NEVADA DIVISION OF
ENVIRONMENTAL
PROTECTION

2022 State of Nevada: Sustainable Materials Management Plan

Aligning Solid Waste, Hazardous Waste, and Other Materials Management Processes with Sustainable Practices

Expansion of and Revision to the 2017 State Solid Waste Management Plan

Revised 12/14/2022

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NEVADA
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COMMISSION

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Executive Summary

Per Nevada Revised Statute (NRS) 444.570, the State Environmental Commission (SEC) is required to develop and update a statewide plan for solid waste management in Nevada. Nevada's 2022 Sustainable Materials Management Plan is an update to and expansion of the 2017 State Solid Waste Management Plan.

The 2017 State Solid Waste Management Plan primarily focused on managing waste based on a linear model of materials management where materials are extracted, transformed into products, used, and then disposed of (i.e., the "take-make-waste" model). With this type of approach, landfilling is often the go-to option for the end-of-life management of products and materials. However, in many cases, landfilling as an end-of-life option is not the best and most productive use of materials when considering other important factors – such as environmental, societal, and long-term economic and business factors.

Instead of landfilling being the primary, go-to method of waste management, it should be the last resort. When products and materials are landfilled, their material value is lost. Materials that are not feasibly recycled, composted, or reused become a loss that could have been used in another process. Additionally, the decomposition of waste in landfills poses environmental problems, such as the potential to impact groundwater or the release of methane - a powerful greenhouse gas (GHG) linked to climate change. To move beyond this current reliance on landfilling, Nevada's waste management system needs to evolve and align with a sustainable materials management (SMM) framework. SMM focuses on using and reusing materials and products more productively over their entire lifecycles. This framework promotes a circular system focused on source reduction, reuse, recycling, and composting as opposed to a linear system dependent on landfilling.

This updated Plan seeks to lay the foundation for a more circular and sustainable system. To achieve this overarching vision, the Plan strives to:

- Provide a comprehensive evaluation of the current state of Nevada's solid waste, hazardous waste, and materials management systems
- Identify ways to align waste management efforts with SMM practices by finding the best end-of-life options for materials
- Facilitate the development and adoption of source reduction and diversion solutions based on the solid waste management hierarchy and best science-based practices
- Ensure that the waste that must be disposed of is managed in a safe and environmentally protective manner
- Provide actionable information to the State, counties, municipalities, and SEC to move Nevada towards a more environmentally sound and sustainable management of materials

Additionally, this Plan analyzes and outlines key trends related to the management of solid waste, hazardous waste, and recyclable materials. Noteworthy trends identified in this Plan include:

- Municipal solid waste (MSW) generated per capita has increased over the last decade from 7.31 pounds of MSW generated daily per person in 2012 to 7.98 pounds in 2021.
- With a growing population trend and a high MSW per capita rate, Nevada will continue to see overall increases in the amount of MSW generated each year.
- In 1990, Nevada adopted a recycling rate goal of 25%. However, despite a general increase in the total tonnage of materials recycled, Nevada has struggled to reach its 25% recycling rate goal. This is because the total tonnage of landfilled MSW has also increased.
- Scrap metals, paper, and organic materials make up over 90% of the recycled tonnage collected in Nevada.
- The COVID-19 pandemic appears to have impacted the composition of waste and recycling streams. For example, Nevada experienced a surge in cardboard being recycled, most likely due to an increase in e-commerce activity during the pandemic.
- Hazardous waste generated from businesses and industries more than doubled between 2011 and 2019. Hazardous waste generation increased from approximately 12,500 tons in 2011 to 29,000 tons in 2019. Additionally, hazardous waste imported from other states has increased from about 71,000 tons to 86,000 tons during the same period. Approximately 73% of all hazardous waste treated or disposed of in the State is landfilled with prior treatment and/or stabilization.
- Like many other industries, the hazardous waste management industry was disrupted by the COVID-19 pandemic. Many of the nation's hazardous waste incinerators became unable to accept hazardous waste in mid-2021. This was due to many compounding reasons, including the pandemic and its associated labor shortages and disruptions to transportation as well as planned and unplanned facility shutdowns due to winter storms and maintenance. This situation affected the ability of some generators in Nevada to dispose of their hazardous waste in a timely manner.

Finally, this Plan presents the challenges of improving the current waste management and recycling systems and aligning these systems with SMM practices. Many of these challenges often result from a lack of one or more of the following: coordination and collaboration among stakeholders, education and awareness, data, infrastructure, and funding. To address these challenges and needs, the Plan outlines eight primary objectives as well as multiple supporting strategies and recommended action items to achieve these objectives. The eight primary objectives include the following:

- Improve collaboration and communication between stakeholders
- Improve data collection and reporting for solid waste, recycling, and relevant SMM efforts
- Enhance and expand education and outreach efforts related to topics such as source reduction, recycling, composting, and diversion

- Develop or improve programs for special wastes and emerging problematic wastes
- Improve the effectiveness of and access to recycling programs
- Promote source reduction strategies for both solid waste and hazardous waste
- Update and establish solid waste and recycling regulations to align with SMM practices and to better protect the environment and public health
- Identify and create sustainable, long-term funding opportunities and grants to address solid waste and recycling infrastructure needs, special wastes, illegal dumping, and solid waste and SMM planning

While the Nevada Division of Environmental Protection (NDEP) Bureau of Sustainable Materials Management (BSMM) is leading the effort to accomplish these objectives, the Plan encourages all waste and recycling stakeholders to participate. BSMM also encourages the Health Districts and municipalities to align their solid waste management plans with SMM practices and consider the recommended action items presented in this Plan. Together, we can develop a more sustainable and environmentally sound management of materials and help assure that Nevadans have sufficient resources to meet today's needs as well as the needs of the future.

Think Outside the Landfill. Think Sustainably.

With Nevada's population boom and an increase of waste from neighboring states destined for landfills around Nevada, the time has arrived to place sustainability at the center of materials management, re-imagining landfills as a last resort.

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Glossary

Alternative Final Cover	AFC
Assembly Bill	AB
Bureau of Mining Regulation and Reclamation	BMRR
Bureau of Sustainable Materials Management	BSMM
Business Environmental Program	BEP
Carbon Dioxide	CO_2
Class III Waiver	C3W
Clean Air Act	CAA
Construction and Demolition	C&D
Department of Defense	DoD
Department of Energy	DoE
Environmental Justice	EJ
Emission Guidelines	EG
EPA Identification	EPA ID
Greenhouse Gas	GHG
Household Hazardous Waste	HHW
Industrial and Special	I&S
Large Quantity Generators	LQG
Lithium-Ion	Li-Ion
Materials Recovery Facility	MRF
Municipal Solid Waste	MSW
Nevada Administrative Code	NAC
Nevada Division of Environmental Protection	NDEP
Nevada Division of Forestry	NDF
Nevada National Security Site	NNSS
Nevada Revised Statute	NRS
Nevada Test and Training Range	NTTR
New Source Performance Standards	NSPS
Partners for a Sustainable Nevada	PSN
Research, Development and Demonstration	RD&D
Resource Conservation and Recovery Act	RCRA
Small Quantity Generators	SQG
Solid Waste Management Authorities	SWMA
Southern Nevada Health District	SNHD
State Environmental Commission	SEC
Sustainable Materials Management Plan	SMMP
Sustainable Materials Management	SMM
The Code of Federal Regulations	CFR
Treatment, Storage, and Disposal	TSD
U.S. Department of Transportation	U.S. DOT
U.S. Environmental Protection Agency	EPA
Very Small Quantity Generators	VSQG
Washoe County Health District	WCHD

Introduction

The State Solid Waste Management Plan is updated every five years. This 2022 Sustainable Materials Management Plan is an update to and expansion of the previous 2017 Solid Waste Management Plan.

