THE CLASS OF 1964 POLICY RESEARCH SHOP

Sustainable Waste Management

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EXECUTIVE SUMMARY

As New Hampshire grapples with dwindling landfill capacity alongside rising waste generation, it is critical to explore sustainable waste management strategies that emphasize solid waste reduction, practical and environmental management, while protecting economic profitability. This report examines current solid waste practices in New Hampshire and provides recommendations based on successful approaches in Vermont, Virginia, Pennsylvania, and Oregon.

New Hampshire's landfills are rapidly nearing capacity, with the state's disposal needs projected to exceed total landfill space as early as 2034 if suitable action is not taken. Further, nearly half the waste deposited at New Hampshire landfills and waste management facilities come from out-of-state sources. While the Commerce Clause in the U.S. Constitution limits outright bans on imported waste, strategies like increased tipping fees, expanded recycling programs, emissions monitoring, and community education offer potential solutions.

An examination of comparison states shows that Vermont has implemented more centralized solid waste policies like bottle redemption, mandatory composting and recycling programs, and extended producer responsibility laws that shift waste management costs upstream. Virginia and Pennsylvania demonstrate how tipping fees for waste disposal can generate revenue that can be reinvested in environmental programs while disincentivizing some waste imports. Oregon state law allows municipalities flexibility in meeting recycling targets and the manners by which they do so, while Marion County specifically showcases an integrated waste management approach centered around its waste-to-energy facility.

By learning from the successes of other states while tailoring solutions to its unique and ever-evolving situation, New Hampshire can forge a path toward sustainable solid waste management that reduces environmental impact while striving to protect profitability.

1 INTRODUCTION: REDUCING SOLID WASTE AND MAXIMIZING SUSTAINABLE MANAGEMENT PRACTICES

As communities across the United States grapple with the environmental and economic challenges posed by increased solid waste generation and at-capacity landfills, it is paramount to explore innovative and sustainable waste management strategies. This report briefly summarizes current solid waste management practices in New Hampshire, making comparisons to Vermont, Virginia, Pennsylvania, and Oregon, and provides recommendations for reducing waste, maximizing sustainability, and promoting a circular economy. This report also seeks to identify potential sources of revenue for the state as it works to balance sustainability and revenue neutrality.

Despite its small size, New Hampshire has a big solid waste problem. New Hampshire will face growing challenges in managing its solid waste as more landfills near and are projected to reach their capacities by 2034. The state's limited number of operating landfills are rapidly nearing their permitted capacities. Exacerbating the issue is the substantial amount of waste imported from out-of-state sources, which accounts for nearly half of all solid waste deposited at New Hampshire facilities annually.

Although it is unconstitutional to ban out-of-state waste altogether, New Hampshire has an opportunity to learn from the approaches taken by other major waste importers across the country. By studying the waste management strategies employed in neighboring Vermont, as well as programs in states like Virginia, Pennsylvania, and Oregon, this report seeks to identify potential solutions tailored to New Hampshire's unique needs. Each case study will present a method to reduce out-of-state waste while avoiding blanket bans and the prohibition of private ownership of landfills.

By examining these case studies and considering the challenges faced by New Hampshire, this report seeks to provide actionable recommendations for policymakers, industry stakeholders, and residents. These recommendations will prioritize waste reduction, diversion from landfills, maximization of resource efficiency, minimization of environmental impact, and promotion of profitability in order to provide Granite Staters a cleaner state for current generations and those to come. By embracing innovative solutions and learning from the experiences of other states, New Hampshire can position itself as a leader in economical environmental stewardship and sustainable practices.

2 FEDERAL CONSTRAINTS ON LANDFILL WASTE MANAGEMENT

Landfills can affect the environment, human health, and economy of their host communities. To minimize potential damage, the federal government has imposed several landfill regulations to promote safety. In addition, the Commerce Clause in the U.S. Constitution hinders states from taking full control of waste flow into their private landfills.

The Resource Conservation and Recovery Act (RCRA) is the main law governing solid and hazardous waste disposal. It was passed in 1976 to protect human and environmental health from the landfilling of increasing amounts of solid waste.[2] RCRA regulations have evolved over time, transforming the law to consist of a combination of statutes impacting solid waste management.[3]

In addition to federal regulations over how landfills can be run, solid waste policies are constrained by the Commerce Clause in the Constitution that is designed to regulate interstate trade. The Commerce Clause "restricts states from impairing interstate commerce."[4] This law grants Congress the authority to regulate trade between states. It also places implicit limitations on individual states seeking to limit interstate commerce. When applied to solid waste markets, the Commerce Clause has historically been used to override policies restricting imports or exports.[5] States retain the power to regulate intrastate commerce under the Commerce Clause; however, if regulations are discriminatory against out-of-state economic interests, they will receive scrutiny. Policies would be found to be in compliance with the Commerce Clause "if the state interest outweighs the burden on interstate commerce."[6] Some states that have tried to regulate imported waste flow, such as New Jersey, Alabama, Oregon, Michigan, and Wisconsin, have at times been unable to construct policies determined to be in compliance with the Commerce Clause.[7]

