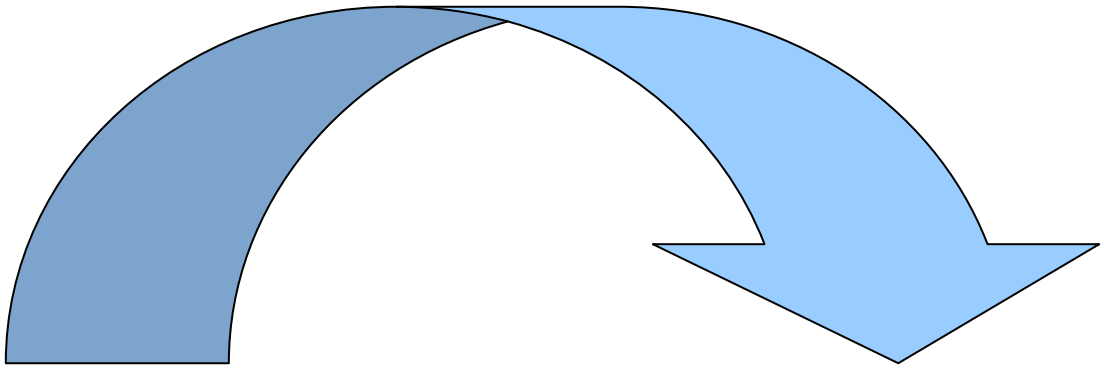
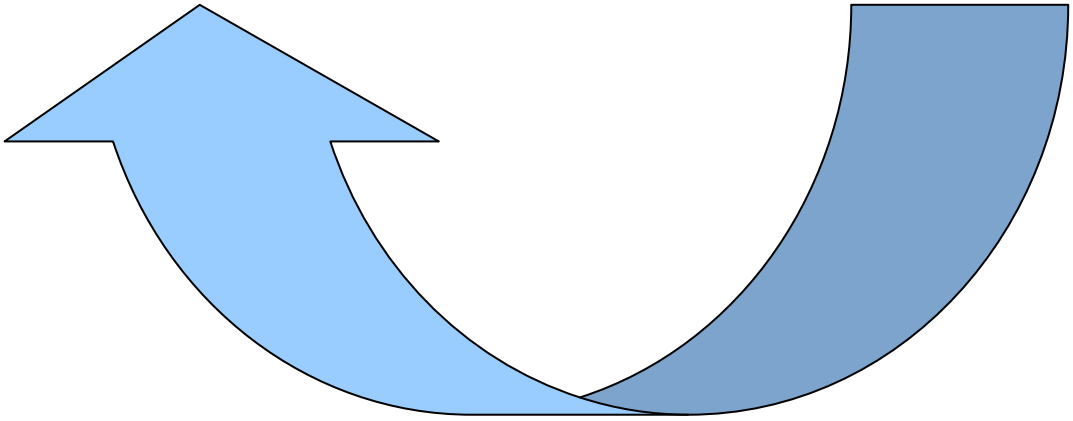


Moving Toward Zero

From Waste Management to Resource Recovery



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Friends of Missing Link Road, Rockingham, VT
Citizens Leading for Environmental Action and Responsibility, Claremont, NH
Working on Waste, Claremont, NH
Concerned Citizens of Hinsdale, New Hampshire, Hinsdale, NH
REACH for Tomorrow, Hopkinton, NH
Oxbow Initiative, Canterbury, NH
AWARE, Bethlehem, NH
We the People, Old Town, ME
Clean Air for Westbrook, ME
Hamden Citizen Coalition, ME
STOP, Hardwick, MA
Holliston-Sherborne Residents Group, Holliston, MA
Saugus Action Volunteers for the Environment, Saugus, MA
Templeton Citizens Against the Dump, Templeton, MA
Residents Against the Trash Transfer Station on South Street, Pittsfield, MA
Woburn Neighborhood Association, Woburn, MA
Help Raynham, Raynham, MA
Citizens Against the Smell, Brockton, MA
Haverhill Environmental League, Haverhill, MA
Stop Any Further Expansion, Cohasset, MA
Concerned Citizens of Russell, Russell, MA
Stop Trashing Our Place, Cumberland, RI
Pawtucket Alliance for Downtown Success, Pawtucket, RI

For 20 years, Toxics Action Center has assisted residents and community groups across New England with toxic pollution issues in their communities. For more information about Toxics Action Center, please contact our office at 802-223-8422 or visit www.toxicsaction.org.

For additional copies of the report, send $10 to:
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Executive Summary

Toxics Action Center is a public health and environmental nonprofit organization that works with communities across New England to prevent and clean up toxic pollution. Waste disposal is often a major cause of contamination since landfills leak toxic chemicals into the underlying soil and groundwater, and incinerators emit harmful pollutants into the air. Toxics Action Center has partnered with the Central Vermont Solid Waste Management District to promote a zero waste model with a goal of reducing waste through incentives and systems that recover discarded resources. This report is a guide for the development and establishment of a statewide zero waste program.

Resources currently move through our society in a linear fashion. Raw materials are extracted, processed into consumer goods, consumed, and disposed of through burning or burial. Vermont produces more than 600,000 tons of waste per year. Seventy percent of that waste is landfilled or incinerated, polluting our air and water. The dioxins, furans, volatile organic compounds, polychlorinated biphenyl, methane, and heavy metals often released from these facilities threaten public health.

A zero waste model offers a circular resource management system in which discarded materials are looped back into the economy to be reused, reprocessed, or composted. Treating discarded resources as actual resources decreases the need for virgin material extraction, reduces pollution produced by waste disposal facilities, and saves large quantities of energy. The waste diversion rate of 30%, achieved nationwide in 2001, helped conserve the amount of energy used annually by 6.5 million homes.[i] Furthermore, the infrastructure required by a zero waste model provides, per ton of discard, approximately ten times the number of jobs that traditional waste disposal facilities provide.[ii]

The first step toward waste elimination is to set a goal of zero waste. Next, it is essential to create systems in which discarded materials are considered worthy of preservation. Shifting from a traditional waste management model to a zero waste model involves:

- Identifying resources within the waste stream and planning to systematically protect these resources from disposal
- Separating the discarded resources, ideally at the source to minimize contamination
- Closing the resource loops through effective collection systems, programs, and infrastructure that maximizes the value of resources
- Applying waste-reduction strategies and creating economic disincentives such as Pay-As-You-Throw programs
- Insisting on producer responsibility by shifting the financial responsibility for the safe reprocessing or disposal of products upstream to manufacturers
- Stimulating the recycled and reusable markets through government buying power
- Funding coordinated local and regional resource recovery infrastructure and programs.

The work of creating a zero waste future is the responsibility of industry in their design of products and packaging, government in their policy and management decisions, and

communities in their collaborations with industry and government to develop innovative and effective policies and programs.

A zero waste goal may seem as unrealistic as zero accidents or zero emissions goals. All of these goals were established, nonetheless, to advance the systems and training necessary to make the goals attainable. Currently, 70-90% of discarded materials can be recycled, reused, or composted. A zero waste goal has helped many municipalities and regions around the world reach waste diversion rates of 50-60% within a few years. The goal of zero waste holds the same promise for Vermont.

Recommendations

Adopting a Goal of Zero Waste

Goals are set to reflect a vision. To build and promote healthy, sustainable communities in Vermont, our vision must not be one of wasted resources that are lost to burial and incineration. Instead, we should envision a state that is industrious with its resources, conserving and using them for the benefit of all. Goals are also set to guide planning, programming, spending, and policy decisions. The goal of zero waste will not be met tomorrow, but it will never be met if we do not set the goal and formulate systems that further the goal. The Agency of Natural Resources should adopt a zero waste goal and create a zero waste model to guide the state's Solid Waste Management Plan.

Setting Limits on Waste Disposal

Very little is accomplished without deadlines. In committing to a goal of zero waste, we must allow ourselves to feel pressure to move toward that goal. Placing a ten-year moratorium on new landfills would apply that pressure. During these ten years, the state's priority should be to fund and build the resource recovery infrastructure of a zero waste system. Other regions have met initial goals of 50% waste diversion within five years of setting a zero waste goal. A ten-year landfill moratorium would provide Vermont with time to take major steps toward zero waste and analyze successes and failures.

Maximizing Existing Waste Diversion Systems

Some of the infrastructure and programming required for a zero waste system already exist in Vermont; however, these systems have not yet been maximized. More than half of the waste landfilled in Vermont could be recycled or composted. To achieve zero waste, resource recovery facilities must maximize the range of materials they accept. Under a zero waste model, these facilities' first priority should be to maximize the resources captured from the waste stream.

