

the journey of junk

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where garbage goes when it leaves your doorstep

Every week, garbage trucks inch through the city and guzzle the contents of our trashcans like insatiable land whales. In the United States, most people don't pay much attention to what happens to their garbage. They simply place it on the curb and the next day it disappears. But without these trucks, waste would pile up into unsightly and malodorous heaps. If it did, maybe people would put a little more thought into their consumptive habits.

Portsmouth has a well-organized system for collecting and processing the 12,000 tons of waste that its residents generate each year. After the garbage is collected from the roadside, it has to go somewhere. And even though it might end up underground and out of sight, garbage doesn't just disappear. Here's what happens.

Unlike other cities, many of which hire private companies for trash collection, Portsmouth picks up after itself. The Public Works Department is responsible for collecting and disposing of regular garbage, recycling, bulky waste and yard debris. There are also hazardous waste pickup days that occur twice a year, once in the fall and again in the spring.

Most of the waste Public Works gathers comes from individual households. The department also collects some commercial waste, but only in the central business district or on business-heavy streets like Islington. For the most part, large businesses are expected to pay private companies to collect their garbage.

There are 10 trash collection routes in Portsmouth, with two routes driven each weekday. In this way, each area of the city is hit once a week. A special route picks up waste from the downtown commercial district every Monday night. "We are set up primarily for residential, with the exception of the central business district," said Steve Parkinson, Director of Portsmouth's Public Works Department.

Waste disposal costs money. The city's solid waste budget for the 2008 fiscal year is \$1,133,667. The figure includes funding for recycling, trash collection, yard debris pickup, equipment, maintenance and workers' salaries and benefits. A typical sanitation laborer—the guy who rides on the back of the garbage truck—makes about \$38,000 a year.

From July 2005 to June 2006, Public Works collected more than 12,000 tons of waste, including common household garbage, bulky waste, recyclables, yard waste, wood, metal, electronics, tires and concrete. However, not all of that went to the landfill. Roughly 52 percent of the waste got diverted to recycling facilities. In 2006, sending waste to the landfill cost the city \$70.86 per ton. That means the recycling program saved the city about \$450,000.

Just about anything can be recycled, according to Silke Psula, the city's solid waste coordinator. The question is: how much does it cost to recycle that material, and is there a market for the recycled goods? While scrap metal and electronics can fetch a handsome price, plastics like Styrofoam packaging peanuts or plastic shopping bags are more labor intensive and expensive to recycle. Public Works takes into consideration a number of factors when determining the fate of Portsmouth's waste. Psula used wood as an example. It costs about \$80 per ton to dispose of wood at the Turnkey Landfill in Rochester. Factor in the costs of a 30-mile roundtrip drive, plus the truck drivers' wages, and it becomes apparent that bringing wood to Turnkey is not very cost effective. In contrast, there is a wood recycling facility in Eliot, Maine that only charges \$45 dollars per ton. This facility is also closer, reducing transportation costs. The Eliot facility recycles the old material into wood fuel chips, which are burned for heat and energy.

Yard debris makes up a significant portion of the city's waste, but Portsmouth still doesn't have its own composting program. "We don't currently, because we don't have the land. We're flooring the possibility for now," Parkinson said. Yard debris currently goes to private composting facilities. A composting program would allow the city to turn yard debris into fresh soil and mulch for use at parks and gardens instead of the pre-packaged soil it currently buys.

A voluntary recycling program began in Portsmouth in the early 1980s. Curbside collection began in the late '80s and early '90s. At the time, curbside recycling was considered innovative. "We started back in the early '90s and there were not that many curbside programs," Parkinson said. The city originally contracted a private company to pick up recycling from the curbside, but city employees started collecting and sorting the recyclables two years ago. Although there has always been some form of a recycling center in Portsmouth, the city built an expanded recycling facility and made it more accessible to the public around the same time in 2005.

Once inside the large, U-shaped recycling facility on Peverly Hill Road, residents can drop off materials in a number of different bins and compactors. There are bins for comingled containers (glass and plastic), paper products, metals, wood waste, lawn waste, tires and electronics. There are also containers for cooking oil, motor oil, batteries, florescent light tubes and white goods—objects that contain Freon, like refrigerators.

By recycling, the Public Works Department sends less material to the landfill and therefore spends less money on waste disposal. Today, sending money to the landfill in Rochester costs \$73.13 per ton. The city can actually make money by recycling valuable materials like metals and electronics. For other recyclable materials, the city can get reduced disposal rates. But the economic benefits are only one reason for recycling. "It's a sustainability issue," Parkinson said. Instead of exploiting valuable natural resources to produce new goods, recycling allows manufacturers to reuse old materials to make new products.