3 THE STATE OF THE STATE: NEW HAMPSHIRE CURRENTLY

New Hampshire is on track to exceed its solid waste disposal capacity by 2034. The state currently has nine operating municipal solid waste landfills with different lining systems to isolate landfill contents from the outside environment and protect soil and groundwater from leachate, or chemicals that have been picked up by fallen rainwater.[8] Two landfills are unlined and one landfill is single lined. These systems are usually designed to hold construction or demolition waste and use a compacted clay liner at least two feet thick. The remaining six landfills are double lined. Double-lined systems can consist of two single liners, two composite liners that combine clay and plastic geomembranes, or a single and a composite liner. The upper layer collects leachate while the lower layer detects leakage. These systems are commonly used in municipal solid waste landfills and are found in all hazardous waste landfills.[9]

However, these landfills are currently being filled at an unsustainable rate. Based on the amount of waste being received by waste management facilities, the New Hampshire Department of

Environmental Services' 2021-2022 Biennial Solid Waste Report expects the state's disposal needs to exceed its total landfill capacity as early as 2034.[10] According to the report, approximately 45 percent of the total waste deposited in New Hampshire facilities is imported from out-of-state sources. Most of this imported waste is received by the three commercial landfills along the state borders in Bethlehem in the northwest, Rochester in the southeast, and Success in the northeast.

Landfill Name	Landfill Type	Location	Earliest Anticipated Year of Closure
Corn Hill Landfill	Unlined, construction & demolition	Boscawen, NH	Goal set to close by end of 2023, did not meet it
North Country Environmental Services, Inc.	Double-lined, municipal solid waste	Bethlehem, NH	2026
Lebanon Regional Solid Waste Facility	Double-lined, municipal solid waste	Lebanon, NH	2030
TLR-III Refuse Disposal Facility	Double-lined, municipal solid waste	Rochester, NH	2034
Lower Mount Washington Valley Secure Solid Waste Landfill	Double-lined, municipal solid waste	Conway, NH	2038
Mount Carberry Secure Landfill	Double-lined, municipal solid waste	Success, NH	2041
Epping Bulky Waste Disposal Area	Unlined	Epping, NH	2043, town not actively using landfill
Merrimack Station Coal Ash Landfill	Single-lined, non-municipal solid waste	Bow, NH	2050
Four Hills Secure Landfill Expansion	Double-lined, municipal solid waste	Nashua, NH	2060

Table 1: List of active New Hampshire solid waste landfills, listed by earliest anticipated closure date[11] [12] [13] [14] [15] [16]

While limiting the amount of waste that these landfills can receive from out-of-state sources could extend their capacity, policies outright banning out-of-state waste would violate the Commerce Clause of the U.S. Constitution. Further complicating the issue, state attempts to extend their landfills' life expectancies by reducing in-state waste flow tend to lead to increases in out-of-state waste flow as private companies seek to utilize their landfill space to maximize profits.[17]

To regulate solid waste disposal in New Hampshire, the Solid Waste Management Act grants NHDES the authority to monitor and enforce its provisions through the Solid Waste Management Bureau. The Bureau oversees four essential programs, discussed below.[18]

3.1 ENGINEERING & PERMITTING

The Bureau uses permitting processes to regulate solid waste facilities. The Engineering and Permitting Section also provides technical assistance, and inspects and monitors the construction,

operation, and closure of active landfills. It reviews environmental data and reviews corrective plans to address problems that arise.[19]

3.2 COMPLIANCE ASSURANCE

The Compliance Assurance Section assures that facilities operate and close in compliance with permits and Solid Waste Rules. It also oversees the Active Facility Inspection Program, Motor Vehicle Salvage Yard Program, Closed Unlined Landfill Program, Inactive Asbestos Disposal Site Program and Limited Reuse of Contaminated Soil Program using an enforcement arm that serves each program area. It provides technical assistance with compliance, reviews reports, conducts inspections, and investigates complaints.[20]

3.3 MATERIALS MANAGEMENT, EDUCATION, & PLANNING

The Materials Management, Education & Planning Section provides education, planning, and technical assistance services. The section runs a Solid Waste Operator Training program for facility operators, informing them about regulatory requirements and promoting voluntary compliance with waste management goals. Around 1,200 operators are certified under this program.[21]

3.4 REPORTING, INFORMATION, & FINANCIAL MANAGEMENT

This branch is responsible for reporting, information, and financial management. It also leads a financial assistance program to ensure that facilities can properly close and be cared for post-closure.[22]

Following China's 2017 decision to eliminate the importation of waste and purchasing of American recycled content in 2018, the New Hampshire legislature and communities across the United States have studied waste management and become increasingly aware of the state's limited landfill capacity. The 2023 passage of HB300, which bans the disposal of large amounts of food waste, ensures that landfills will not continue to be flooded with easily compostable food waste.[23] In 2024, HB 1145, intending to prohibit private ownership of landfills, failed to pass. The State does not own any landfills, so it operates as a market regulator, setting restrictions, fees, and other controls for private and municipal landfills. When a municipality or state owns a landfill, they can operate as a market participant, allowing them to freely select locations they would accept waste and business from. If this initiative had passed, the State would have been able to directly reduce the amount of out-of-state waste.

A key reason NH remains a popular destination for neighboring states to ship their waste can be attributed to its low tipping fees. A tipping fee, also known as the gate rate, is the per ton fee charged to dispose of municipal solid waste in a particular landfill, including state and local taxes, landfill operating costs, and other charges.[24]

These fees are designed to discourage excess waste disposal. Although prices vary at the county level, 2022 New Hampshire Solid Waste Management Plan estimates that the average fee in-state is around $104.30 per ton.[25] It has set waste reduction goals; however, they are not mandatory.[26] Enforceable policies have the potential to better address the state's need for solid waste diversion.