To ensure that recyclable materials and food scraps are separated, landfill bans should be placed on materials for which resource recovery systems are established. In Vermont, a full ban on the disposal of compostable organics such as food waste and dirty paper should be adopted within five years, fully utilizing the 23 composting facilities currently permitted. Similarly, the disposal of all clean paper, including cardboard and newsprint and plastics 1 and 2 should be banned, or inversely, recycling made mandatory.

Training Toward Zero

Being told what to do is not nearly effective as being shown what to do. To ensure the success of zero waste programming, participants must be trained, not just educated. This training aspect should be incorporated into zero waste programming. Similarly, the concept of zero waste and the resulting behavior changes should be reinforced and promoted. Opportunities to capture resources through recycling and composting should be as accessible and available as opportunities to dispose of waste. Trash cans should never stand alone, but should instead have recycling and composting opportunities nearby.

Assuring Producer Responsibility

In Vermont, taxpayers supply virtually all waste disposal costs. This system should be changed to place responsibility on manufacturers. Vermont should institute producer take back policies, forcing manufacturers to consider the disposal costs in their product designs. Ultimately, incentives should favor reusable, recyclable, repairable, upgradeable, or biodegradable products.

Additionally, consumers should see reasons to greatly reduce their waste. Pay-As-You-Throw programs should be established across the state, in which, for example, residents pay a highly inflated rate to purchase a trash bag. Funds collected from these programs could then be used to expand resource recovery work. Under a zero waste system, resource diversion options and/or producer responsibility systems should accept the entirety of the waste stream, allowing active participants to avoid costs.

Funding Zero Waste

At the national level, subsidies for virgin material extraction should be reallocated to fund local resource recovery infrastructure, forcing virgin materials enter the market un-buffered. At the state level, funding should come from the various sectors, such as agriculture or environmental protection, contained within the comprehensive resource recovery system resulting from a zero waste goal.

The State of Trash

Vermont's Current Waste System Threatens Public Health and the Environment

The current management of our waste stream, from collection to incineration or burial, leads to a range of environmental and public health problems. Approximately 10% of Vermont's waste is exported and burned in incinerators,[iii] which spew hazardous dioxins, furans, polychlorinated biphenyls, and heavy metals into the air. The resulting toxic ash enters landfills.[iv] The airborne pollutants settle to the earth, contaminating our soil and water,[v] or combine with atmospheric moisture, leading to acid rain.[vi] Incinerators release many heavy metals, including mercury, lead, cadmium, chromium, and arsenic. These metals are known to cause neurological and reproductive disorders and are probable carcinogens.[vii] Incinerators also release dioxins, persistent organic pollutants that are highly toxic. As dioxins travels through the environment, they bioaccumulate, or build up, in the food chain. Dioxins harm human reproductive and immune systems and fetal development and are considered possible carcinogens. According to the United Nations Environment Programme, in 2000, municipal solid waste incineration was responsible for 69% of dioxin emissions worldwide.[viii]

The remaining 90% of Vermont's trash enters landfills,[ix] which pose similar threats to the environment and human health. All household waste, 30-50% of which is organic, decomposes in the anaerobic, or oxygen-deprived, environment found in landfills. Landfills can produce toxic leachate,[x] carbon dioxide, methane, and natural gas.[xi] A variety of hazardous volatile organic compounds, such as paint thinner, solvents, and pesticides, are also found in landfills.[xii]

While new landfills require linings by law, all liners eventually leak.[xiii] When these liners leak, toxic leachate seeps into the soil and groundwater, potentially contaminating drinking water supplies. When leachate enters a water supply, its high organic matter concentration leads to anoxic (oxygen-deprived) conditions in the water. Anoxic conditions promote the conversion of leachate's hazardous chemicals into even more potent toxins.[xiv] Vinyl chloride, a human carcinogen, is one such product often found in leachate-contaminated water supplies.[xv] Across the country, approximately 10,000 abandoned and unregulated landfills exist,[xvi] which impact the health of nearby communities nearby. Vermont has more than 400 closed landfills, the vast majority of which are small, unlined and unregulated town dumps.[xvii]

In addition to toxic leachate, landfill gases rise from piles of decomposing trash. Approximately half of the gas released from landfills is methane, which poses a threat both as a flammable vapor and a potent greenhouse gas. Methane is over 20 times as efficient as carbon dioxide at advancing global warming by trapping heat in the atmosphere.[xviii] Landfills account for 34% of human-produced methane in the United States, making it the largest single source.[xix]

Communities living near landfills are directly affected by the accompanying pollution. Adults who live near landfills demonstrate a higher rate of a variety of cancers, including non-Hodgkin's lymphoma, leukemia, and lung, liver,[xx] and bladder cancers.[xxi] Their children suffer disproportionately from low birth weight and birth defects.[xxii] [xxiii]

In addition to the hazards created by landfill and incinerator pollution, waste collection also presents a hazard. Garbage collection is one of the most dangerous jobs in the United States. The Bureau of Labor Statistics classifies refuse collection as "high-hazard" work, along with logging, fishing, driving a taxi-cab, and mining. Garbage collectors are approximately three times more likely than police officers or firefighters to be killed on the job.[xxiv]

The National Outlook on Waste

America is currently facing a waste crisis. "In 2003 Americans threw out almost 500 billion pounds of paper, glass, plastic, wood, food, metal, clothing, dead electronics and other refuse."[xxv] Included in this weight was 236 million tons of municipal solid waste.[xxvi] Each American discards an average of more than 1,600 pounds of garbage per year, or approximately 4.5 pounds per person each day.[xxvii] Compared to other nations, the United States has a poor waste production record. Home to only 4% of the global population, it is responsible for more than 30% of the planet's total waste generation.[xxviii] Approximately 80% of American products are single-use items. Under this linear paradigm, Americans extract vast resources, produce items intended to have short life spans, and then burn or bury discarded materials, effectively loosing resources to landfills and incinerators.

Municipal solid waste is the solid portion of waste, not including hazardous or toxic waste, generated by households, commercial establishments, public and private institutions, and government agencies.[xxix] Municipal solid waste consists of waste from kitchens, hotels, bathrooms, schools, local shops and offices, and small construction sites,[xxx] including food and yard waste, durable and non-durable products, and packaging.[xxxi] In 2000, America's solid waste was composed of 38.7% paper and paperboard, 12.8% yard trimmings, 5.3% wood, 10.1% food, 9.9% plastics, 7.6% metals, 5.5% glass, and 10.1% other.[xxxii] Packaging was and still is the largest and most rapidly growing category of solid waste.[xxxiii] More than 30% of municipal waste is packaging, and 40% of that waste is plastic.[xxxiv] Since plastic's life span ranges from 200 to 1,000 years,[xxxv] this quantity of plastic waste is concerning. Plastic waste has accumulated to the point where "the middle of the Pacific Ocean is now six times more abundant with plastic waste than with zooplankton."[xxxvi]

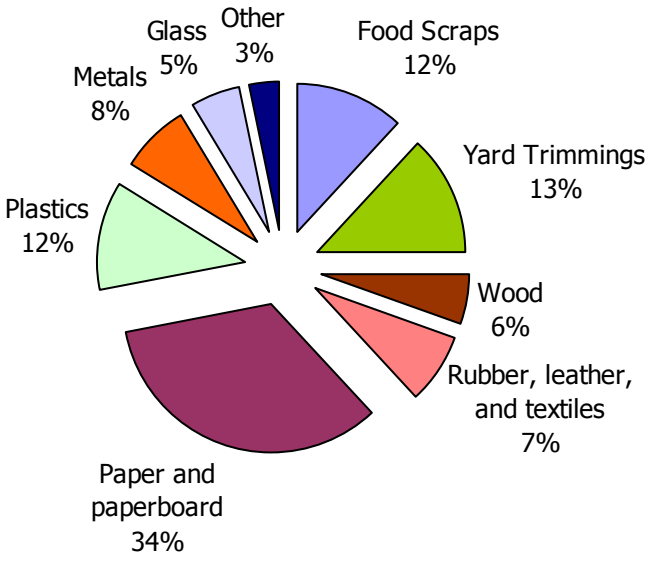


Figure 1. Components of the national waste stream, before recycling. Graph taken from the 2005 EPA Municipal Solid Waste in the United States Report [xxxvii]

Vermont's Solid Waste History

Vermonters currently generate about 600,000 tons, or approximately one ton per person, of waste each year.[xxxviii] In 2001, through reuse and recycling programs, approximately one third of the state's waste was diverted from landfills and incinerators.[xxxix] Vermont set a goal of 50% diversion by 2005, but by 2004, the state's diversion rate had slipped to 29%.[xl] Vermont is currently behind the national recycling rate of 32%.[xli] In 2004, 412,641 tons, or approximately 73%, of the remaining waste was disposed of in-state at the state's four active landfills and 149,900 tons, or approximately 26%, was exported to landfills and incinerators in New York, Massachusetts, and New Hampshire.[xlii]