In North Berwick, Maine, residents have to pay their town government for trash bags. Recycling, however, is free. As a result, people try to recycle as much as possible instead of paying extra to throw away garbage.

Some people argue that recycling a product can be more expensive than throwing it away. Recycling requires energy, and producing

that energy can be more harmful to the environment than most people realize. Greg Norris studies the life cycle of consumer products. Norris is a North Berwick resident, professor at Harvard University and has his own life cycle consulting company. When asked if he thought recycling could have hidden costs, he said, "I've noticed that comes up a lot. It's good people are thinking in the life cycle way, but the good news is that recycling is beneficial."

However, it all depends on the material, Norris said. "Recycling all metals is a no-brainer. Recycling glass and heavier plastics is good. Plastic foam products are not good because they are mostly air," Norris said. The transportation and energy costs for recycling lightweight plastics outweigh the environmental benefits. It is better therefore, to send some products to the landfill. Portsmouth has been shipping waste to the Turnkey Landfill in Rochester since the early 1990s. The city has a long-term contract with Turnkey and therefore enjoys a reduced disposal fee.

The Turnkey Landfill is owned and operated by Waste Management Inc., the largest waste management operation in the United States. Turnkey opened in 1979 as the first "lined" facility in New Hampshire. Landfills typically come in two varieties: lined and unlined. Lined facilities employ a highly technical system of synthetic lining that stops garbage and runoff from seeping into the ground.

Turnkey receives about 1.3 million tons of waste each year. Fifty percent of that comes from New Hampshire and the rest comes from other New England states. Turnkey's three landfills, each of which measures about 200 acres, are scattered across the company's 1,200-acre plot of land. After 28 years in operation, Turnkey has roughly 15 million cubic yards of space left and is permitted to operate through 2020.

As waste arrives, it is compacted into layers and then covered with six to 12 inches of soil, which helps cover up odors and deter scavengers. When the landfill reaches its permitted height, a layer of compacted clay is placed over the waste to form a cap. This layer seals in gases and odors and prevents rainwater from seeping into the landfill. A thick plastic layer is then placed over the clay to further seal in odors and protect the garbage from rain. Next, a drainage layer of sand or gravel is added, followed by regular soil and top soil. As portions of the landfill are capped, native grasses and shrubs are planted to form areas of open space.

In addition to the Turnkey facility, nine other landfills operate in New Hampshire, according to Mike Guilfooy, solid waste administrator for the N.H. Department of Environmental Services. The landfills take waste from Massachusetts, Maine, Vermont and New Hampshire.

Every two years, the DES submits a Solid Waste Report to the New Hampshire Legislature. According to the 2005 report, New Hampshire produced about 1.8 million tons of garbage that year. About 29 percent of that was recycled, down from 31 percent the year before. From 1990 to 2005, the tonnage of materials collected for recycling increased from 40,000 tons to 465,616 tons per year. Nearly 99 percent of the state's population, representing 228 of the state's 234 communities, has access to recycling, according to the report. As of 2005, towns with the highest recycling rates included Peterborough at 78 percent, Littleton at 71 percent and Lancaster at 61 percent. According to the report, Portsmouth recycled 49 percent of its solid waste. "That's not bad," Guilfooy said.

The DES makes sure landfills comply with waste management regulations. "There is a lot of monitoring that goes on at the landfill," Guilfooy said. The waste management companies that own the landfills hire private consultants to monitor ground water quality and air quality. The data that they collect is then submitted to the state. The DES reviews the data and sends inspectors to the landfills to perform compliance reviews. DES representatives also attend construction meetings at landfills to make sure any new developments meet the requirements agreed upon in their original permit. According to Guilfooy, construction at the landfills is ongoing.

The most pressing environmental concern with landfills is ground water contamination. Runoff and other contaminants can leak through the ground and reach important water sources. "There (are) still a couple of unlined landfills, so the largest concern is ground water contamination," Guilfooy said. "The DES over the last 10 to 15 years has been involved in closing the unlined landfills—the old town dumps. Most of those are closed. Some of those had ground water contamination," Guilfooy said. Several unlined landfills still operate in New Hampshire. While there are no immediate plans to shut these potentially harmful facilities down, the DES has discussed a timetable for closing them. There are no existing laws in place to eliminate the unlined facilities. "There is no regulatory hook to force them to close," Guilfooy said. The Farmington Landfill is an example of an unlined facility. The Colebrook Landfill is another unlined facility currently in operation. It's scheduled to close later this year.