4 VERMONT

Although located nearby with relatively similar demographics and geography, Vermont has taken a stricter and more centralized approach to solid waste management compared to New Hampshire. While the two states share many qualities and some sustainable waste management approaches, highlighting their differences can be valuable as we continue to weigh the feasibility of potential initiatives.

4.1 COMMON GROUND: RESTRICTION OF CERTAIN MATERIALS

Despite their policy differences, Vermont and New Hampshire share some common ground regarding their solid waste regulations. Both states ban the disposal of certain items, such as lead-acid batteries, whole tires, and liquid wastes, in landfills. They both also restrict the direct landfilling of commonly recycled materials, like aluminum, glass, and some plastics. Both states have established programs to divert household hazardous waste like paints, pesticides, and automotive chemicals from the municipal trash stream.[27][28]

4.2 DIFFERENCES: BOTTLE BILLS, MANDATORY DIVERSION, & EPR

Unlike New Hampshire, Vermont has implemented a bottle return policy to reduce plastic waste.[29] Initially intended as a road-side cleanup program, the "Bottle Bill" has transformed into a successful recycling program. Participants can bring their covered bottles or cans to retailers or redemption centers to redeem the deposit amount, which is between five and fifteen cents per item. The law specifies, however, that only beverages purchased in-state are eligible for redemption.[30]

Vermont has also imposed statewide mandatory composting and recycling requirements under Act 148—going beyond New Hampshire's more decentralized municipal policies.[31] While recycling is mandatory across Vermont, recycling can be made mandatory only by individual New Hampshire municipalities. Some in VT have even profited from the expansion of recycling.[32]

Perhaps most distinctly, Vermont has emerged as a leader in extended producer responsibility (EPR) legislation, requiring manufacturers to internalize end-of-life management costs for products including electronics, batteries, and packaging.[33] Although New Hampshire has considered EPR

frameworks in the past and is currently considering HB 1630,[34] as of now the state lacks an overarching policy. These upstream diversion and producer responsibility measures allow Vermont to reduce waste volumes and shift costs away from municipal taxpayers.

4.3 LANDFILL CAPACITIES AND DISPOSAL RATES

Vermont is also highly selective about what materials its single privately-owned landfill can accept, including out-of-state imports. New Hampshire and Vermont likely approach waste management differently due in part to the number of landfills in each state. Vermont has one operating landfill while New Hampshire has nine landfills in operation.[35] [36] This difference translates to disparate solid waste disposal policies, perhaps revealing some of the motivations behind Vermont's more stringent laws.

In 2021, Vermonters generated 639,835 tons of municipal solid waste; of which 219,501 tons were diverted (recycled, reused, composted, etc.), and 420,334 tons were disposed of. Over the last 10 years, Vermont has maintained a 34 percent average diversion rate. 28,125 tons of municipal solid waste were sent to New Hampshire and 43,096 tons to New York, meaning that 16 percent of municipal solid waste generated in Vermont was sent for management at an out-of-state facility.[37] In contrast, New Hampshire disposed of 1,999,123 tons of municipal solid waste in 2021, of which 1,121,263 tons, or 56 percent, were from in-state and 877,861 tons, or 44 percent, were from out-of-state sources. Based on municipal transfer station data, the statewide diversion rate is estimated at 25 percent.[38]

One way that Vermont has reduced out-of-state waste entering its landfills without violating the Commerce Clause is by requiring approved Solid Waste Implementation Plans (SWIP), which demonstrate that Vermont required waste reduction and diversion goals have been met by the outside entity. No out-of-state entities have applied for SWIP approval, so Vermont does not currently receive any out-of-state municipal solid waste.[39] Vermont does, however, accept other forms of waste from other states, such as construction and demolition (C&D) waste, sludge, asbestos, and contaminated soil.[40]

Some of Vermont's strategies, like adopting a Bottle Bill of its own, expanding EPR legislation, mandating universal composting and recycling, or enforcing sustainability plans for out-of-state waste generation locations may be applicable to NH. Since Vermont has a greater incentive to reduce waste landfilling because of its decreased capacity, it has necessarily led the charge in pioneering various sustainability and waste management measures. Different problems require different solutions; therefore, we suggest a holistic approach incorporating policies and perspectives from a variety of states and considering their application to New Hampshire's unique positioning.

5 VIRGINIA

Similar to New Hampshire, Virginia's private landfills accept both in-state and imported out-of-state solid waste, making it a good comparison state to study waste management strategies. The state began developing its current solid waste management system in the early 1970s. In 1976, the newly passed federal RCRA required open dump systems to be replaced with sanitary landfills.[41] On top of RCRA guidelines, the Virginia Waste Management Act (VWMA) of 1988 introduced more comprehensive policies, including restrictions on landfill locations, and requiring landfills to be double lined. This allowed private companies to enter the market, as they could afford to make the required changes, while many small local operators could not.[42] The state's inexpensive, underdeveloped land and geology create ideal conditions for landfills,[43] leading to the development of the state's seven regional landfills in Amelia, Brunswick, Charles City, Gloucester, King and Queen, King George, and Sussex Counties.[44] The capacity of these "mega-landfills" exceeds in-state demand, causing companies to import waste from the East Coast to protect their profits.[45]

5.1 *WASTE MANAGEMENT HOLDINGS V. GILMORE*: PAST VIOLATION OF THE COMMERCE CLAUSE

Virginia lawmakers have not always been happy with the state's large amount of solid waste imports. In 1999, a set of amendments to the Code of Virginia aiming to limit the importation of out-of-state waste was signed into law. These laws were enacted in response to concerns about Waste Management's efforts to export trash from New York City to be landfilled in Virginia's regional landfills. The provisions included a cap provision that allowed landfills to accept the greater of either the average amount of waste accepted by the landfill in 1998 or 2,000 tons per day. The General Assembly also enacted restrictions on the use of barges to transport solid waste on Virginia waterways.