Updating the Plan

Per Nevada Revised Statute (NRS) 444.570, the State Environmental Commission (SEC) is required to develop and update a statewide plan for solid waste management in Nevada. The 2022 Sustainable Materials Management Plan (SMMP) is an update to and expansion of the previous 2017 Solid Waste Management Plan. This update was prepared by the Nevada Division of Environmental Protection (NDEP) Bureau of Sustainable Materials Management (BSMM) for the SEC.

Each update to the statewide plan provides the BSMM with the opportunity to meet with stakeholders, analyze data and trends, review the efficacy of existing laws and regulations, and engage in informational discussions regarding the challenges and planning efforts to improve local solid waste management systems. Additionally, this review gives the BSMM the opportunity to align waste management practices with current best management practices.

Thinking Outside the Landfill

Presently, landfilling is the primary method of end-of-life management for many products and materials. Nevada has large landfill capacities, and there are relatively low monetary costs associated with landfilling. However, landfilling as an end-of-life option may not be the best and most productive use of materials when considering other important factors – such as environmental, societal, and long-term economic and business factors.

The Plan's broad vision involves rethinking the landfill as the "go-to" end-of-life management option for products and materials. Instead, as its name suggests, this Plan promotes a sustainable materials management (SMM) approach as the more environmentally sound way to reduce and manage waste streams. SMM is a systemic approach that seeks to use and reuse materials and products more productively over their entire lifecycles from extraction to disposal. More specifically to waste management efforts, SMM promotes a circular system focused on source reduction, reuse, recycling, and composting. This Plan seeks to align both solid and hazardous waste management efforts in Nevada with SMM practices.

Scope & Purpose

To lay the foundation and begin the transition to a SMM system, the Plan strives to:

- Provide a comprehensive evaluation of the current state of Nevada's solid waste, hazardous waste, and materials management systems
- Identify ways to align waste management efforts with SMM practices by finding the best end-of-life options for materials
- Facilitate the development and adoption of source reduction and diversion solutions based on the solid waste management hierarchy and best science-based practices
- Ensure that the waste that must be disposed of is managed in a safe and environmentally protective manner

- Provide actionable information to the State, counties, municipalities, and SEC to move Nevada towards a more environmentally sound and sustainable management of materials

Plan Structure

The Plan is organized into six sections:

- A Vision for Nevada
- Managing Solid Waste
- Managing Recyclable Materials
- Managing Hazardous Waste
- Objectives, Strategies, and Recommendations
- Implementation Considerations

The "A Vision for Nevada" section defines the SMM framework, explains how SMM applies to the management of waste and recyclable materials, and emphasizes how SMM can be integrated with other environmental initiatives such as climate action and the conservation of energy and resources.

The next three management sections ("Managing Solid Waste," "Managing Recyclable Materials," and "Managing Hazardous Waste") discuss the regulatory background and the responsible governing agencies of the associated waste stream or material. Additionally, these sections provide an analysis of the relevant data trends and summarize the current conditions, practices, and challenges of the associated sector and key stakeholders.

The "Objectives, Strategies, and Recommendations" section establishes eight primary objectives to improve the current waste and recycling systems and to align these systems with SMM practices. Multiple strategies and action items are recommended to achieve these objectives and are provided for decision-makers' consideration. However, additional analysis is required prior to being actionable items.

Finally, the "Implementation Considerations" section prioritizes the recommended action items, evaluates various key stakeholder roles regarding the implementation of the Plan, and calls for the consideration of environmental justice principles and practices when implementing the Plan.

Differences from Previous Plans & the Consideration of the COVID-19 Pandemic

This updated Plan involved a significant overhaul of the framework and content of the previous State Solid Waste Management Plan. The use of SMM as a focal point for the Plan makes it unique from former plans. Additionally, unlike previous plans, this updated Plan includes information about hazardous waste management. Previous State Solid Waste Management Plans did not discuss hazardous waste, because hazardous waste is regulated and managed under a separate Federal program from solid waste. However, to support a shift to a SMM approach and to place a stronger emphasis on reducing the toxicity of waste, the

BSMM decided it was important to address the management of hazardous waste in this comprehensive Plan.

Additionally, unlike previous plans, the BSMM had to analyze solid waste and recycling data within the context of a global pandemic. Potential impacts from the COVID-19 pandemic to the waste management and recycling systems have been identified throughout this Plan.

Moving Towards a More Sustainable Nevada

The overarching goal of any sustainable practice is to ensure that people have sufficient resources to meet today's needs as well as the needs of the future. The SMM framework helps to achieve this goal by focusing on ways to use materials in the most productive way and by emphasizing waste reduction. Therefore, an effective Sustainable Materials Management Plan is an important facet of a sustainable society. This Plan strives to lay the foundation for a SMM system in Nevada and helps to build a more sustainable Nevada for today's residents and future residents. Furthermore, this Plan encourages all relevant stakeholders – governmental, private, and non-profit – to partner together to make the needed changes and develop a more sustainable and environmentally sound management of resources.

A Vision for Nevada

A Nevada where communities recognize and implement the sustainable use of all resources.

Thinking Outside the Landfill

Due to large landfill capacities and the relatively low monetary costs associated with landfilling in Nevada, landfilling has been the preferred method of end-of-life management for many materials. However, in many cases, landfilling as an end-of-life option is not the best and most productive use of materials when considering other important factors – such as environmental, societal, and even long-term economic and business factors.

Instead of landfilling being the primary, go-to method of waste management, it should be the last resort. When products and materials are landfilled, their material value is lost. Whatever is not feasibly recycled, composted, or reused becomes a loss of materials that could have been used in another process. Additionally, the decomposition of waste in landfills can pose environmental problems, such as the potential to impact groundwater or the release of methane - a powerful greenhouse gas (GHG) linked to climate change. To move beyond this current reliance on landfilling, Nevada's waste management system needs to evolve and align with a sustainable materials management framework and the solid waste management hierarchy.

Sustainable Materials Management

Rather than focusing solely on end-of-life management, a sustainable materials management (SMM) framework takes a step back and looks at whole systems and lifecycles of materials.

SMM's primary goal is to find ways to use and reuse materials more productively over their entire lifecycles – from materials extraction to end-of-life management.[1]

SMM views waste as a system inefficiency, and for the wastes that cannot be avoided, this approach looks for ways to use those wastes as resources and inputs to new processes. Also, SMM involves understanding material flows and the associated inputs (e.g., raw materials, energy, water) and outputs (e.g., waste streams, emissions, by-products) at each stage of a product's lifecycle (Figure 1 on page 7). Lifecycle assessments are one type of tool for analyzing a product from cradle to grave and determining how its inputs and outputs interact with the environment at each phase. Such assessments can highlight how different types of materials and products have unique management challenges that need to be handled with specialized and targeted solutions. Additionally, viewing products and materials through this lifecycle perspective helps us understand that when a product ends up in a landfill, more impacts are occurring than just the disposal of that particular item. When a product is thrown away without making the most productive use of it, all of the upstream inputs are lost, and the associated environmental impacts are intensified.