The active solid waste landfills in Vermont accept municipal solid waste and construction and demolition debris for on-site disposal in Moretown and Coventry. Most hazardous materials are banned from these sites.[xliii] The Moretown landfill, currently owned by Waste Services International (WSI), is permitted to accept 172,000 tons annually. In December 2006, the landfill was expanded, and Cell 3 was opened. This expansion provided 1,027,500 tons, or approximately six years, of capacity. The Coventry landfill, owned by New England Waste Services, a subsidiary of Casella Waste Systems, represents a larger operation with 370,000 tons of capacity. This site was also recently expanded, and Phase VI was opened. This expansion provided 6,661,350, or 18 years, of capacity. Two small town dumps still operate at Bristol and Salisbury, Vermont with each accepting no more than 1,000 tons of municipal waste annually. Two additional landfills have been permitted in the state – one by the Greater Upper Valley Solid Waste District and a second by the Northwest Solid Waste District – for a total intake of 70,000 tons annually. Construction of these landfills is not anticipated in the near future.[xliv]

Historically, Vermont disposed of its waste, which included industrial, commercial and household waste, in central town dumps.[xlv] Before the passage of Act 78[xlvi] in 1987, dozens of landfills in the state were closed without remediation.[xlvii] Act 78 forced the

closure of nearly all of the remaining unlined landfills. Only two unlined landfills remain open.[xlviii] More than 400 closed landfills in the state exist in the state: 81 documented and 339 undocumented according to a 2004 count.[xlix] As of July 1987, all new landfills required liners and systems to collect and treat leachate, except those that accepted waste from which hazardous materials and organics was removed.[l]

Pursuant to Act 78, Vermont law places waste management responsibility on municipalities and outlines the requirements for waste planning.[li] Municipalities may act independently; participate in solid waste districts; or partner with other municipalities through regional agreements to meet the planning and management requirements set forward in Act 78. In response to Act 78's passage, 16 waste districts and alliances were formed across the state:

Addison County Solid Waste Management District
Bennington County Regional Commission
Central Vermont Solid Waste Management District
Chittenden Solid Waste District
Greater Upper Valley Solid Waste Management District
Lamoille Regional Solid Waste Management District
Londonderry Group
Mad River Valley South West Alliance
Northeast Kingdom Waste Management District
Northwest Vermont Solid Waste Management District
Rutland County Solid Waste Management District
Solid Waste Alliance Communities
South Windsor/Windham County Solid Waste Management District
Tri-town Agreement
White River Alliance
Windham Solid Waste Management District

In addition to municipal responsibility for solid waste management, Act 78 established waste prevention as a priority for Vermont's waste management, followed by diversion and then disposal. To further these priorities, Act 78 required leadership and coordination at the state level through the production of a State of Vermont Solid Waste Management Plan that would direct district and municipality plans. The Department of Environmental Conservation published its first Solid Waste Management Plan in 1989. This statewide plan guides municipal solid waste planning and establishes the benchmarks and goals that municipalities, independently or cooperatively, must achieve in five-year cycles.[lii] While Act 78 recognizes the need to revise and update the state plan every five years, the plan has been updated only once. With the exception of the November 2001 plan, the state has simply readopted the previous plan in each five year cycle.

The state's 16 solid waste management districts and alliances and 23 independent municipalities must then create and adopt Solid Waste Implementation Plans (SWIPs) which comply with requirements set by the state of Vermont and its Solid Waste Management Plan.[liii] A SWIP describes how the district or municipality will meet the requirements of Title 10 V.S.A. § 6602(a)(1), which are identified in the Solid Waste Management Plan in section two on pages 38 to 42.[liv] SWIPs are submitted to the

Agency of Natural Resources for review and approval. Since the state's Solid Waste Management Plan was last revised in 2001, each of the state's waste districts and alliances and 21 of the 23 independent municipalities have submitted updated SWIPs for approval. Of these 37 SWIPs, only 10 have received final approval.[lv] Each SWIP undergoes at least two, if not four or five submissions before approval, and so most are in the process of comment and revision.[lvi]

Municipal or regional SWIPs are implemented with funds provided by member municipalities, grants, local taxes on private solid waste haulers, fees collected at waste disposal facilities and minimal state funding: $400,000 divided across the state.[lvii]

Current Waste Diversion Programs Fall Short

Unfortunately, recycling alone is not the answer to the solid waste problem. More than 9,000 curbside programs exist across the country but many are ineffective.[lviii] Only a fifth of all plastic is recycled, and almost two-thirds of all glass containers, half of aluminum beverage cans, and half of all paper is burned or buried.[lix]

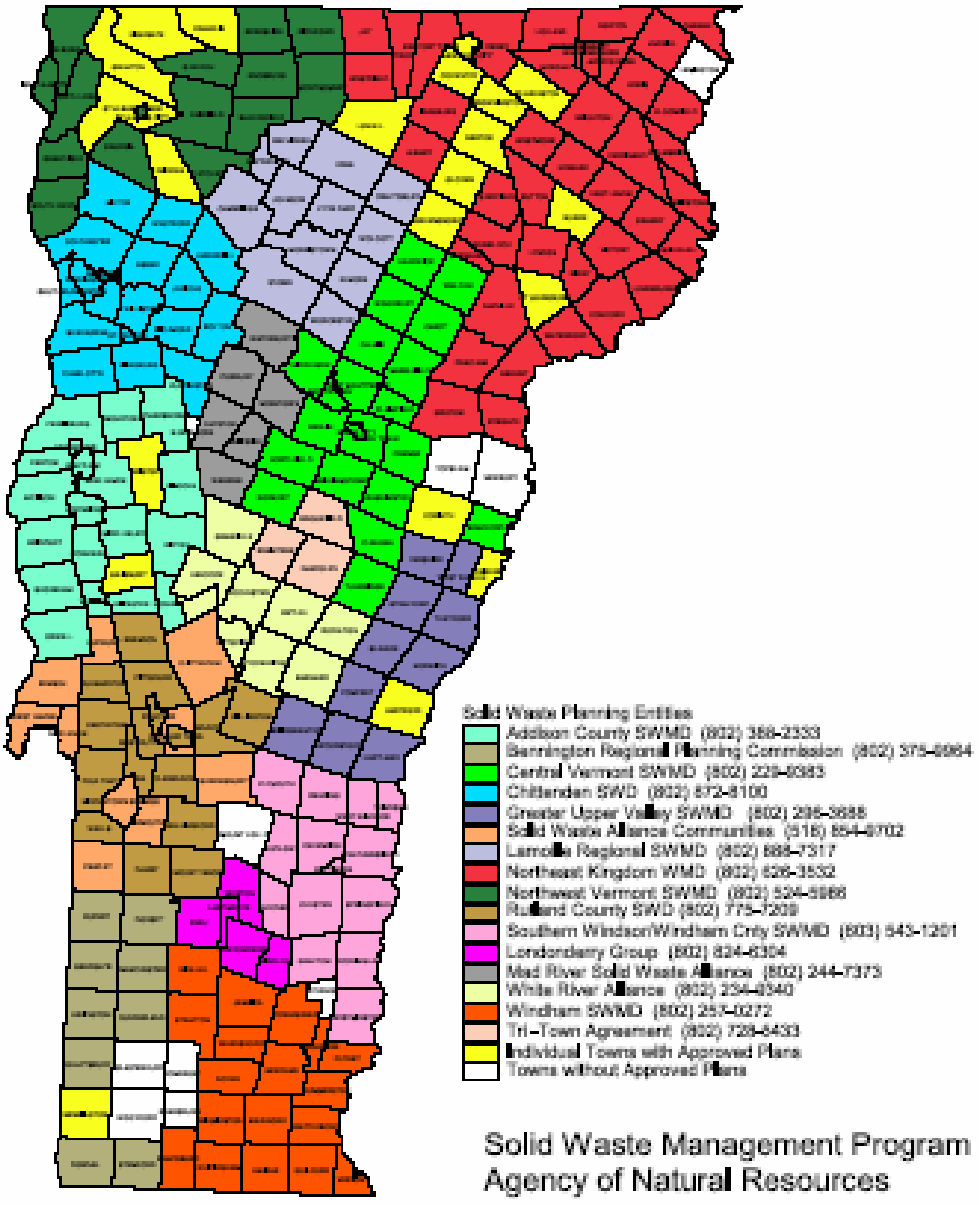
While Vermont has set a goal of 50% waste diversion, Vermont's diversion rate in 2004 was only 29%.[lx] As a state, we have not yet adopted the programming nor constructed the infrastructure necessary to reach or move past a 50% diversion goal. A 2004 waste sort undertaken at one of Vermont's transfer stations and one of its landfills demonstrates the resources left un-recovered in Vermont's waste stream. More than 30% of the waste that arrives at the state's waste disposal facilities from residential sources is compostable. Recyclable paper and containers comprise nearly 25% of this residential waste stream.[lxi] The waste stream produced by offices similarly includes 22-38% recyclable paper and nearly 20% food scraps and other organic material.[lxii] Between 40 and 60% of the waste produced by restaurants and businesses is organic, not including soiled paper. Finally, of 20% of the construction and demolition debris that enters the state's landfills is clean wood, and 7% is scrap metal.[lxiii] In fact, the Agency of Natural Resources recorded that no construction and demolition debris was diverted from landfills in 2005.[lxiv]

The continued discarding of these resources, especially the organic or compostable components of the waste stream, compounds the pollution potential of our landfills.