These 1999 amendments were challenged in the 2000 court case *Waste Management Holdings v. Gilmore*. The Court concluded that the statues were discriminatory in both purpose and practical effects. These laws were explicitly designed to burden out-of-state waste flows, which was determined to violate the Commerce Clause.[46]

5.2 CURRENT WASTE MANAGEMENT METHODS

Today, solid waste management facilities in Virginia process millions of tons of waste every year without violating the commerce clause. According to the 2023 Annual Solid Waste Report, 22.5 million tons of solid waste were received at permitted facilities in the 2022 calendar year, of which 5.5 million tons originated from jurisdictions outside the commonwealth, representing a 1.81 percent

increase in solid waste received from out-of-state since 2021. Five jurisdictions accounted for 96.48 percent of these imports: Maryland (45.35 percent), New York (17.01 percent), New Jersey (15.07 percent), Washington, D.C. (12.71 percent), and North Carolina (6.35 percent).[47] Private regional landfills charge tipping fees for the solid waste they store. These fees can be quite high. For example, Montgomery County charges $72 per ton for items such as residential municipal solid waste.[48]

The host counties collect revenue based on these fees, which can be combined with taxes to fund infrastructure projects, such as road construction, highway and bridge improvements, trash cleanups, exhumation of old landfills, monitoring of closed landfills, waste disposal convenience centers, and construction of parks for county residents.[49]

Although the revenue generated can positively impact host communities, they are accompanied by environmental and health concerns. Grassroots organizations in Virginia have expressed concerns that increased importation may be associated with violations of federal and state landfill regulations that threaten human and environmental health.[50] For example, in 2022, Charles City County residents pushed back against WM and Ingenico's efforts to expand the local landfill due to concerns surrounding toxic air emissions and the amount of leachate threatening local wetlands and the groundwater drinking water supply.[51] Hazardous wastes, such as medical waste, and contamination of soil, water, and air could also pose significant risks to the health of residents and local ecosystems unless sufficient inspection and accountability mechanisms are put in place.[52]

Virginia could serve as a potential model for New Hampshire to be able to generate revenue by importing out-of-state waste. If the state wishes to continue importing waste in a way that is consistent with the Commerce Clause, tipping and host fees could be used to fund infrastructure or sustainability projects that would benefit local communities. However, given pollution concerns, ideally this type of program would be implemented in conjunction with more stringent environmental safety regulations to protect residents impacted by nearby landfills.

6 PENNSYLVANIA

The Commonwealth of Pennsylvania has historically been one of the largest waste importers on the East Coast and nation at large. Its state mandated tipping fee surcharges, which support the recycling fund and an environmental stewardship fund, make it stand out as the only state to use such fees to finance land conservation programs. In this section, tipping fees will refer to specifically the state-imposed fees on each ton of waste disposed of in a landfill in that state. Every year, tipping fees generate millions of dollars for environmental programs, while simultaneously raising the cost of waste disposal in the state, leading to declines in the importation of out-of-state waste.

The calls that New Hampshire lawmakers have faced in recent years are familiar to many in Pennsylvania. According to multiple Congressional Research Service (CRS) reports from the early 2000s, Pennsylvania has long remained the largest waste importer of any state in the nation, importing over 30 percent more than the next state, Virginia.[53] With most of the waste coming from New Jersey and New York, Pennsylvania's waste imports represented 19 percent of the national total at 7.9 million tons. At that same time, New Hampshire ranked 20th in imports of municipal solid waste, representing less than 1 percent of national tons imported with 403,000 tons.[54] Despite the continued growth of interstate waste shipments along the Eastern seaboard in the 21st century, the amount of municipal solid waste imported into Pennsylvania had already decreased by more than 2.7 million tons in 2005 compared to 2001 figures. Most recently, according to 2019 data from the Environmental Protection Agency, Pennsylvania ranked 9th in the country for new waste dumped in landfills per capita, at 1.73 tons per person.[55] In those same statistics, New Hampshire ranked 6th in the country at 2.03 new tons of waste per capita. The 2007 CRS report attributed the Pennsylvania decline in waste imports to the imposition of new state fees on waste disposal, which provided economic incentives for some haulers to dispose elsewhere. When paired with geographic factors like the lack of rail connections, the Pennsylvania case-study demonstrates the potential role of surcharges in decreasing waste importation and increasing the sustainable livelihoods of residents.