[1] EPA. (2021, December 15). Sustainable Materials Management: Non-Hazardous Materials and Waste Management Hierarchy. EPA. https://www.epa.gov/smm/sustainable-materials-management-non-hazardous-materials-and-waste-management-hierarchy

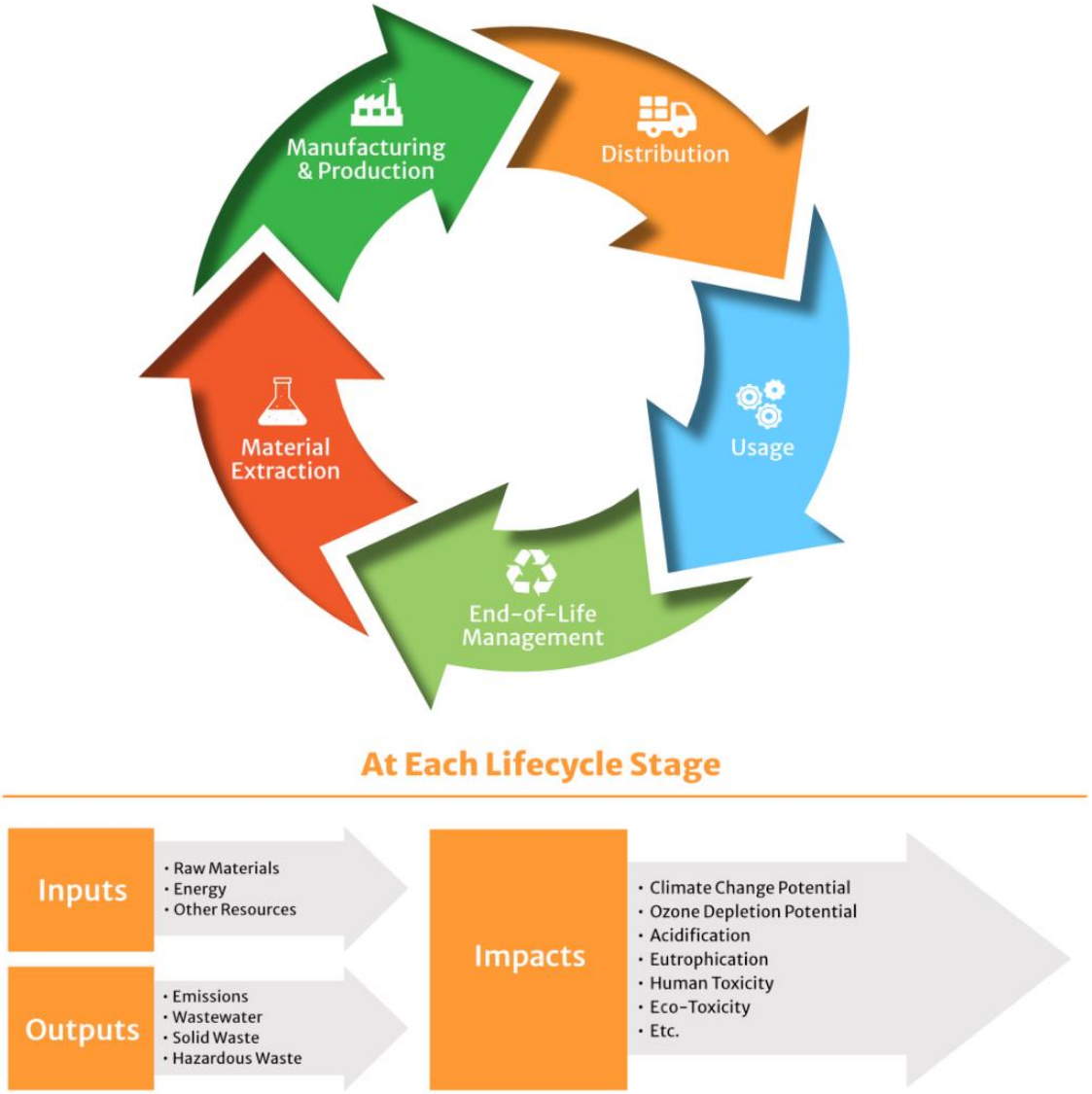

Figure 1: The sustainable materials management lifecycle perspective identifies environmental impacts at each major stage of a material's lifecycle, not just the end-of-life stage. At each stage, different amounts and types of resources and energy are used, while different types and amounts of emissions and waste are generated. Additionally, this perspective seeks to achieve circularity where possible, using waste as material inputs to new processes. Figure 1 was adopted from general concepts in the U.S. Environmental Protection Agency's technical report: Life Cycle Assessment: Principles and Practice.

Nevada's waste management system can begin to use the SMM framework to reframe its priorities and to identify problematic products and waste streams that need specialized policies and programs. The management of waste needs to move beyond a focus on landfilling and a general recycling rate goal. As a start towards SMM, waste management planning needs to shift towards finding and developing the most productive options for materials and products once an individual or entity no longer has use for them. This is where the solid waste management hierarchy becomes a useful tool. This hierarchy is explained in the next section.

Solid Waste Management Hierarchy

The U.S. Environmental Protection Agency (EPA) developed the solid waste hierarchy, which indicates an order of preference for reducing and managing waste. This hierarchy places an emphasis on reducing, reusing, recycling, and composting over energy recovery and landfilling.[2] Not only do these more preferred strategies reduce the amount of waste going to the landfill, but they also help conserve natural resources and energy and reduce the amount of greenhouse gas emissions, toxins, and pollutants released to the environment. Pairing the solid waste hierarchy with a lifecycle perspective can lead to a better materials management system that finds the most productive uses for materials while reducing waste and its associated impacts at each stage of a material's lifecycle. Also, the solid waste hierarchy acknowledges that a "one-size-fits-all" approach does not work for all product lifecycles and waste streams. Often, targeted and customized solutions are needed to effectively manage specific types of material streams. By studying products and materials through a lifecycle perspective, we can properly identify the best-suited end-of-life options or specific ways to minimize the impacts of the associated waste generation. Figure 2 depicts how the concept of the waste management hierarchy fits into the end-of-life management phase of the lifecycle perspective of SMM.

Figure 2: The diagram shows the solid waste hierarchy concept paired with the SMM lifecycle perspective. This model emphasizes the preferred options for materials that reach the end of their life as well as ways to reduce the amount of waste or toxicity produced. Figure 2 is a variation of the US EPA's SMM lifecycle model.

It is important to note that local resources and available infrastructure may influence which management strategies are feasible for a community. Therefore, programs should consider local factors when utilizing the waste management hierarchy.

[2] EPA. (2021, December 15). Sustainable Materials Management: Non-Hazardous Materials and Waste Management Hierarchy. EPA. https://www.epa.gov/smm/sustainable-materials-management-non-hazardous-materials-and-waste-management-hierarchy

Integrating Climate Initiatives, Energy and Resource Conservation, & Sustainable Materials Management

As we shift away from a solid waste management-focused perspective to a SMM lifecycle perspective, Nevada can begin to discover new opportunities for addressing more than just waste and recycling challenges. Nevada can look for new opportunities to conserve resources and to reduce pollution, energy usage, and greenhouse gas emissions.

Climate

Methane (CH_4) is the most prevalent greenhouse gas (GHG) emitted by the waste sector, and MSW landfills are the largest emitters of methane in this sector.[3] Notably, methane is more than 25 times more potent than carbon dioxide (CO_2) at trapping heat in the earth's atmosphere.[4] Therefore, when developing climate initiatives, the waste sector should not be ignored.

In 2019, the waste sector accounted for 4% of Nevada's GHG emissions; by 2030, the waste sector is projected to account for 6%.[5]

By 2041, the waste sector is projected to see continued increases in GHG emissions. This increase is tied to a growing population, which will produce more waste if current solid waste management practices are continued.