Figure 2. Agency of Natural Resources, Solid Waste Division. Map of Solid Waste Districts and Alliances with approved solid waste implementation plans.[lxv]

Figure 3. Map of landfills, both active and closed, in Vermont. [lxvi]

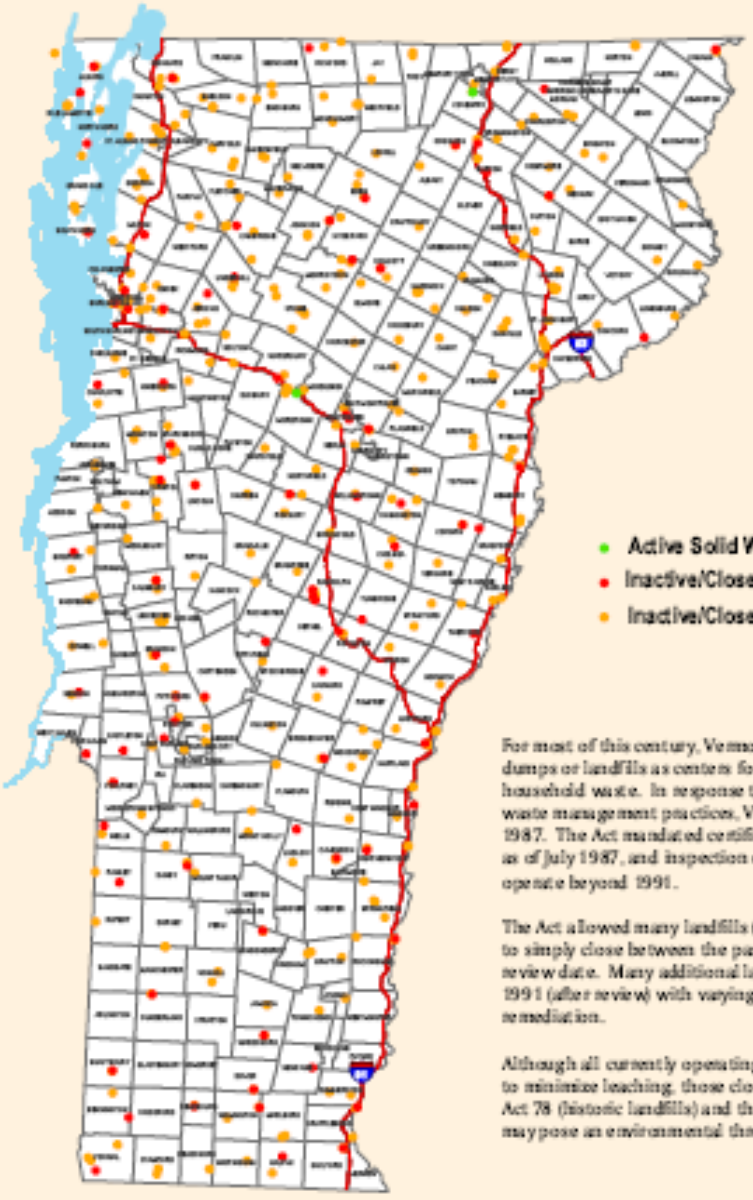
State of Vermont
Solid Waste Planning Entities



Solid Waste Management Program
Agency of Natural Resources

Jeff Bourdeau (802) 241-3488
January 12, 2007

Landfills in Vermont



For most of this century, Vermont towns have operated dumps or landfills as centers for disposal of industrial and household waste. In response to rising concern about waste management practices, Vermont passed Act 78 in 1987. The Act mandated certification for all new landfills as of July 1987, and inspection of all those continuing to operate beyond 1991.

The Act allowed many landfills (especially small landfills) to simply close between the passage of the Act and the review date. Many additional landfills have closed since 1991 (after review) with varying degrees of recommended remediation.

Although all currently operating landfills must now be lined to minimize leaching, those closed before the passage of Act 78 (historic landfills) and those closed before review may pose an environmental threat in some areas.

All data collected from the State of Vermont Agency of Natural Resources Solid Waste Management Division

Privatization and Consolidation of the Solid Waste Industry

In the previous two decades, the solid waste industry experienced a shift toward privatization and then consolidation. In 1989, 50 municipal and 14 privately-owned landfills existed in the state. Many of these landfills were forced to close due to strengthened environmental regulation.[lxvii] Vermont is now home to only two small municipal landfills and two large privately-owned landfills, which accept nearly all of the 73% of Vermont's trash that is not exported.[lxviii] Similarly, 500 licensed haulers operated in Vermont in 1989. By 2001, this number had dropped to 277, as small,[lxix] local haulers went out of business or were purchased by large national waste management companies. Only a few of these haulers own the majority of the landfill capacity and the solid waste collection infrastructure.[lxx] Trash is a profitable industry. The shift from publicly-owned to privately-owned haulers, landfills, and incinerators shifted waste managers' priorities from ensuring public responsibility to producing profit. Elected officials, held accountable by their constituents, previously served as the waste management decision makers. Now they are increasingly replaced by private corporate boards and CEOs who are primarily responsible to their stockholders.

Due to the privatization and consolidation of both the solid waste and recycling industries, much of Vermont's waste remains briefly in transfer stations, and then it is shipped to one of the state's two regional landfills or to neighboring states for disposal or incineration, or it is sold into the recycling markets.[lxxi] Looking back two decades in New England, it is difficult to find a proposal for the construction or expansion of a solid waste facility that was rejected by state officials,[lxxii] perpetuating the current paradigm in which waste companies profit from disposal at the expense of environmental and public health. This private business model translates into a prioritization of land filling and incineration over the reduction, reuse, and recycling of materials. Casella Waste Systems (Casella), for example, generates only 20% of its profit from recycling.[lxxiii] This shift from public to private waste management has likely contributed to Vermont's low diversion rate.

While private companies have continued to gain control over solid waste infrastructure, municipalities have lost legal power to decide where their waste is deposited. The 1994 Supreme Court case *C&A Carbone, Inc. v. Town of Clarkstown* greatly restricted a municipality or district's "flow control," and enabled contracted private haulers to determine the destination of collected waste.[lxxiv] Therefore, as of 1994, municipalities and districts that do not self-haul have been unable to depend upon fees generated from waste brought to their facilities.

Casella illustrates the impacts of waste privatization in the region, and specifically in Vermont. As of 2005, Casella was one of the largest waste collection and disposal firms in the northeast, operating more than 45 landfills and trash transfer stations as well as 39 recycling facilities.[lxxv] In Vermont, Casella and its subsidiaries operate the landfill in Coventry, the fourth largest landfill in New England,[lxxvi] as well as 14 transfer stations.[lxxvii]

Casella's vertical integration business model is of particular concern in Vermont. Since Casella owns both Vermont's largest waste disposal facility and much of its hauling infrastructure, Casella haulers have an advantage over small local haulers. In regions

where competition is minimal, consumers pay higher prices. Vermont's tipping fees are currently among the highest in the nation,[lxxviii] averaging just over $100 per ton.

Indeed, state officials have specifically expressed concern over the lack of competition in the solid waste industry and over Casella's market share. In 2002, the Vermont Attorney General's office and Casella negotiated an agreement in which Casella discontinued contract behavior that the attorney general found to be anti-competitive. A settlement was reached to shorten contract terms and reduce the company's cancellation fee.[lxxix]

The Zero Waste Model

What is Zero Waste?

Zero waste is a whole system approach that aims for a major change in the way materials flow through society. Its goal is the elimination of, rather than simply the management of, waste.[lxxx] It is not any single technology, program, or policy. Instead, it is a strategy that begins with better industrial design and ends with the separation of discarded products.[lxxxi] Zero waste creates a circular or closed-loop waste stream that mimics a natural system where one material feeds another; life, death, decay to new life is the natural cycle.[lxxxii] Discarded materials are separated and cycled back into the manufacturing process. In this way, materials are reused to make consumer goods, reducing the need to extract and process raw materials and bolstering the sorting, reprocessing, and composting sectors. Essentially, a zero waste goal and accompanying zero waste model redesigns the existing industrial waste system that processes waste in one direction, with the majority of our discards being recovered instead of lost to landfills or incinerators.