6.1 THE ESTABLISHMENT OF TIPPING FEES

In 1989, Pennsylvania's Act 101 established a $2.00 per ton recycling fee on waste disposed at landfills and waste to energy facilities. This fee supports municipal and county grants for recycling programs, education, training, and planning.[56] The Recycling Fund generates approximately $39 million annually according to a 2021 Pennsylvania Department of Environmental Protection (DEP) white paper.[57]

In 1999, Act 68 created an Environmental Stewardship Fund (ESF) and imposed a $0.25 per ton tipping fee on landfill waste. This fund was intended to support State parks and forests, grants to support public environmental spaces, fund research on biological research, and support abatement and cleanup efforts. This fund, often referred to as the Growing Greener Plus grants program, was vastly expanded by 2002's Act 90, which authorized an extra $4.00 per ton tipping fee on landfill waste disposal.[58] This allowed tipping fees to become the dedicated source of revenue for the fund which "generates approximately $60–65 million annually and is allocated to four state agencies for environmental restoration, land conservation, and community recreation and revitalization projects."[59]

Despite repeated attempts to increase tipping fees, they have remained totaling $6.25 per ton, the same fee as when they were set. In 2007, then Governor Ed Rendell successfully proposed a $0.50 per ton increase to support the ESF and the imposition of a new $2.25 tipping fee to benefit the Hazardous Sites Cleanup Fund. Another 2015 effort led by Representative Garth Everett saw HB1624 propose an expansion of the same fees to residual waste landfills, potentially generating $20.4 million more annually, but the bill died in the committee.[60] Finally, in November 2023, Representative Mary

Isaacson introduced HB 233, a current bill that proposes the Recycling Fund portion of the tipping fee be increased from $2.00 to $5.00.[61]

Despite the lack of increases to fees supporting the Recycling Fund and ESF, the two funds have faced repeated diversions from the state to balance the state budget. In 2008, 2017, and 2021, Pennsylvania diverted $74 million from the Recycling Fund to the state's General Fund.[62] Since 2008, the ESF and tipping fees have increasingly supplanted the General Fund as the funding source for environmental programs ranging from DEP administrative costs, to support for county conservation districts, the Heritage Parks Program, and five Interstate River and Bay Commissions.[63] Most notably, from 2005 to 2020 the ESF was tasked with paying debt service on the Growing Greener Bonds. The bond was originally intended to support and accelerate the ESF's work, but later legislation enabled the bond's debt service to be paid out of the ESF instead of the General Fund, continuing a trend of only environmental programs being required to pay their own bond debt service.[64] [65] As a result, millions of dollars had been channeled away from the Fund's environmental conservation and restoration work, until 2020, when lawmakers made appropriations from Personal Income Tax revenues to completely offset the debt service payments.

6.2 OVERVIEW OF THE ENVIRONMENTAL STEWARDSHIP FUND (ESF)

In FY 2022-2023, the ESF generated $103.9 million in revenue. Over $70 million came from tipping fees, and $10.5 million from personal income taxes offsetting the debt service. 2012's Act 13 saw the creation of the Marcellus Shale Legacy Fund (MSLF), which takes a portion of the impact fees from oil and gas drilling and channels them to cleanup and environmental funds.[66] In FY 2022-2023, this figure amounted to about $7.5 million. The remaining revenue comes from the fund's interest.

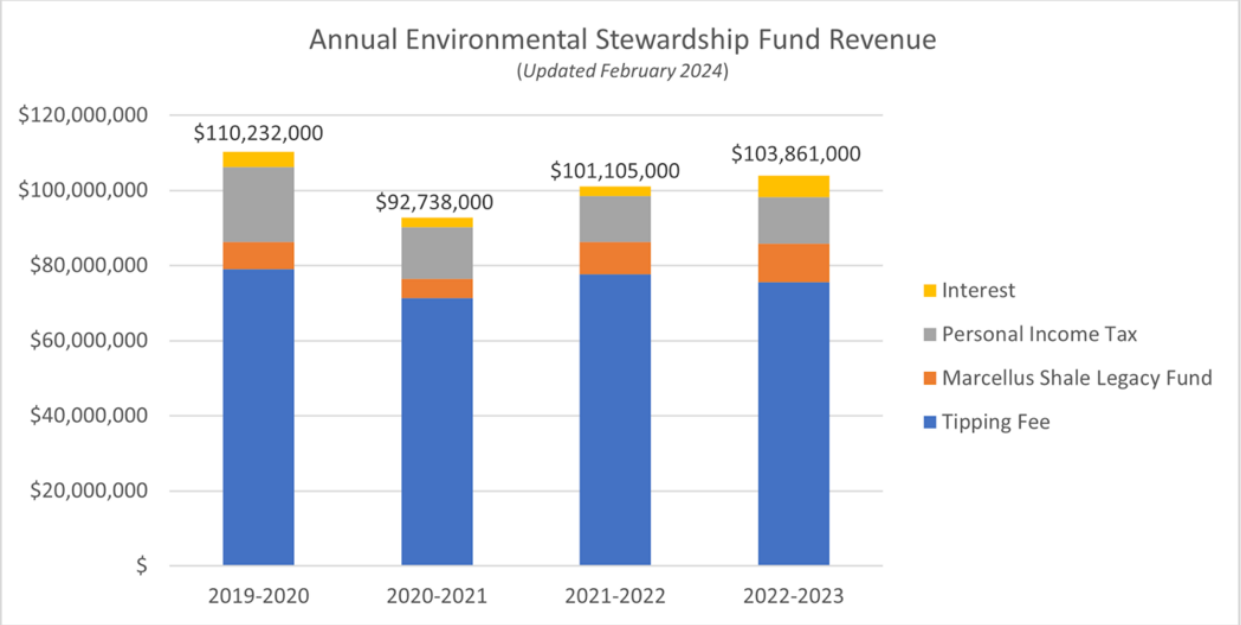

Figure 1: Annual Revenue of Pennsylvania's Environmental Stewardship Fund[67]