Moreover, when we view materials management from a lifecycle perspective, we understand that more GHG emissions are associated with materials than just their disposal. The EPA found that over 40% of U.S. GHG emissions come from the management of materials over the course of their lifespan (e.g., extraction, manufacturing, transportation, and disposal).[6] Knowing this, the SMM practices of source reduction and extending the useful lifespan of a product should be preferred materials management approaches when considering GHG emissions. Due to the waste sector's connection with GHG emissions, there is an opportunity to integrate this Plan's efforts with the Nevada Climate Initiative by focusing on ways to capture the gas at landfills, reuse materials, and reduce the amount of waste landfilled in the State.

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[3] EPA. (2019). Greenhouse Gas Reporting Program Industrial Profile: Waste Sector. https://www.epa.gov/sites/default/files/2019-10/documents/waste_industrial_profile_9_30_2019.pdf

[4] EPA. (2021b, June 30). Importance of Methane. https://www.epa.gov/gmi/importance-methane#:~:text=Methane%20is%20the%20second%20most,trapping%20heat%20in%20the%20atmosphere.

[5] NDEP. (2021). Nevada Statewide Greenhouse Gas Emissions Inventory and Projects, 1990-2041: 2021 Report. https://ndep.nv.gov/uploads/air-pollutants-docs/ghg_report_2021.pdf

[6] EPA. (2022, March 18). Resources, Waste and Climate Change. https://www.epa.gov/smm/resources-waste-and-climate-change

Resources & Energy

Reusing and recycling materials, instead of landfilling, reduces waste volumes and conserves resources and energy. For example, one ton of paper recycled will use 50% less water compared to using virgin wood pulp, and using recycled aluminum cans to make new cans uses 95% less energy than using bauxite ore – the raw material from which aluminum is made.[7] Therefore, when considering resource and energy conservation initiatives, it is important to develop materials and waste management systems that not only emphasize reuse and recycling over landfilling but also work to develop markets for reusable and recyclable materials.

Other Statewide Sustainability Integration Opportunities

2030 State of Nevada Sustainable Materials Management (SMM) Strategic Plan

In 2020, the NDEP BSMM released its *2030 State of Nevada Sustainable Materials Management Strategic Plan*. With this Strategic Plan, the BSMM has taken the lead to lay the foundation for a SMM system. To accomplish this, the BSMM has developed a wide range of strategies that involve reviewing product stewardship policies, conducting research on material flows and markets, facilitating stakeholder communications, reviewing state regulations, providing technical assistance, and expanding education and outreach efforts. However, the Strategic Plan is very specific to NDEP's role in materials management. This Sustainable Materials Management Plan uses the Strategic Plan as a guide and expands to incorporate stakeholders at a higher and broader level. It involves more stakeholders beyond NDEP, such as the SEC, health districts, counties, municipalities, and waste haulers.

Partners for a Sustainable Nevada (PSN)

Additionally, in 2021, NDEP BSMM brought together stakeholders from governmental agencies, non-profit organizations, and the private sector to form the Partners for a Sustainable Nevada (PSN). This stakeholder group focuses on statewide sustainability issues and opportunities and works to identify and implement innovative solutions. In 2022, the PSN produced its own Menu of Options, suggesting potential ways for pursuing sustainability in the State.[8] As part of that document, the PSN proposed many project and policy ideas to

[7] EIA. (2022, February 15). Energy and the environment explained. https://www.eia.gov/energyexplained/energy-and-the-environment/recycling-and-energy.php#:~:text=Recycling%20saves%20energy%20in%20the%20production%20of%20new%20products&text=For%20every%20one%20ton%20of,and%20uses%2050%25%20less%20water

[8] PSN. (2022, March). Partners for a Sustainable Nevada: Menu of Options. https://ndep.nv.gov/uploads/recycles-docs/PSN_Menu_of_Options.pdf

further SMM efforts, including circular economy initiatives, source reduction strategies, organics diversion policies, solutions for improving markets for recyclable materials, and reuse programs. As Nevada works to implement the State Sustainable Materials Management Plan and transform its solid waste system into a more sustainable system, there is an opportunity to integrate this Plan's efforts with the PSN and build an even stronger network of materials management professionals.

A Vision for Nevada's Waste & Material Management System

The short-term vision of this Plan is to start the transition toward aligning waste management efforts with SMM practices by identifying, developing, and promoting the most productive options for materials and products once an individual or entity no longer has use for them. Additionally, this Plan works to facilitate the near-term development and adoption of source reduction and diversion solutions based on the waste hierarchy and best management practices for both solid and hazardous waste.

The long-term vision for Nevada's solid waste and hazardous waste management systems is to transform them into a truly sustainable materials management system – i.e., a system based on a more holistic mindset that considers every major phase of a product's lifecycle and finds the most productive use and/or management of the product at each phase, not just at the end-of-life. Moreover, it emphasizes source reduction, reuse, and recycling as preferred ways to manage solid waste, conserve resources, reduce toxicity, and minimize negative environmental and health impacts.

This Sustainable Materials Management Plan sets the foundation to move towards this vision and to capitalize on opportunities to integrate with other environmental initiatives.

Managing Solid Waste

Effective solid waste management is vital infrastructure for protecting public health and the environment and conserving resources through recycling and reuse.

Legislative Background & Solid Waste Regulation

According to Nevada Revised Statute (NRS) 444.490, solid waste is defined as all putrescible and non-putrescible refuse in solid or semisolid form. It includes, but is not limited to, garbage, rubbish, junk vehicles, ashes or incinerator residue, street refuse, dead animals, demolition waste, construction waste, and solid or semisolid commercial and industrial waste. Solid waste management involves the process of storing, collecting, transporting, processing, recycling, and disposal of this waste. It also includes programs and plans to reduce waste and educate the public.

In the 1990's, Nevada implemented the federal Subtitle D standards and established State regulations for solid waste management that affected landfill standards.[9] Since then, the Nevada State Legislature has adopted various solid waste and recycling bills. A complete list of both passed and proposed bills, by year and bill number, is included in Appendix 1. Additionally, the SEC has adopted and updated many regulations related to solid waste and recycling, which are outlined in Appendices 5 and 7.

Government Roles & Responsibilities

In Nevada, state and local governmental entities share certain roles and responsibilities for solid waste regulations and program management. Governmental authority is defined in the Nevada Revised Statutes (NRS) 444.440 – 444.645 (see Appendix 4) and the Nevada Administrative Code (NAC) 444.570 – 444.7499 (see Appendix 5). In Southern Nevada, the authority to regulate solid waste is assigned by statute to Clark County's Southern Nevada Health District (SNHD). In the North, authority is given to the Washoe County Health District (WCHD). NDEP is the solid waste management authority for the remaining 15 counties.

Municipal Governments

Per NRS 444.510, each municipality or Health District in Nevada is required to develop and implement a plan for a solid waste management system. A solid waste management system is defined in NRS 444.500 as, "the entire process of storage, collection, transportation, processing, recycling and disposal of solid waste. The term includes plans and programs for the reduction of waste and public education." Municipalities are also required to implement recycling requirements as found in NRS 444A.040. To carry out these responsibilities, the statutes give authority to municipalities to adopt ordinances, acquire land, offer franchises for solid waste collection, and levy appropriate fees (Note: these fees are not subject to the fee revenue cap specified in NRS 354.5989). Additionally, municipalities and Health Districts are largely responsible for enforcing the statutory prohibitions against unlawful dumping. Amendments to the solid waste statutes adopted by the 2001 and 2013 Nevada Legislature provide significant authority to local government agencies and peace officers to levy civil and

[9] EPA promulgated the Revised Criteria for Municipal Solid Waste Landfills on October 9, 1991 (56 FR 50978)

criminal penalties for unlawful dumping. Penalties collected from unlawful dumping violations can be used to support the local government's solid waste management programs.