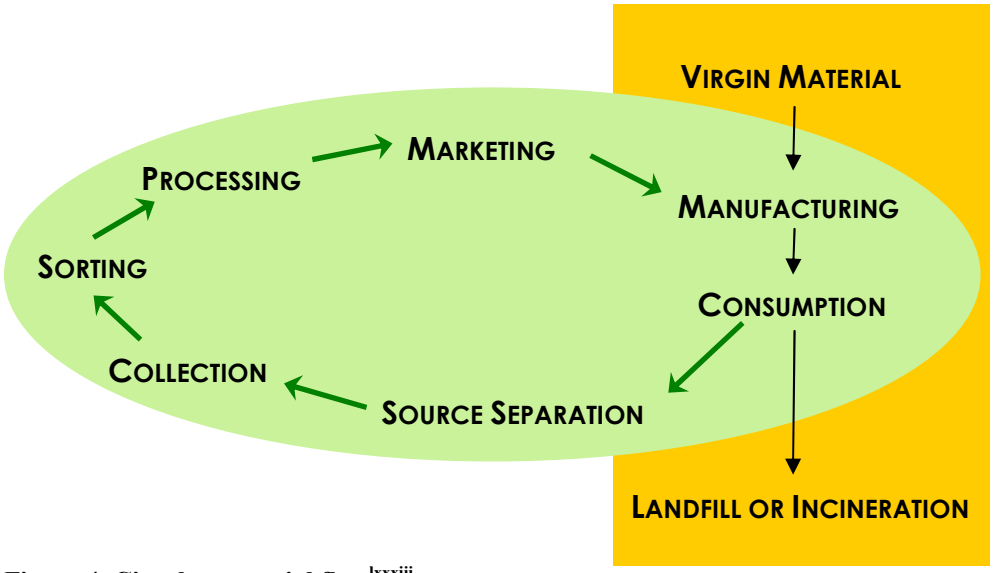


Figure 4. Circular material flow[lxxxiii]

A Waste Paradigm Shift

To achieve zero waste, elected officials, corporations, and the public must change how they perceive and treat waste. Waste, from reprocessed plastics to compost fertilizer, can no longer be considered worthless trash, but must be considered a resource. What we now call waste is simply a discard that is valueless for the individual but it is not necessarily valueless for the larger community.[lxxxiv] According to Peter Montague, director of the Environmental Research Foundation, "[z]ero waste had the potential to motivate people to change their lifestyles, demand new products, and insists that corporations and governments behave in new ways."[lxxxv] In sum, zero waste is not just a goal, but a concept and a guiding principle. As William McDonough states in a recent Fortune

Magazine article, "We're not talking here about eliminating waste. We're talking about eliminating the entire concept of waste."[lxxxvi]

The History of Zero Waste

The first recycling programs, as we know them today, were established in the United States in the late 1960s[lxxxvii] through the 1970s. They picked up momentum from the first Earth Day in 1970 and the Clean Air and Water Acts. In 1968, curbside recycling pickup for newspapers was first offered in Madison, Wisconsin.[lxxxviii] The recycling movement further developed as landfill regulations were enacted in the 1980s and early 1990s. However, local waste managers did not yet regard recycling as a real alternative to disposal,[lxxxix] so advocates coined the term "Total Recycling.[xc]"

Canberra, Australia's capital, was the first city to adopt a "no waste" or "zero waste" policy in the late 1990s as the result of a community consultation process.[xci] The zero waste movement grew as the grassroots recycling movement embraced a model that answered the limits of recycling with a more comprehensive model that addressed both the front end (production and design) and the back end (reuse and reprocessing) of material flow.[xcii]

Referred to as a "growing global phenomenon,"[xciii] many regions are implementing zero waste models. The majority of Australia's provinces have committed to a zero waste goal by 2010. Seventy percent of New Zealand's local councils have passed ordinances formally adopting a zero waste goal by 2015.[xciv] Similar resolutions have passed in twelve Asia-Pacific nations, Ireland, Scotland, and regions of Canada and France. In the United States, several California counties and Carrboro, North Carolina have passed zero waste initiatives.[xcv]

Spotlight on Nova Scotia

Overview of Nova Scotia and Their Successes

Nova Scotia, one Canada's eastern provinces, has set a strong example in effective waste diversion and resource recovery. In 2006, Nova Scotia had a population of approximately 934,000 within its 21,000 square miles. Approximately half of the population (485,000) lived in the provinces' two largest cities, Halifax and Cape Breton, while the remainder lived in smaller towns and more rural areas.[xcvi] Vermont's 2005 population of 623,000 was spread over 9200 square miles,[xcvii] with approximately 200,000 populating urban centers. Per capita income in Nova Scotia was approximately $28,000 in 2005 and approximately $35,000 in Vermont in 2000.[xcviii] While larger and less densely populated than Vermont, Nova Scotia still offers a useful comparison to Vermont's relatively small population and small towns.

In 1995, Nova Scotia began working on a five-year goal to reach 50% diversion and a ten year plan to implement new disposal standards. To meet their goals, they sought to improve regional waste coordination and in doing so reduce costs, increase economic opportunities, and better support the resource recovery sector. By 2004, they had met with success as 99% of Nova Scotia's residents had curbside recycling, 76% had compost collection, and 87% of households were located within 20 km of an EnviroDepot. Each of the 84 EnviroDepots is an independently owned business which collects beverage containers, paint, cardboard and newsprint, which are then shipped to a larger recycling facility.[xcix] Recycling program managers observed a 79% return rate on beverage containers, meaning 241 million bottles were redeemed over the course of 2004. Nova Scotia's programs divert 900,000 tires from landfills each year and recycling over 400,000 liters of paint. In addition to the substantial reduction in waste production, the resource recovery programs created 1000 jobs over the course of ten years.[ci]

Setting the Course with Strong Zero Waste Policy

To achieve its goals, Nova Scotia policy makers set forward strong policy, requiring the development of programs to collect easily recyclable, reusable, or compostable materials as well as hazardous materials. Therefore, all beverage containers, glass containers, and metal cans; cardboard and newsprint; tires, car batteries, and antifreeze; #2 plastic containers and polyethylene bags and packaging; used paint; and organic waste including food scraps, yard waste, and soiled paper, were banned from Nova Scotia's trash disposal sites. In addition to landfill bans, Nova Scotia policy established deposit systems to create economic incentive for individual participation. The bottle deposit system, for example, charges a 10 or 20 cent deposit per bottle, based on the size of the bottle, but returns only half of the deposit on non-refillable beverage containers.[ci] Deposits on refillable containers are fully refunded, creating incentive both for manufacturers to produce and consumers to purchase refillable bottles.

Laying the Groundwork for Zero Waste

Resource Recovery Fund Board

In 1996 the government of Nova Scotia established this nonprofit organization, the Resource Recovery Fund Board, with a staff of 25 to administer its solid waste-resource management programs.[cii] This included administering the deposit system for beverage containers and recycling programs for hard-to-recycling products (namely, tires and paint); developing industry responsibility programs as well as education and awareness programs; providing funding to support municipal diversion programs; and promoting value-added manufacturing.[ciii]

Major Disposal Sites
Nine major solid waste collection sites are spread across Nova Scotia, some of which include landfills and all of which are owned publicly. Each has published tipping fees for the discards it collects separately. For example, at the Little Forks Landfill Facility, tipping fees are:[civ]

- Garbage - $126.50/tonne
- Construction & Demolition Debris - $110.00/tonne
- Organics - $77.00/tonne
- Recycling - $0/tonne
- Clean Wood - $77.00/tonne
- Metal - $0/tonne
- Leaf &amp Yard Waste - $0/tonne
- Asbestos - $4/bag

Construction and Demolition Debris Collection Sites
In addition to the construction and demolition debris collected at the large disposal sites, seven private salvage facilities are found in Pictou, Colchester, Annapolis, Digby, and Shelburne counties.[cv]

Organic Composting Facilities
Nova Scotia is home to 18 composting facilities, both publicly and privately owned, which each accept between 300 and 50,000 metric tons of organic waste annually. Smaller facilities are often limited to food and yard waste collected from either the commercial or residential sectors. Larger facilities are also able to process animal carcasses and fish scraps, wood and paper products, and grease.[cvi] Together, these facilities convert 100,000 tons of organic material into compost annually.[cvii]

Recycling Facilities
Nova Scotia's dozen recycling facilities[cviii] receive recyclables collected both at the province's 84 EnviroDepots and from curbside pickups. Annually these facilities sort and process over 40,000 metric tons of materials, including 240 million beverage containers.[cix]