The funds are distributed to four agencies, which are each allocated at specific percentages: the Department of Environmental Protection (DEP) (35.7 percent), the Department of Conservation and Natural Resources (DSNR) (23 percent), the Pennsylvania Infrastructure Investment Authority (PENNVEST) (26 percent), and the Department of Agriculture (PADA) (18.7 percent).[68] Each agency is responsible for overseeing the implementation and distribution of grants for a specific issue. DEP is tasked with overseeing abandoned mine land reclamation and watershed-based conservation efforts. Projects focus on controlling runoff, river management, streambank and floodplain restoration, and more while giving preference to projects in Pennsylvania's Environmental Justice Areas.[69] The text in

the sidebar relates the experiences of one group of concerned Pennsylvanians who were able to take advantage of ESF funds, generated in part by tipping fees from out-of-state waste, to increase the access to green space and limit runoff in their own local communities.[70]

DSNR grants primarily target the improvement and rehabilitation of open spaces and recreation projects. DSNR grants can fund the planning and study of parks, pools, greenways, and other recreation facilities. The funds can be used to continue to support the park development process through funding land acquisition. One priority is an investment in motorized and non-motorized trails, as the state seeks to provide a trail within 10 minutes of every Pennsylvanian. Finally, the DSNR has contributed significant funding to river and watershed conservation, in relation to planning support, acquisition of land, river access points, and water trail management.[71] PENNVEST grants go to improving drinking water, wastewater, and storm water infrastructure and facilities. Over 350 projects have targeted failing infrastructure, helping municipalities repair and improve pipes, basins, and water treatment facilities.[72] Finally, PADA funding supports federal and other state funds in farmland preservation via the Pennsylvania Agricultural Conservation Easement Purchase Program, which allows state and local governments to slow the loss of prime farmland to other uses by purchasing development rights from farm owners. The program allows property owners to retain their title, pass property to heirs, or sell the property, allowing farmers to reduce debt loads, expand operations, or ease the transition of the farm to the next generation. As of 2023, 632,856 acres of farmland have been placed under agricultural conservation easements, protected into perpetuity.[73]

Immaculate Heart of Mary (IHM) Congregation and Storm Runoff: A Case Study of ESF Funding

- After attending a presentation about stormwater runoff, the nuns of the IHM in Scranton, became concerned about stormwater runoff from their church and community center. Hoping to protect the nearby Lackawanna River, the IHM Congregation requested a $262,000 grant from the ESF to incorporate stormwater solutions during renovations to their property. The funding constructed:
  - Permeable pavement in the parking lot
  - Rain gardens in strategic locations planted with native flowers and shrubs
  - A new drainage system that diverts runoff into a wetland area behind the buildings.
- Thousands of gallons of runoff are absorbed and filtered through these measures, keeping water sources like the Lackawanna River and the Chesapeake Bay cleaner for public use and recreation. Wildlife like birds, butterflies, and turtles have found a new home on the IHM property itself.

7 OREGON

Oregon has developed an expansive and successful approach to recycling. The state's Opportunity to Recycle Act (1983) promotes the conservation of energy and natural resources through the Environmental Protection Agency's (EPA) waste management hierarchy (see *Figure 1*), which New Hampshire also looks to. Oregon's waste-to-energy facility, like New Hampshire's, is aligned with

the EPA and state's preference for recovery over landfilling. Oregon also provides a great deal of flexibility as it balances statewide policy with municipal autonomy.

Figure 2: EPA Waste Hierarchy[74]

Under current Oregon law, all cities with at least 4,000 people must provide recycling services; over ninety cities must offer recycling programs. Municipalities in this tier, which includes those with populations between 4,000 and 10,000 people, must choose from a list of thirteen recycling programs, with the number of programs required for implementation determined by population size and distance to markets. From there, cities with over 10,000 people and with a county population of over 100,000 are required to choose from a list of seven waste prevention program elements. These programs include educational campaigns, grassroot support for local food rescue programs, and funding of infrastructure.[75] This tiered, community-oriented approach to recycling and waste management requirements allows for municipalities to approach waste reduction and management according to their needs and specific qualities.

One county in particular—Marion County—demonstrates Oregon's integrated approach. Marion County is located south of the Portland metropolitan area, stretching from the Willamette River to the Cascade Mountains and encompassing 1,180 square miles. It has a population of 346,000.[76] It is also home to the Oregon state capital, the city of Salem, which has a population of 175,535 as of 2020.[77] Marion County is home to 20 incorporated cities and 37 unincorporated communities in total.[78] It is the 25th largest county in Oregon by total area, containing 128,541 total housing units with a median household income of $71,022 and 8,851 total employer establishments.[79]

Marion County has implemented a comprehensive solid waste management strategy that prioritizes waste diversion, material recovery, energy recovery, sustainable disposal methods, as well as profits and community reinvestment. Brian May, the Environmental Services Division Manager for Marion County, illuminated some of the steps taken to expand the county's waste management systems and the results they have seen since.

7.1 MARION COUNTY'S WASTE-TO-ENERGY FACILITY

A key component of Marion County's waste management infrastructure is its unique Marion Resource Recovery Facility (MRRF), a waste-to-energy facility owned and operated by a private entity, Covanta. This facility converts non-recyclable waste into electricity and usable energy via incineration while closely monitoring emissions.

The MRRF operates under a contractual agreement with the county, which exercises flow control authority to dictate where waste is processed for final disposal. While the county guarantees a minimum annual tonnage of 125,000 tons to the facility, the MRRF also accepts waste from other counties and states. The MRRF now processes ninety percent of Marion County's waste with only ten percent entering landfills.[80] Meanwhile, approximately 20-50 percent of the facility's total waste volume comes from outside Marion County, including old police officer uniforms from across the region, medical waste from Washington, and waste from large corporations in the Portland metropolitan area promoting sustainability goals.