When people think of landfills, they generally picture big bulldozers moving heaps of trash. That image is true for Turnkey, which receives over 4,000 tons of solid waste a day. But in an effort to dispel images of dirty old town dumps, Turnkey offers a number of recreational frills. There are hiking trails, a dog park, a model airplane field, a driving range and a homeless shelter. "It's the Disney World of solid waste disposal," said Alan Davis, district manager for the Turnkey Recycling and Environmental Enterprise facility. Turnkey has recently applied for a responsible wildlife management certification by the Wildlife Habitat Council.

Workers and machines at the giant facility try to filter out as much recyclable material as possible. Construction and demolition debris is separated and sent to a processing facility, where it can be made into wood fuel or building materials. Glass is crushed and formed into a building compound that Turnkey then uses on a variety of construction and road-making projects on-site.

Waste Management and the Turnkey facility utilize a number of green technologies to reduce their environmental impact. Trash is trash, and there will always be challenges to disposing of it, but innovations in waste management are creating some benefits. Methane represents about 50 percent of the gas produced at landfills. Turnkey harnesses that methane to power turbines that create enough electricity to power more than 9,000 homes in the surrounding area. "It's green power," Davis said. Right now, Turnkey "flares off" the remaining methane, but construction will soon begin on a \$42 million processing plant and pipeline that will bring surplus methane to the University of New Hampshire, where it will be used to satisfy 85 percent of the university's power needs, according to Davis.

By using methane instead of fossil fuels, these plants reduce the amount of greenhouse gases being emitted into the air. Such a reduction has allowed Waste Management to accumulate carbon credits. These credits can be sold to companies, governments or

events that exceed carbon emission standards. Waste Management has donated a great deal of their carbon credits to large sporting events, like the Olympics, to offset the carbon footprint created by such large gatherings of people.

Leachate, the liquid runoff that settles at the bottom of a landfill, is another potentially harmful byproduct. Turnkey uses a double lining system to catch leachate before it seeps into the ground. The noxious fluid is then filtered and processed at an on-site treatment plant before being sent off to the town's wastewater treatment plant. In the future, Turnkey officials hope to use leachate to produce more methane. By mixing the liquid with certain chemicals and injecting it back into the landfill, the production of methane will occur at a faster rate, according to Davis. The methane will, in turn, be used to help power the electricity-generating turbines.

"If we have the technology to put a man on the moon, we can safely dispose of our waste," Davis said.

Waste management is a reactive way of dealing with trash. People produce garbage and other people deal with it. But there are ways to be proactive about waste management, including limiting the amount of waste people produce in the first place. Using products with less packaging or recyclable packaging can have a tremendous impact on how much garbage is produced. Reusable shopping bags and food available in bulk bins also help cut back on garbage.

Life cycle assessment is the study of a product's true cost. What went into a product and where did those inputs come from? Where did the fuel and energy that it took to make something come from? What happens after someone throws it away? How much does it cost to dispose of the product? What environmental impact will the product have throughout its entire existence? These are the questions that Greg Norris tries to answer. He looks at the economic and environmental consequences of products and services. Will the product contribute to global warming or acid rain? What pollutants will be released into the air, water or land?

Companies often hire life cycle specialists to gauge the true costs of their products. Norris has done consulting work for big players in industry and government, including Caterpillar, Dell Inc., The Texas Commission on Environmental Quality, the government of Japan and the U.S. Green Building Council.

In a recent interview, Norris offered the example of apple pie. Where did the apples come from? What fuels were used to grow the apples? How were they transported, processed and packaged? Where did the aluminum pan come from? What did it take to extract and process the aluminum? What were the byproducts of making the pan? Where did the heat to bake the pie come from?

"What most of us don't realize is that businesses (and) their operations are all connected. They buy inputs from other businesses," Norris said. He looks at these various connections to see what goes into making a product. "The other part is, if I design the product differently, it might change how it is used, how long it lasts and how it is disposed of. The decision that people make anywhere in that process affects the whole system," he said. His goal is to help people in the chain realize what influence they have on the entire system. Once people understand their impact, they understand how different decisions can have positive or negative impacts on the world.

Hewlett Packard recently redesigned their packaging for toner cartridges and ink jets, according to Norris. They shrunk their packages, which cut down on cardboard and allowed them to fit more units into their trucks. They saved money on materials and transportation. "The benefits are usually bigger than you think," Norris said. As consumers become more green savvy, companies respond with more responsible practices and better products. Consumers then reward the companies by choosing their products. "It saves them money and it's giving them good press. A lot of companies are interested in this. There is so much opportunity. It just takes creativity," Norris said.

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