Promoting Reuse Markets: More Jobs for More Nova Scotians

In requiring or providing incentive for the diversion of these recyclable, reusable and compostable materials, policy makers simultaneously supported the collection and reprocessing industries, creating jobs in these sectors. In response to these landfill bans, a variety of companies stepped up to accept, process, and resell the diverted materials. Almost 3,000 jobs exist in the waste-resource management sector in Nova Scotia. For example:[cx]

- Novapet, Inc. grinds plastic soda bottles into pellets that are sold to carpet and clothing manufacturers.
- Thermo-Cell converts a portion of the province's used newspaper to insulation. USG uses newspaper as a component of their wallboard, and CKF, which employs 250 individuals, reprocesses newspaper into new paper products, from cup holders to egg cartons.
- Minas Basin Pulp and Power, with 200 employees, has taken on all of the island's used corrugated cardboard, converting it back into liner board, a component of new cardboard.
- The Enviro-Depot network employs 500 Nova Scotians in transportation, processing, and marketing beverage containers and other materials.
- A new tire recycling plant is currently under construction in Colchester County, Nova Scotia. The plant will crumb tires for the manufacturing of various products.
- The Paint Recycling Company in the Halifax Regional Municipality processes leftover paint that would otherwise be disposed of down the drain or in landfills. Amherst Glass Works in Colchester County, Nova Scotia manufactures glass figurines and plaques out of waste glass.
- Composting facilities across Nova Scotia process over 100,000 tonnes per year of organic material into compost, a valuable soil enhancer.

Benefits of a Zero Waste Approach

Environmental Protections

Zero waste is a whole system approach with widespread benefits. In the ideal zero waste system, resources remain bound in local cycles. For example, farmers produce food which is sold locally. Consumers return their food scraps and other organic wastes to local composting centers to provide farmers with healthy soils for food production. In short, zero waste strategies minimize the need for landfills and incinerators, and therefore reduce the related public health risks and green house gas emissions. A zero waste model conserves resources and reduces the energy consumed in the production and collection of materials by decreasing the need to extract and refine virgin materials. For example:

- In using scrap iron to manufacture steel, the industry minimizes the need to mine iron ore, reducing mining wastes by 97%, air pollution emissions by 80% and water pollution by 76%.[cxi]
- Each year Nova Scotia diverts 350,000 metric tons of discards from landfills and incinerators,[cxii] minimizing the use of their disposal facilities.
- Seventeen trees are left standing for each ton of newspaper recycled.[cxiii]
- Nationwide recycling in 2001 reduced greenhouse gas emissions by 32.9 million tons, a weight equivalent to that produced by 25 million cars.[cxiv]
- For every glass bottle recycled into a new glass container, enough energy is conserved to light a 100-watt bulb for four hours.[cxv]
- Producing new aluminum cans from recycled cans uses 95% less energy than the energy use to extract and process virgin aluminum.[cxvi]
- A United States recycling rate of only 30% in 2001 resulted in an energy savings equivalent to the annual energy needs of approximately 6.5 million homes.[cxvii]

Economic Benefits of Zero Waste

Our society currently manages waste in an uneconomical manner. Waste requires money since landfills and incinerators must be permitted, constructed and operated. When landfills leak, taxpayers share the cost of remediation. Currently, 17 of Vermont's 52 recognized Superfund sites are former landfills and dumps.[cxviii] Similarly, people living in nearby communities accrue medical costs. The costs of waste collection and disposal are covered directly by the individual in "Pay-As-You-Throw" systems or are shared by the community through local taxes.

Recovered resources, however, produce money when processed materials are resold into the market. Recovery similarly minimizes the long-term costs of landfill remediation. Closed loops of resource flow transform discards into jobs, not trash.[cxix] For every ton of discarded materials, approximately ten times more jobs exist in the recycling and reuse sectors than in the disposal sector."[cxx] For example:

- Hewlett Packard saved $28 million by reducing its waste by 95%.[cxxi]
- In 2005, Epson saved $73 million when it eliminated nearly its entire waste stream.[cxxii]

- Interface, Inc. set a zero waste goal zero to reach by 2020 and has saved $260 million so far.[cxxiii]
- In 1997, 17,339 residents of Great Britain held jobs within the closed resource loops of a zero waste model.[cxxiv] The majority of these positions were in waste collection (5,450 jobs) and sorting (1,624 jobs) or paper and cardboard reprocessing (9,400 jobs).[cxxv]
- The British government estimated that it could provide 45,000 jobs if it reached a recycling rate of 30%.[cxxvi]
- Across the United States, 1.1 million people are employed by the recycling industry, which is a $238 billion business[cxxvii]

Implementing a Zero Waste Program

An overarching component of zero waste is the implementation of a circular approach to handling society's waste. This approach may also be referred to as a closed-loop system that decreases the amount of waste that enters the waste stream. This is how a zero waste system prevents the creation of waste rather than simply "managing" it.[cxxviii] This circular technique mimics nature "where everything that wears out or dies becomes food or shelter, however temporarily, for something else, giving rise to a vibrant yet efficient flow of energy and resources."[cxxix] Zero waste visualizes our economy as a circular or spiral system in which every part supports and affects every other part. This system can replace the current outdated linear economic and production system, which does not recognize the interconnectedness of impacts and the trail of wastes left behind.[cxxx]

Steps Toward Zero Waste

1. Set a Goal of Zero Waste

A zero waste goal is similar to the goals of zero accidents on a manufacturing line, zero defects in the production of a product, or zero emissions from a polluting industry. A goal of zero waste allows public and private organizations to focus creativity and resources on continuous improvement in waste infrastructure that will completely change the way we think about and deal with waste.[cxxxi] Of course, no system is 100% efficient. Setting a goal of zero waste will not allow us to completely eliminate waste, but it will drive our waste infrastructure and programming in the right direction.

Short-term goals can then be set as stepping stones. For example, Nova Scotia set a five-year goal of 50% diversion for their entire waste stream. San Francisco, California has set goals of 75% diversion by 2010 and zero waste by 2020.[cxxxii] Goals can also be set for each major component of the waste stream. New Zealand's initial zero waste master plan, the New Zealand Waste Strategy, set individual goals for organics (95% reduction of commercial and garden waste by 2010), construction and demolition debris (50% reduction of 2005 levels by 2008), pilot programs in eight categories of hard-to-recycle materials such as tires and batteries by 2005, hazardous waste (20% reduction by 2012), and organochlorines, primarily dioxins (90% reduction by 2020).

2. Identify Resources within the Waste Stream and Make a Plan

Everyday we throw away materials – plastics, metals, paper, electronics, paint, textiles – that are still valuable to a manufacturer. Likewise, the organics we discard in our food

scraps and yard trimmings can become a rich fertilizer if properly processed. According to Eric Lombardi, director of Eco-Cycle, a market exists for up to 90% of what is thrown in the trash. To loop our discards efficiently back into the economy, we must first identify them.

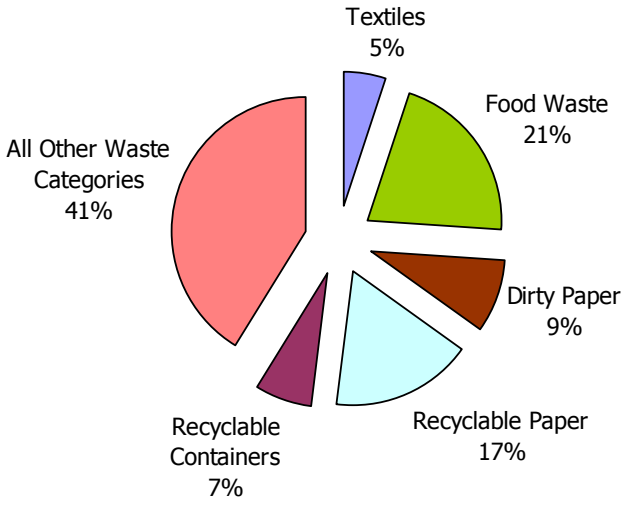


Figure 5. Composition of residential waste in Vermont based on four waste sorts at two of Vermont's waste disposal facilities.[cxxxiii]

Once resources have been identified, a plan is created to recover those resources and prevent their permanent loss to a landfill or incinerator. As plans develop, these resources are often grouped by initiative. The planning around a recycling initiative, for example, could include a range of identified resources. Central Vermont Solid Waste Management District's plan includes chapters covering:[cxxxiv]

- Recycling (paper, metal, plastics)
- Organics and composting
- Hazardous and special wastes
- Disposal (residuals, or traditional "trash")
- Biosolids (sludge)

Plans may also focus on specific sectors[cxxxv] or sources[cxxxvi] since certain sectors constitute major sources of a particular resource. For example, restaurants discard large amounts of organics, and the commercial sector discards large amounts of paper. Regardless of the structure of a zero waste plan, the goal of the plan is to protect identified resources.