7.2 ENVIRONMENTAL CONCERNS

The MRRF houses a 36,000 square foot processing facility with a large tipping floor where waste is unloaded and then sorted. Since its opening in 2000, additional drop boxes have been added to support increased material processing. During the sorting process, a long list of recycled materials are recovered from the mixed waste stream. The MRRF also purchased a wood grinder in 2011, which is used for hog fuel, the basic feedstock for biomass-fired power plants.[81] Mr. May also pointed out that the incinerator sterilizes the waste it processes, which makes for a more sanitary waste management system and eliminates odor for the surrounding community.

Marion County has implemented stringent monitoring measures to ensure compliance with environmental regulators. In 2023, Oregon became the first state to require higher standards for continuous emissions monitoring at incinerators, partly in response to complaints and concerns about the MRRF.[82]

Emissions are constantly monitored and optimized, and the data is digitally transmitted in real-time to regulators for oversight–all of which is virtually impossible to do with landfills. Marion County claims that the MRRF reduces greenhouse gas emissions of C02 by 130,000 tons per year (as much as is emitted by 26,000 cars) while simultaneously providing enough electricity to power 6,000 homes in Marion County.[83] While there appears to be little consensus around the issue of renewability and sustainability, Marion County has complemented their MRRF with expansive recycling and educational programs.[84] [85] The County is also dedicated to evolving alongside technological and policy advances encouraging more comprehensive and accurate data collection and communication.

7.3 EDUCATIONAL PROGRAMS & COMMUNITY REINVESTMENT

Marion County's integrated solid waste management system involves educational programs like the Marion Resourcers Movement (formally known as the Marion County Master Recyclers). This initiative, spearheaded by volunteers, fosters community engagement and education, outfitting the public with the resources to improve their local environment. Their team holds events that promote waste reduction education, provides opportunities for community members to get items repaired for free at "Repair Fairs," hosts "Item Swaps" where community members trade unused or unwanted items, and more.[86]

These programs, in tandem with recycling policies, landfill management, and incineration, are proving to be as crucial as ever as disposal rates continue to increase. Mr. May explained that although Marion County's waste recovery rate is nearing fifty percent, county, state, and national disposal rates are constantly rising. When asked why, he attributed these trends, in part, to consumerism. "Unfortunately," he continued, consumption is the "downside of a prosperous economy," and that disposal rates have decreased during recent recessions.

The MRRF in Marion County generates revenue through various means, including the disposal fees charged for processing waste streams. The revenue generated is reinvested into the community through programs and initiatives aimed at promoting sustainability and environmental stewardship. Additionally, the facility supports the local economy by providing between thirty and forty high- and living-wage jobs and ancillary employment opportunities.[87]

7.4 PUBLIC BUY-IN & PERCEPTION

When asked about public buy-in and perception of these strategies, Mr. May explained that major metropolitan areas have more resources available directly to them, but rural communities can be more hesitant to adopt programs that may not be immediately cost effective. The Oregon Department of Environmental Quality (DEQ) and statewide legislation have helped guide and direct industry, private, and government entities.

Marion County is considered urban, but like some of New Hampshire's southern counties, it is also home to rural areas. Its population—346,000— is comparable to those of Hillsborough and Rockingham County, 426,500 and 319,400 respectively.[88] Although Oregon differs from New Hampshire in many respects, Oregon's Marion County is a leader in sustainable recycling and waste management strategies that can serve as model policies.

Mr. May also described initiatives driven by public demands, like partnerships to reduce and recycle waste generated by Oregon's unsheltered or homeless population. While the issues underlying homelessness cannot be remedied immediately, cleanup efforts are underway in the meantime to clean and reuse abandoned bedding, sleeping bags, and clothing—effectively diverting these items from landfills and allowing for reuse in the local community.

7.5 TAKEAWAYS

Overall, Marion County's integrated waste management approach, centered around the waste-to-energy facility and expansive material recovery efforts, demonstrates a commitment to sustainable solid waste management practices while addressing environmental concerns and generating economic opportunities for the local community. This strategy has helped Marion County achieve a waste recovery rate of 48.5 percent (for the year 2020), compared to the Oregon state average of 42.1 percent.[89] New Hampshire, in contrast, has an estimated recycling rate of 26 percent.[90] Constant emissions monitoring, maximization of recyclable materials, energy production, and educational initiatives in Marion County all combine to create an incredibly effective model for sustainable waste management.

Although Oregon as a state is significantly different from New Hampshire overall, perhaps Marion County can be used for a more realistic comparison. Marion County's approach to waste management offers several potentially viable methods of waste reduction that could be explored within the context of New Hampshire waste policy.

8 RECOMMENDATIONS

Following this research on the waste management systems of Virginia, Pennsylvania, and Oregon, a series of recommendations are included that could be implemented in New Hampshire to reduce the amount of waste going to landfill while attempting to protect profits.

8.1 TIPPING FEE SURCHARGES

Our research found that the imposition of state-wide tipping fees typically lowered the attractiveness of a landfill for waste haulers. Increasing tipping fee surcharges in New Hampshire could help to reduce the amount of solid waste being landfilled in the state. This fee would have to apply to both in-state and out-of-state waste haulers so as not to violate the Commerce Clause. This may increase waste disposal costs for New Hampshire residents and businesses. However, the fees could also be deposited in an environmental fund and reinvested into providing land conservation programs that improve residents' access to public parks, improve water quality, protect farmland, increase access to curbside recycling programs, and more. Host fees and taxes could be used to fund programs and infrastructure projects, and to mitigate potential environmental harm. These public goods could offset the financial burden of tipping fees, disincentivize disposal and waste importation, and extend the lifespan of state landfills.