Health Districts

The Health Districts—SNHD in Clark County and WCHD in Washoe County—are the waste authorities and primary regulatory agencies over solid waste management in Nevada's two most populated and urbanized counties. The State's statutes (NRS 444.495) designate these agencies as the Solid Waste Management Authorities (SWMA) in their respective jurisdictions, with the programs of the Health Districts subject to periodic review by the NDEP. In addition to enforcing unlawful dumping provisions, the Health Districts are responsible for issuing permits to and conducting compliance inspections at disposal sites, transfer stations, materials recovery facilities (MRFs), and other solid waste handling and/or processing facilities in their jurisdictions. The governing boards of the Health Districts may adopt ordinances governing solid waste disposal sites and solid waste management systems, or any part thereof, which are more restrictive than those adopted by the SEC and other solid waste management regulations as long as they do not conflict with the SEC regulations.

State Government

NDEP is responsible for all aspects of regulation, including permitting and inspection of solid waste disposal facilities and implementing public information programs outside of Washoe and Clark Counties. NRS 444A gives NDEP additional responsibility for encouraging statewide recycling programs. To ensure that solid waste management practices are consistent with state and federal criteria, all counties are required to submit their updated solid waste management plans to NDEP every five years for review and approval. In 1994, the U.S. EPA granted Nevada the authority to enforce the federal municipal landfill regulations. In order to receive that approval, the State had to demonstrate that its regulations were at least as stringent as the federal landfill criteria and that it had adequate resources and authority to enforce the standards. The NDEP and Health Districts have the responsibility to ensure compliance with the minimum federal standards for municipal landfills. While unlikely, procedures are established in statute for the NDEP to exercise authority over SNHD and WCHD. If necessary, the U.S. EPA retains authority to take enforcement action. This may occur if evidence is found that handling or disposal of solid waste is presenting an imminent and substantial endangerment to public health or the environment, or in cases where there are violations of the federal landfill criteria, and the State has failed to take remedial action. It is for this reason that it is imperative that the Health Districts and NDEP continue to work cooperatively to ensure that this never occurs.

NDEP currently permits and/or regulates and routinely inspects 14 Class I landfills, 10 Class II landfills, 16 Class III landfills, 10 composting facilities, 40 public waste bin sites, and 8 transfer facilities in its SWMA jurisdiction. (Information current as of June 2022)

Tribal Governments

The NDEP and the Health Districts do not have the authority to regulate solid waste management on tribal lands. The Federal Subtitle D regulations are self-implementing on tribal lands; however, the U.S. EPA may issue site-specific flexibility waivers for landfills on tribal lands if a site wishes to establish a "flexible" performance standard rather than adhering to the prescriptive standards set forth in 40 CFR Part 258. This ensures that landfills located on

tribal lands may apply for the same flexibility available to landfills in states with U.S. EPA-approved municipal solid waste landfill permit programs. Historically, coordination between the tribes and the NDEP has been informal regarding solid waste management. In an effort toward improving coordination between NDEP and Nevada's tribes, a tribal liaison position was established in the NDEP in 2007. Additionally, NRS 444A.040 requires municipalities with approved recycling programs to make them available to reservations and colonies within their jurisdictions.

Federal Facilities

The federal government operates several solid waste facilities in Nevada, including some with proprietary landfills at Department of Defense (DoD) and Department of Energy (DoE) installations, such as the Nevada Test and Training Range (NTTR) or the Nevada National Security Site (NNSS). These landfills are for the federal installations' use and are not open to the public. A number of these facilities lie within publicly restricted areas but are regulated by the NDEP. NDEP's Bureau of Federal Facilities oversees DoE facilities. The remaining solid waste facilities under federal control are regulated by the appropriate SWMA.

State & Local Funding

Nevada's three SWMAs are statutorily approved to collect fees and fines through permitting, as well as compliance and enforcement actions involving solid waste management. In 1991, State Legislature authorized a bill that approved a $1 fee (Tire Fee) per retail tire sold, which became the solid waste management account. Funds from the tire fee must be used exclusively for solid waste management, in accordance with statute. The Tire Fund partially funds the solid waste management programs of the three SWMAs and is collected by the State Department of Taxation. Sellers of new tires are required to submit 95% of each tire fee to Taxation and are authorized to keep the other 5% to offset their administrative burdens.

Local solid waste management activities may be funded through disposal fees collected at the landfill gate, property tax assessments, general funds, or a combination of any of these methods.

Solid Waste Trends

Solid Waste Data Collection

Solid waste data is collected from landfills and stored in the State of Nevada's solid waste database. Quarterly, semi-annual, or annual disposal reports are required from all operating landfills. The larger landfills weigh the incoming waste on scales, which captures over 95% of Nevada's disposed waste. The smaller landfills, however, do not have scales. Instead, they use volume estimates with conversion factors to calculate and report tonnage disposed.

Landfills report the amount of waste placed into the landfill based on the category of waste: municipal solid waste (MSW), construction and demolition (C&D), industrial, tires, and other minor categories of waste. Landfills also report where the waste originated from (e.g., in-county, a different Nevada county, or out-of-state). Using this data, the State can identify general trends in solid waste generation and importation. However, it is important to emphasize that data gaps and limitations, which are discussed throughout this Plan, make it challenging to provide detailed analysis on specific waste and material streams.

Solid Waste Generation & Composition

From 2012 to 2021, total waste generated within the State trended upwards from about 4,233,000 tons to 5,363,000 tons (Figure 3). Overall imported waste increased from 2012 to 2021 with it peaking in 2019 at 299,198 tons. Generally, imported waste makes up about 4-5% of all Nevada waste.

Figure 3: Solid waste that was generated in-state and imported to Nevada generally increased from 2012 to 2021. A switch to electronic reporting occurred around 2014.

The total solid waste tonnages can be further broken down by category: MSW and Industrial and Special (I&S) wastes. I&S wastes consist of the following wastes: C&D, industrial, tire, medical, ash, sludge, and asbestos. In 2021, MSW made up approximately 67.6% of Nevada's total waste whereas I&S wastes made up the remaining 32.4%.

Municipal Solid Waste (MSW)

Most of the waste imported to and generated in Nevada is categorized as MSW. MSW is general trash and garbage from everyday products, such as food waste, furniture, packaging, and clothing. From 2012 to 2021, MSW sent to Nevada landfills increased (Figure 4). In 2021, MSW consisted of 67.6% of all waste imported to and generated in the state of Nevada.

