserves at universities, like MIT, Harvard, and BU in Boston and UC Santa Barbara in Burbank.</td>
<td>• Goodwill</td>
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<td></td>
<td>• The Salvation Army</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Local thrift shops and furniture exchange programs</td>
</tr>
<tr>
<td><strong>Mattresses</strong></td>
<td>Mattress recycling in the United States is highly fragmented, although a local network of recyclers has developed in recent years. Given the negative perception of used mattress (i.e. bed bugs), a secondary market for such products does not exist, although some not-for-profits will accept mattresses in good condition.</td>
<td>• Product Stewardship Initiative</td>
</tr>
<tr>
<td></td>
<td>New state legislation for mattress recycling has been introduced in California and Connecticut. Such regulations would charge a per item fee (effectively a sales tax), which would be used to fund an industry-led recycling infrastructure.</td>
<td>• Waste Management</td>
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<td>• International Sleep Products Association</td>
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<td>• St. Vincent de Paul</td>
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<td>• Conigliaro Industries</td>
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