Policy initiatives also are a part of the protection of discarded resources. Bans that prohibit the land filling of particularly dangerous or easily recyclable materials, such as plastics and household toxics, are part of zero waste systems in many regions.[cxxxvii] Landfill bans lead to the establishment of both collection and diversion programs and infrastructure for these resources and enforcement capacity.

Nova Scotia, the European Union, and others have enacted landfill bans or restrictions on a variety of readily recyclable resources and toxic materials from beverage containers and corrugated cardboard[cxxxviii] to flammables and hospital waste.[cxxxix] Some municipalities in Vermont have enacted mandatory recycling ordinances. These local ordinances are then enforced by Vermont's solid waste districts through a process similar to traffic ticketing. In central Vermont, initial citations of large generators have quickly led to compliance without the need for fines.[cxl]

3. Separate Waste into Categories

Separating waste into categories is extremely important because trash is generally created when discarded materials are mixed. Mixing prevents the proper reuse and recycling of discards since materials need to be returned to their respective reprocessing loop free from contamination.[cxli] The separation of discarded items into well-defined categories avoids the need to dispose of them in expensive and dangerous incinerators and landfills.[cxlii] Some waste systems, especially in large urban areas, collect mixed recyclables, food scraps, and trash from the curbside and then separate the materials at sorting centers. Unfortunately, this system reduces the amount of waste that can be easily reused or reprocessed by increasing the amount of contamination.[cxliii] Source separation can be:

- **Wet/dry separation.** Perhaps the simplest system, separation is focused on removing organics (wet) from the remainder of the waste stream (dry). [cxliv] Guelph, Ontario has adopted this type of system in which curbside collection involves pick up of green bags (wet/organics) and blue bags (dry/recyclables and residuals, or remaining discards). The blue bags are transported to a sorting center for further separation. Using this system, Guelph achieved 98% participation and a 58% diversion rate within several years.[cxlv]
- **Organic/Recyclables/Residuals.** This three-way separation focuses on removing both organics and recyclables, but collecting a range of dry recyclables in a single stream. Residuals comprise the small portion of the waste stream that can not yet be reused, recycled, or composted due to poor design or material choices. The *Fantastic Three,* San Francisco's three-container curbside collection system includes black bags for residuals, blue bags for recyclables such as metal, plastic, glass, and paper, and green bags for organics such as yard waste, kitchen scraps, and food stained cardboard.[cxlvi]
- **Organics/Commodity A/Commodity B/Recyclables/Residuals.** Other systems ask participants to further separate the recyclable stream, often removing the most valuable commodities. For example in central Vermont, corrugated cardboard is collected separately.[cxlvii] This system is most often found at rural drop offs where certain materials may be directed to a local reprocessing center to avoid transport to a larger, central sorting facility. The concept is similar to sorting your in-town and out-of-town mail.

Once they are trained, Americans are willing separators. In fact, more Americans separate their trash and recycle their plastics, metal, and paper, than vote.[cxlviii]

4. Close the Loops
Closed loops refer to cyclical material flows in which an item is produced, used, potentially reused, reprocessed, and reproduced or composted. These cycles include different "stops" along the way, depending on the material or item. For example, a glass milk bottle could be filled, consumed, cleaned, and refilled many times before it is crushed and reprocessed into a new bottle. In a similar loop, food produce is grown and consumed, and the food scraps are composted.

The prioritization of loops requires individuals to assess the infrastructure and programs that already exist and to determine the largest or most critical components of the waste stream to divert. It's important to close the loops through building upon existing waste-reduction infrastructure strengths.

Collection
The first step in a resource management system is collecting discarded materials from participants – residential, commercial, or otherwise. Several different models serve this purpose:

- Curbside collection is most often found in densely populated areas. Some regions collect each separated component of the waste stream simultaneously, and some, like Nova Scotia rotate the component of the waste stream collected on any given pick-up date in two-week cycles.
- Drop-off centers are most often found in suburban or rural areas and accommodate the separation of small components of the waste stream such as hazardous waste.
- A third model is buy-back centers/send back promotions. This model could include bottle redemption centers or producer take-backs of a range of products from disposable cameras and electronics to carpeting and large machinery (ie. copiers).

Infrastructure
The second step in resource management is sorting and reprocessing the discarded materials. While the traditional waste management system involves the construction of landfills and incinerators, the zero waste model requires a different kind of infrastructure. The zero waste model is focused on separation and resource recovery and should allow for the storage of commodities to maximize profits in fluctuating materials markets. A complete zero waste infrastructure would include:[cxlix]

- **Materials Recovery Facility (MRF)-** A MRF is designed to accept traditionally recycled materials – metals, plastics, paper and cardboard – and sort and ship the materials to manufacturers.
- **Center for Hard-to-Recycle Materials (CHARM)-** A CHARM is a depot for hazardous waste and other "non traditional" recyclables from books to Styrofoam to old appliances, some of which can enter recycling markets and some of which require disassembly.
- **Re-Use Facilities**- These facilities can include traditional flea markets, but ideally would comprise more specialized facilities and shops, including consignment stores for clothing, used book stores, used furniture stores, bike repair and resale shops, used building material warehouses, etc. For example, Recycle North of Burlington,

Vermont accepts a variety of household appliances, electronics, and construction salvage and trains employees in repair. In 2000, it generated $750,000 in income.[cl]

- **Composting Facilities**- Organics infrastructure should include both regional facilities and household composting with bins in which worms eat the organics.[cli] The compost produced can then be sold back to farmers as a healthy soil amendment, or can be used to combat erosion, reclaim brownfield sites, and more.[clii]
- **Construction and Demolition Facilities**- These facilities separate and remarket or recycle construction discards as well as the "left-overs" from deconstructed buildings. Deconstruction of buildings is greatly preferred over demolition since demolition debris is a highly mixed waste.
- **Residue Facility**- Approximately 10% of currently discarded materials is truly waste. The remaining residual should be stabilized to capture the gases and liquids of decomposition before it is buried in a dry-tomb landfill. Manufacturers of these materials should be billed for their disposal.

5. Explore and Apply Waste Reduction Strategies

Creating economic disincentives to waste and incentives to divert is critical, both at the consumer level, through waste audits and Pay-as-You-Throw systems and within the waste hauling industry, through the differential taxing of waste hauling and recycling or organics hauling. In combination with these incentives, education and training programs are necessary to maximize participation and minimize contamination during source separation. For example:

- Following a waste audit, Quaker Oats of Canada identified ways to cut its waste stream by 90% and save money.[cliii]
- In Massachusetts Pay-as-You-Throw programs have decreased the production of residential trash in a community while increasing the community's recycling rate from 20-27%.[cliv]
- In Rockford, Illinois participation in the community's recycling program increased by 400% when they adopted a garbage lottery. Each week, a random household was chosen to win $1,000 if their trash was free of recyclables.[clv]
- Due in part to the on-site training programs Central Vermont Solid Waste Management District provides to schools and businesses that participate in its organics programs, it has not yet experienced contamination in its collected food scraps.[clvi]
- As of 2001, the ten states with bottle deposit legislation recovered 80% of bottles, while non-deposit states observed recycling rates on soda bottles of only 10%.[clvii]

6. Insist on Producer Responsibility

In addition to providing back-end incentives, after materials have been bought, used, and discarded and are now the responsibility of the disposal and diversion sectors, incentives should be provided at the front end, where products are designed and produced. Companies should be compelled to:[clviii]

- Maximize the consumer value of their products and services by designing for durability and long life and by providing repair services
- Support current recycled materials markets by incorporating recycled content into products and packaging and maximizing the reuse or recycling of production discards

- Reduce procurement needs, minimizing the use of virgin materials in products and packaging
- Minimize the negative environmental impact of their products by designing for a cyclical lifecycle (cradle to cradle) instead of a linear one (cradle to grave).[clix] This goal can be accomplished by reducing excess materials, removing toxics, and designing for reuse, reprocessing, or composting
- Take responsibility for the disposal or reprocessing of products at the end their useful lives by taking back products directly or helping to fund the programs that do.