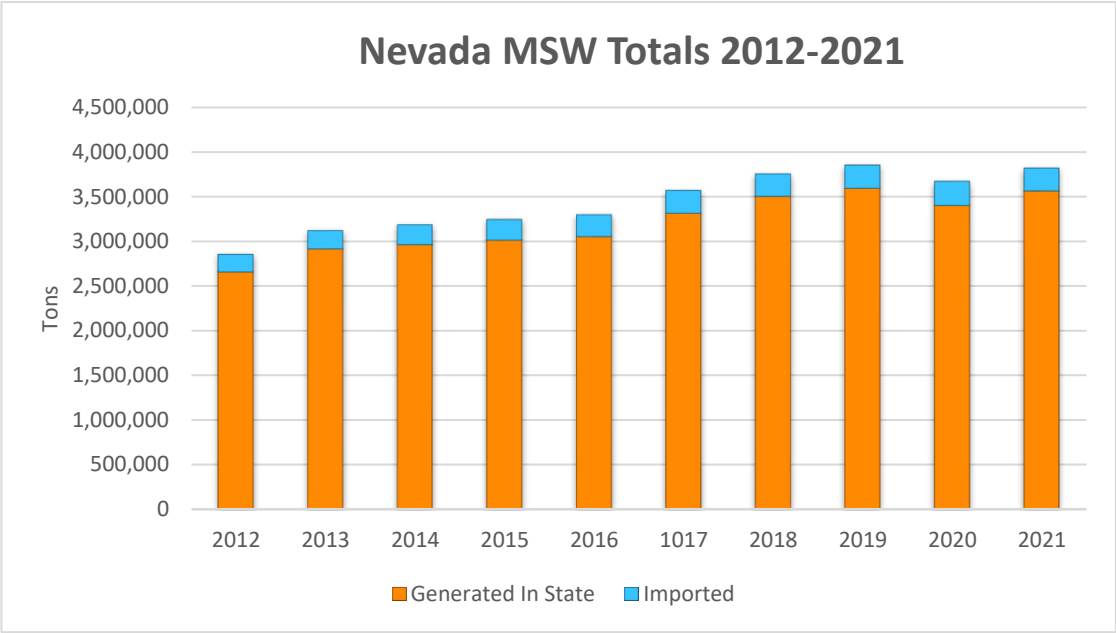

Figure 4: Overall total MSW generated in and imported to Nevada has increased since 2012.

Of note, the State has not yet conducted a statewide MSW characterization study. Such a study would provide useful estimates regarding how much glass, plastic, paper, food waste, and other types of materials are in the waste stream. As discussed later, a statewide MSW characterization study would provide actionable data for creating targeted recycling programs. Also, such a study could provide insight into how tourism affects Nevada's waste streams. For example, it has been suggested that Nevada's tourism economy affects its MSW generation. The Las Vegas Convention and Visitor's Authority has reported that approximately 42 million people visit Las Vegas per year; however, the number of visitors did drop to 19 million in 2020 during the first year of the COVID-19 pandemic.[10]

Construction & Demolition (C&D)

C&D waste is the second largest category of waste imported to and generated in the state of Nevada. C&D waste is generated from the construction and demolition of buildings and infrastructure. It includes waste such as concrete, steel, asphalt, and large amounts of plastic, paper, and wood. Between 2012 and 2017, C&D waste sent to Nevada landfills increased, and then from 2017 to 2021, C&D decreased (Figure 5). This recent decrease may be attributed to an increase in the amount of C&D that was recycled in the State. The amount of C&D recycled increased from 1,449,560 tons in 2017 to 1,972,299 tons in 2021. Additionally, the recent decline in C&D waste may have been influenced by the COVID-19 pandemic and an interruption of construction projects nationwide. In 2021, C&D consisted of 26.6% of all waste imported to and generated in the state of Nevada.

Industrial Waste

Industrial waste is generated from industrial/manufacturing operations and includes product residues, slags, and kiln dust. From 2012 to 2021, the disposal of industrial waste fluctuated in

[10] Las Vegas Convention and Visitors Authority. (2022). LVCVA Tourism Tracker. https://www.lvcva.com/research/

Nevada (Figure 5). Spikes in industrial waste disposal were observed in 2015 and 2017. These spikes were attributed to a power plant's closure process. In 2021, industrial waste consisted of 2.4% of all waste imported to and generated in the state of Nevada.

Tires

Except from 2018-2020, tire waste generation remained under 5,000 tons (Figure 5). Generally, tire waste makes up less than 0.1% of all waste imported to and generated in the state of Nevada.

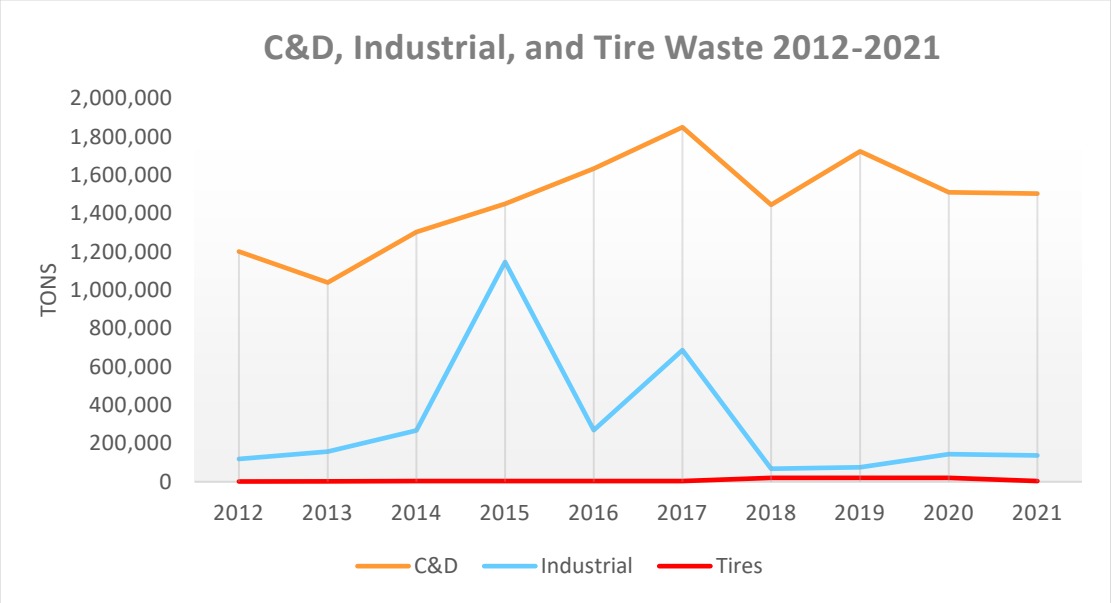

Figure 5: Trends of C&D, industrial, and tire waste generated in and imported to Nevada from 2012 to 2021.

Ash

Ash is waste generated from industrial and manufacturing operations that leave behind ash and/or residue. From 2012 to 2021, ash waste decreased in Nevada landfills (Figure 6). In 2017, there was an increase of ash waste, approximately 196,000 tons, before dropping back down to approximately 102,000 tons in 2018. The 2017 increase was attributed to the closure of a power plant. In 2021, industrial waste consisted of 1.8% of all waste imported to and generated in Nevada.

Sludge

Sludge is a waste that is generated from municipal, commercial, or industrial wastewater treatment. It is treated before being placed into landfills. From 2012 to 2021, sludge waste increased in Nevada (Figure 6). In 2021, sludge consisted of 1.4% of all waste imported to and generated in Nevada.

Asbestos

Asbestos is a naturally occurring fibrous silicate mineral that is used in buildings and construction. Due to its danger to human health, asbestos is often removed from older infrastructure. However, it can still be found in new building materials imported from overseas. From 2012 to 2019, asbestos waste increased before declining in 2020 and 2021

(Figure 6). This may be due to the COVID-19 pandemic and the decrease in construction nationwide. In 2021, asbestos was 0.1% of all waste imported to and generated in Nevada.

Medical Waste

Medical waste is generated from health care facilities, including research facilities and veterinarian clinics. From 2012 to 2021, medical waste fluctuated with larger amounts disposed of in 2013-2014 and 2020-2021. The fluctuations are most likely caused by increases of disease in certain years, such as the severe 2013-2014 flu season and the 2020-2021 COVID-19 pandemic. In 2021, medical waste was less than 0.01% of waste.