8.2 RECYCLING, WASTE DIVERSION, & EMISSIONS CONTROL

States like Vermont and Oregon have demonstrated the importance of recycling to waste reduction, in line with the EPA's waste management hierarchy. While Vermont mandates universal composting and recycling, Oregon approaches recycling with tiered requirements that allow for community-specific customization and flexibility. Considering New Hampshire's preference for municipality-based and less-centralized autonomy and control, a tiered approach may be appropriate.

While recycling will continue to be more environmentally and economically ideal as landfill capacities dwindle and tipping and hauling fees increase, recycling markets will be a valuable cost avoidant strategy. Currently, over half of New Hampshire communities source separate rather than use single stream recycling (source separation is better for resale because of reduced contamination), but less than half of the total population is serviced by source separation. According to Reagan Bissonnette of the Northeast Resource Recovery Association, New Hampshire the Beautiful, a beverage industry group, offers grants to municipalities to purchase equipment and storage for recycling that would better enable source separation of recyclable materials.[91] Revenue from the expansion of the recycling market could be reinvested into communities, greater recycling and recovery capacity, or both.

Concerns over the environmental impacts of New Hampshire's two municipal waste combustors in Concord, which are comparable to Marion County's, could also be partially ameliorated by the expansion of both recycling and emissions standards. Expanded source separated recycling across the state could effectively reduce the amount of waste entering both landfills and waste combustors. Emissions could be controlled both up front by reducing waste as well as throughout the incineration process via increased monitoring and oversight. Oregon's state legislature passed a bill in 2023 requiring waste incinerators to continuously monitor a broader range of emissions than required under federal regulations. Environmental groups have responded positively to the change, saying that continuous monitoring "provides a more accurate depiction of the levels of toxic emissions discharged into our air and atmosphere on a daily basis."[92]

8.3 EDUCATIONAL PROGRAMS & COMMUNITY-ORIENTED APPROACHES

Oregon's case study has also illuminated waste reduction methods via reuse of waste generated by unhoused populations and the expansion of community education and reuse programming. As New Hampshire continues to grapple with ever-worsening housing and cost of living crises, the state could consider cleaning and reusing or recycling supplies and materials discarded by unhoused individuals and communities. Such items are most frequently discarded and brought to landfills, or perhaps incinerated, but have the potential to be cleaned and brought back to communities in need or recycled instead of landfilled.

Oregon has also developed a robust community education program that encourages waste reduction and recycling through informational as well as participatory events. Granting autonomy to community members to engage with informational content, waste reduction events, or both allows for greater

flexibility and participation. This approach also involves all types of community members of all ages, encouraging life-long education and commitments to sustainability.

9 CONCLUSION

In conclusion, the need to remain receptive to evolving waste reduction and management strategies and technologies cannot be understated. As waste generation remains at unsustainable levels, and landfill capacities continue to plummet nation-wide, states have and will continue to respond in real time to these complex circumstances. Case studies examining a diverse array of states have illuminated several possible avenues through which to reduce solid waste generation and subsequent landfilling while also attempting to protect profitability.

Expanding recycling capacity state-wide would perhaps have the largest impact on reducing the waste entering New Hampshire landfills and combustors. Increasing source separated recycling processes, specifically, and the associated decrease in contamination, could allow for greater recycling as well as resale of recyclable materials. Leaning into this market could allow for reinvestment into recycling, emissions monitoring, sustainable technologies, and community education programs.

Tipping fee surcharges are a method of discouraging waste disposal without officially limiting the amount of waste that can be landfilled from any source. While this could increase costs for New Hampshire residents, raising fees could promote more sustainable habits by encouraging reductions in the amount of waste produced in the first place. The revenue generated by fees and taxes could also be reinvested into host communities to improve infrastructure or mitigate detrimental effects of landfill pollution. This policy could help New Hampshire reduce the amount of imported waste going into state landfills while turning the remaining solid waste stream into a market opportunity that can generate revenue.

While it would violate the Commerce Clause to ban specific states from landfilling solid waste in New Hampshire, it could be feasible to ban specific types of solid waste instead. Placing limits or banning specific types of waste, especially ones that are more hazardous or difficult to dispose of, can be done without violating the Commerce Clause.[93] While these policies would affect both in-state and out-of-state waste producers, it could be an effective strategy to reduce the amount of specific waste products that are most undesirable.

Another method of limiting out-of-state waste or promoting sustainability throughout the waste collection process prior to entering New Hampshire's landfills is requiring implementation plans like those seen in Vermont. Vermont's Solid Waste Implementation Plan requirements enforce standards for out-of-state entities that may wish to dispose of waste in Vermont. No such entity has applied, so Vermont does not currently process any out-of-state waste. Without restricting waste importation

completely but still ensuring some profits from out-of-state sources, perhaps New Hampshire could adopt a version of this policy but with slightly greater flexibility.

The time is ripe for New Hampshire to move ambitiously toward a comprehensive solid waste management system centered on sustainability and circularity. Learning from the experiences of other states facing similar challenges can pave the way for effective solutions tailored to New Hampshire's specific position. An innovative, multi-pronged approach will be vital to confronting the looming solid waste crisis and positioning New Hampshire as a leader in environmental stewardship.

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