Examples of companies that are already taking responsibility:

- One of Sanyo's CD models and Sony's Smart Cards are made out of corn-based plastic and thus biodegrade.[clx]
- Daily Camera, a daily news source in Colorado, is funding a plastic recycling program run by EcoCycle, a nonprofit recycler, in an effort to recover the plastic sleeves that wrap its daily newspapers.[clxi]
- Xerox provides multiple upgrade options on their printers and copiers.[clxii] In Europe, Xerox recovers old machines and reuses their parts. In doing so, it saved $76 million in 2000 between reduced production and avoided disposal costs.[clxiii]
- Dell, Inc. takes back computers from their customers and refurbishes them for resale.[clxiv]
- Shaw Industries, the largest carpet manufacturer in the world, no longer sells carpets, but leases them so that they can be returned and recycled as they wear.[clxv]

Policy is often used as a tool to establish producer responsibility or producer take-back systems. Legislation has been passed in a number of different provinces and countries, including the following:

- In 1991, Germany passed the first Extended Producer Responsibility law, the Packaging Ordinance, which requires businesses to take back and recycle all transport as well as sales packaging.[clxvi]
- The European Union passed two sister policies in 2003 - the Waste Electrical and Electronic Equipment (WEEE) and the Restriction of Hazardous Substances (ROHS) Directives – that together require the removal of hazardous substances, including lead, chromium, and brominated flame retardants,[clxvii] from product design and place responsibility for the safe disposal of electronic products on manufacturers.[clxviii]
- British Columbia first established retailer take back of automobile oil in 1992, and then producer responsibility for paint in 1994. Currently, British Columbia requires take back of all flammable liquids, pesticides, gasoline, pharmaceuticals, ready-to-drink beverage containers (excluding milk), and electronics.[clxix]
- In 1996, Germany extended its Packaging Ordinance to require producer take back on all products sold in Germany with the Recycling and Waste Management Act.[clxx]

Between 1991 and 1997, packaging decreased 13% per capita in Germany, while packaging *increased* by 14% in the United States.[clxxi] The United States is one of only a few industrialized countries that do not have some form of Extended Producer Responsibility policy,[clxxii] though U.S. companies are meeting their required take back responsibilities abroad.

7. Stimulate the Market for Recycled and Reusable Products

Government agencies should take the lead by using their consumer power to support markets for recycled products and products designed for recyclability, from paper to computers.[clxxiii] For example, the U.S. Environmental Protection Agency,[clxxiv] as well as California's Integrated State Agencies Board,[clxxv] have set guidelines and made recommendations for the minimum recycled content allowed in an array of government-purchased products.

8. Fund Local and Regional Diversion and Resource Recovery Initiatives

Many of the first seven steps include making investments in infrastructure, personnel, and training programs across the state. Therefore, program- or initiative-specific funding is essential in creating a zero waste model. The Zero Waste New Zealand Trust suggests that two-thirds of solid waste funding flow directly to local authorities to fund the construction of the necessary collection, sorting, and processing infrastructure. The remaining one-third would then be allocated to a state or national-level zero waste agency to oversee, coordinate, and support regional implementation efforts.[clxxvi] Broader coordination allows municipalities to maximize economies of scale. Zero waste regions and countries have found sources to fund their zero waste plans, including:

- Landfill levies have been established in communities in New Zealand, in some provinces of Australia, and most countries in Europe. As of 2003, these levies ranged from $10/metric ton in South Australia to $130/metric ton in the Netherlands, in addition to the regular landfill fee.[clxxvii] These levies create a disincentive on waste production since they increases the price of waste.[clxxviii] Continued diversion programs depend on a constant waste stream or a diminishing waste stream with an increasing levy.
- Manufacturers that provide the necessary funds to support the local collection and reprocessing of their products. The European WEEE directive[clxxix] and EcoCycle Partners for Responsible Recycling program[clxxx] are based on this ethic. This ethic creates incentive for manufacturers to make products that are cheap to recycle, reusable, and long-lasting to keep the price of their products competitive. If the cost of recycling products is directly passed to the consumer, it similarly creates disincentive for the consumer to buy hard-to-recycle products.
- Unclaimed deposits (ie. on plastic containers) are transferred to a Clean Environment Fund in Massachusetts pursuant to Ch.94 §323D. These funds could then be used to support statewide diversion efforts.

Taking Responsibility for Wasted Resources – Whose Work is Zero Waste?

> *"Communities aiming for Zero Waste are aware that there is only so much they can do. Without intervention upstream through government legislation and industry responsibility there is no way to get to Zero. … There is an increasing expectation that manufacturers must play their part—and that government must take a leadership role to make sure this happens."*[clxxxi]
>
> *~Getting There! The Road to Zero Waste*

Under a zero waste model, industry, government, and communities must first take responsibility for their role in the current waste management paradigm and then work to achieve zero waste.

Industry Responsibility

In 1993, Allan Hershkowitz of the Natural Resources Defense Council wrote in the *Atlantic Monthly* that "the nation's economy would be well served if the municipal waste was reclassified as manufacturer's waste—and the waste itself became the financial obligation of the consumer-products companies."[clxxxii] The closed loops of a zero waste model include the front end of product design and manufacture as much as they include the back end of disposal. For a successful zero waste model, producers must take responsibility for their products' entire lifespan and not pass that burden onto local agencies and taxpayers.[clxxxiii]

Government Responsibility

Government responsibility for advancing a zero waste model at the federal, state, and local level is critical for the passage, implementation, and enforcement of zero waste policies and programs.[clxxxiv] The benefit to passing legislation in support of zero waste programs is that it applies a "large conceptual umbrella over a whole series of practical steps" that communities must take to actualize waste reduction.[clxxxv]

Zero waste strategies can be included in local solid waste management plans or regional economic development plans. For example, diversion goals can be replaced with zero waste goals. Local governments can also implement policy and enforcement laws that ban landfills, mandate extended producer responsibility programs, and require minimum recycled content standards. In addition, local governments have the ability to establish composting programs and Pay-As-You-Throw systems and conduct education and awareness campaigns about zero waste and waste reduction generally.[clxxxvi] In sum, government responsibility is crucial to realizing zero waste because, "local governments can create the political will to dam the waste stream and make the captured resources generate wealth, jobs, and a healthy environment."[clxxxvii]

Community Responsibility

For successful waste management, communities must create change. Planning for a zero waste future must be a collective, inclusive process, with members of the community taking responsibility and joining government and business stakeholders.[clxxxviii] As Heather Rogers stated, "Zero waste works through grassroots activism and policy-level advocacy to foster deep structural reforms."[clxxxix]

When they take responsibility, communities should not underestimate their political power as constituents and their economic power as consumers.[cxc]

Spotlight on Central Vermont Solid Waste Management District

Central Vermont Solid Waste Management District (CVSWMD) was formed in 1984 and chartered in 1995, binding its member communities together in an effort to secure future capacity for the waste generated within their boundaries. Today, CVSWMD is one of the largest three districts in the state, serving 60,000 residents in 22 diverse communities in central Vermont.[cxci] The District's Board of Supervisors, composed of a representatives from each member town, oversees the District's budget and establishes the direction of the District's work.[cxcii]

In 2003, the CVSWMD formally committed itself to achieving a zero waste goal and plan. The zero waste plan focuses on aggressive recycling, commercial composting programs and waste-reduction education programs. The plan also integrates home composting and electronic-waste programs.

Central Vermont Solid Waste Management District's Zero Waste Successes

- The Clothing Drop 'N' Swap is a two-day textile reuse event held in the fall and spring.
- The CVSWMD's DeTox Family Program teaches families with young children about the dangers of some household products and how to reduce the use of toxics.
- Lawrence Walbridge Reuse Fund provides financial support for reuse businesses and public educational efforts about the social, economic, and environmental benefits of reuse strategies.
- In 2005, CVSWMD partnered with the Vermont Public Interest Research Group and Good Point Recycling of Middlebury to host a free collection of electronic waste in Montpelier. Residents, schools, and businesses from around the state brought 56,280 pounds of old computers, televisions, cell phones and more during the five-hour pickup.

The Organics Program is a three-part diversion program that targets restaurants, schools, and private homeowners. Successes under this program include:

- In 2005, CVSWMD launched a pilot Bin and Cone Project with 92 households. By the end of the year, participants reported a 20% reduction in the amount of trash they sent to landfills as a result of the project.
- In 2004, the CVSWMD business and school composting program began with four Montpelier businesses, the Montpelier school district, two farms to receive and compost the food waste, and two hauling routes to connect the businesses and schools and to the farms. Within a year, the program grew to include 23 businesses and seven schools.

As of November 2005, 390 tons of food scraps had been diverted through CVSWMD's businesses and schools program. Meanwhile, businesses are reducing the cost of waste disposal as they remove the heaviest component of their waste streams.

Conclusion

A zero waste goal presents a vision of a world without waste. In a zero waste system, resources maintain value. A material is manufactured, consumed, and then used for a new purpose. The zero waste model forces industry to follow the circular pathways modeled by natural systems. In a natural system, the refuse of one individual or species becomes nourishment for another.

In a world of limited resources, the zero waste goal is an essential vision as the extraction of virgin materials becomes more costly and dangerous, our state's landscapes become ever more scarred with landfills, and the air, water, and ultimately our bodies become ever more burdened with industrial chemicals. The vision of a world without waste is a sustainable model for the protection and maximization of our resources.

Endnotes

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