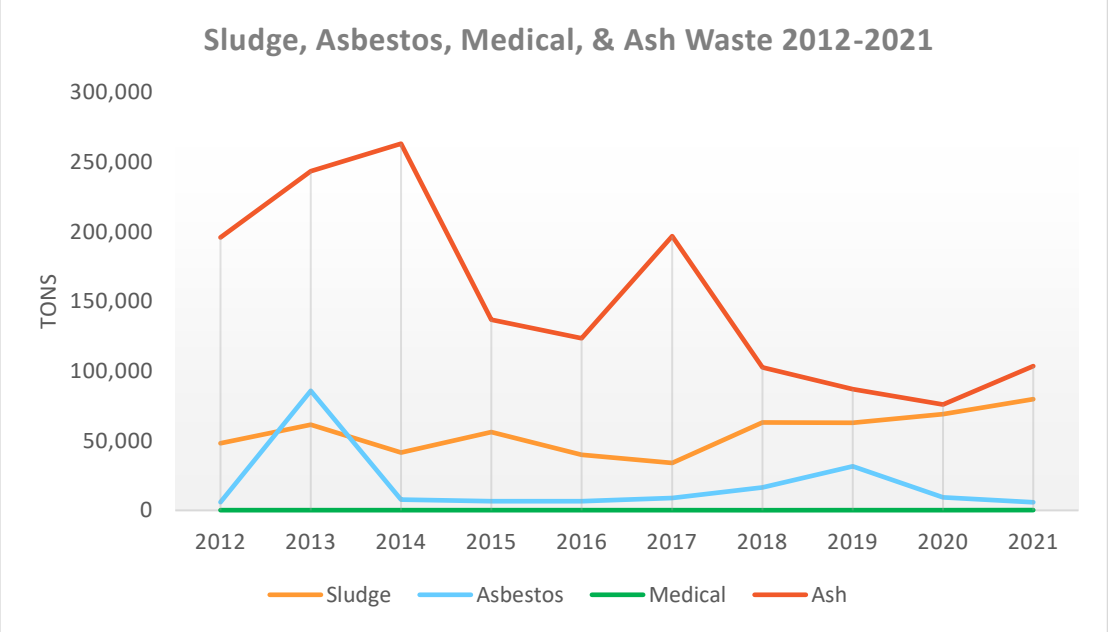

Figure 6: Trends of sludge, asbestos, medical, and ash waste generated in and imported to Nevada from 2012 to 2021.

MSW Generated per Capita

MSW generated per capita (i.e., pounds/person/day) represents a population's intensity of waste generation. From 2012 to 2021, the total MSW generated per capita in Nevada generally trended upwards (Figure 7). Nevada's most current MSW generated per capita rate, 7.98 pounds/person/day, is higher than the national average, which is 4.9 pounds/person/day.[11] As mentioned, Nevada's tourism economy may be impacting MSW generation, and in turn, its generation per capita rate.

[11] EPA. (2021, July 14). National Overview: Facts and Figures on Materials, Wastes and Recycling. https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/national-overview-facts-and-figures-materials

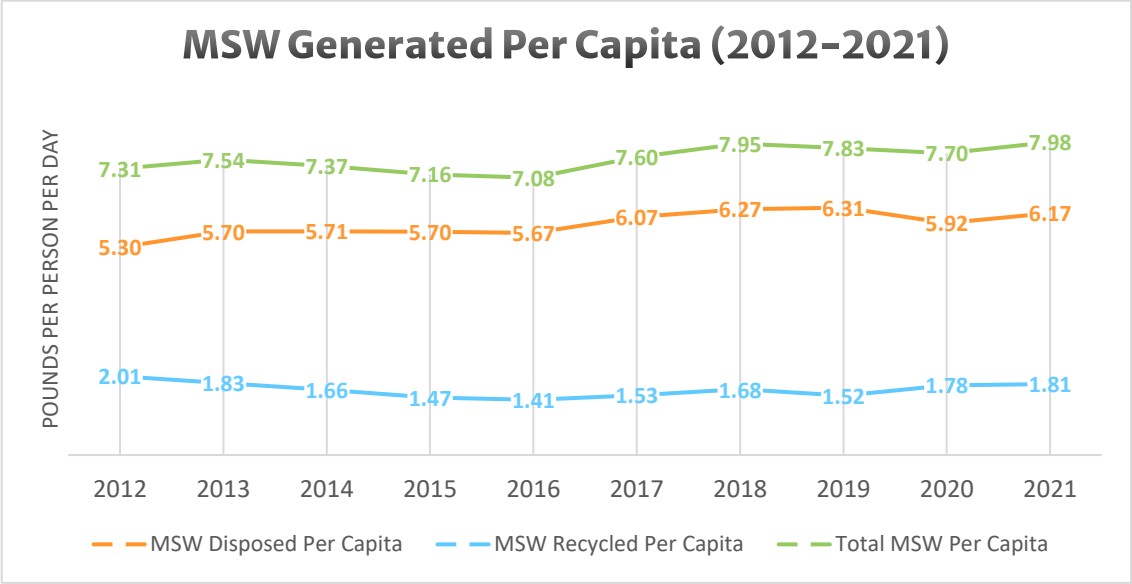

Figure 7: Nevada's MSW generated per capita (pounds per person per day) increased from 2012 to 2021. Notes: MSW generated per capita was calculated for each year using the total MSW tonnages generated in the state and the state population for that year. Population data came from the NV Demographer Population Estimates for 2001-2021.

MSW generated per capita generally increased in most counties over the last decade. Figure 8 depicts the most current MSW generation rates for each county. It is important to note that some rural county landfills do not have scales to weigh their waste and instead must use volume estimates to approximate MSW tonnages. Additionally, Storey County was separated into a different graph as the county's data was an outlier (Figure 9).

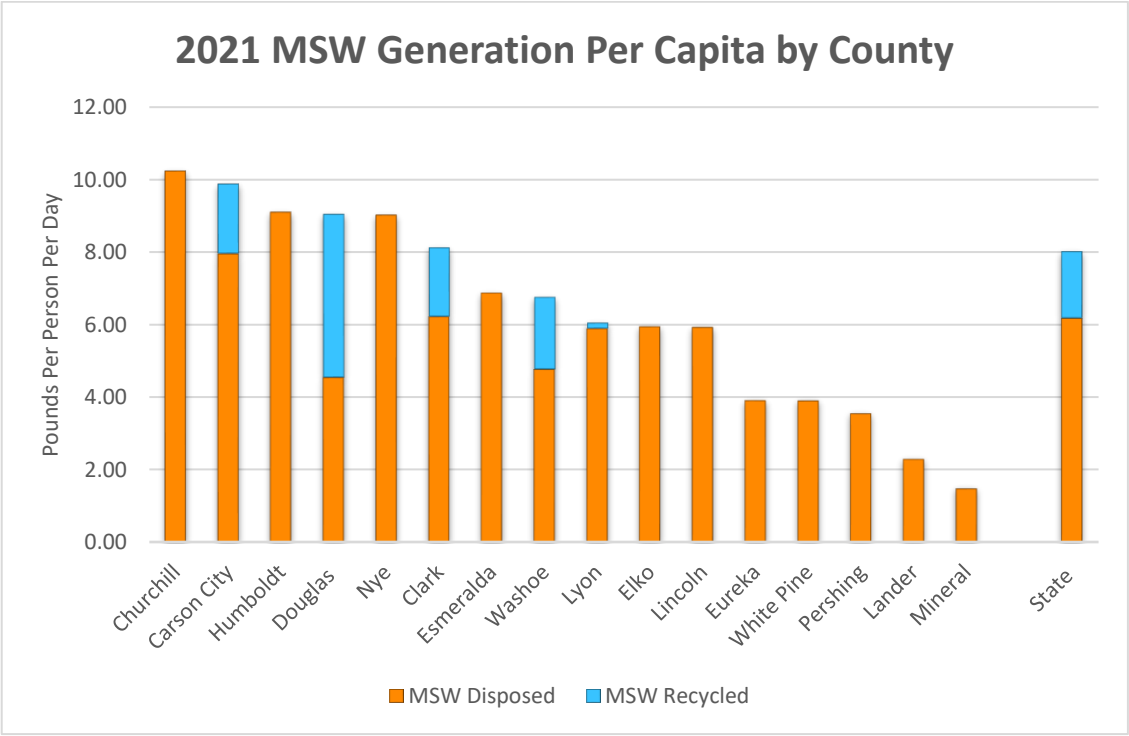

Figure 8: Municipal solid waste generated per capita for each County for 2021. Some rural landfills do not have scales and use volume estimates for reporting tonnages. The generation rate in the figure represents the amount of landfilled or diverted MSW by County origin. Note: Storey County data was separated into Figure 9 due to being an extreme outlier. The population estimates are based on the NV Demographer Population Estimates for 2001-2021.

Within the last few years, Storey County's MSW began to increase significantly starting in 2019 (Figure 9). MSW generated per capita increased from 4.29 lbs/person/day in 2018 to 93.79 lbs/person/day in 2021. From 2017 to 2021, reported commercial MSW increased from over 3,400 tons to over 74,000 tons. This increase in MSW may be associated with the development and growth of the Tahoe-Reno Industrial Center located in Storey County. This industrial park's landmass equates to 65% of Storey County and is continuing to be developed as more companies move into the area.[12] However, further research into this trend is needed.

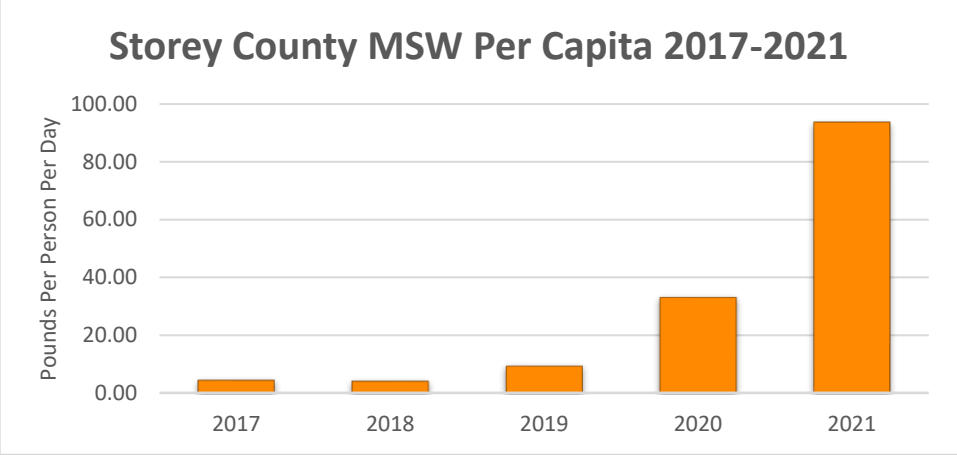

Figure 9: Storey County MSW per capita increased significantly starting in 2019. This increase is likely tied to the Tahoe-Reno Industrial Center. In 2021, 99% of the reported MSW was categorized as commercial MSW.

Collection, Transportation, & Solid Waste Facilities

In the more populated areas of Nevada, single-family homes receive weekly collection of solid waste and weekly or bi-weekly collection of recyclables. However, in more rural areas, there is not always weekly collection, and households must self-haul their solid waste to a waste facility. Additionally, there is a network of transfer stations and rural public waste bins for which waste is collected and hauled to the regional landfills. Covered roll-off containers and waste transfer trucks are used to transport waste collected from transfer stations and public waste bins to the regional landfills. In more highly populated areas, some of the public waste storage bin sites are staffed by attendants who collect fees from the public for waste disposal; however, most public waste bin facilities are unattended. Public waste bins are maintained by the counties at their expense, either by the county itself or through contracted services. Appendices 2 and 3 contain maps depicting landfills, transfer stations, and public waste bin locations.

Transportation services vary widely, from waste collection services provided by large corporations under franchise agreements in urban areas, to individuals self-hauling in sparsely populated rural area.

[12] Tahoe Reno Industrial Center. (Retrieved 2022). Maps. http://tahoereno.com/maps/

Landfills

In the 1990's, more stringent state and federal landfill regulations were implemented, which started the trend of the regionalization of solid waste collection and disposal infrastructure.[13] Faced with the option of upgrading to the new, "more costly" standards or closing their gates, more than 100 of Nevada's small, rural landfills chose the latter. In their place, large, regional municipal landfills became the dominant disposal end-destination for solid waste.

Landfills are classified into different classes: Class I, Class II, Class III, and Class III Waivered (C3W). Each class must meet specific requirements as defined by the NRSs/NACs. Some classes may only handle specific amounts of waste, while others may only handle specific waste materials.

- **Class I**: Comprised of at least one municipal solid waste landfill and is not a Class II or III site (e.g., Apex, Lockwood, and Elko City Landfills)
- **Class II:** Comprised of at least one municipal solid waste landfill but accepts less than 20 tons of solid waste per day on an annual average, has no evidence of contamination of groundwater originating from the site, serves a community that has no other practicable alternatives for waste management, and is in an area which annually receives no more than 25 inches of rain. (e.g., Humboldt Regional Landfill, Lander County Landfill, and Tonopah Landfill)
- **Class III:** Accepts only industrial solid waste (e.g., Kennametal Landfill)
- **Class III Waiver**: Involves a reduction or waiver of certain standards for certain Class III sites. C3W sites must submit plans to their solid waste management authorities for approval that outline materials that are allowed in the landfill and a program for maintenance (e.g., Robinson Mine Project, Phoenix Mine, and Turquoise Ridge)

As of 2022, Nevada has 17 Class I sites, 10 Class II sites, 23 Class III sites, 101 C3W sites, and 440 closed sites. Table 1 on the next page lists the five-year averages for daily tonnages received at each landfill as well as the remaining capacities of the major landfills in Nevada. Apex, one of the largest landfills in the nation, receives on average over 7,400 tons of waste per day, while many of the smaller landfills receive between 20-300 tons per day. Every five years, landfills must submit a volumetric survey, which calculates the remaining lifespan. Technology and best management practices evolve over time, which can prolong the life of the landfill.

[13] EPA promulgated the Revised Criteria for Municipal Solid Waste Landfills on October 9, 1991 (56 FR 50978)

Table 1: 5-Year Average Daily Tonnage Rates and Remaining Capacities of Major Landfills

County	Facility	Class	5-Year Average - Daily Tonnage	Remaining Landfill Volume (Cubic Yards)	Estimated Closure Year	Last Capacity Report Received
Carson City	Carson City Landfill	I & III	756.30	15,795,900	2048	2021
Churchill	Kennametal Inc	III	2.74	481,113	2069	2022
	Russell Pass Landfill	I	271.96	12,814,049	2103	2018
Clark	Apex Regional Landfill	I	7,456.75	800,013,084	2275	2017
	Boulder City Landfill	I	73.96	11,007,153	2192	2021
	Laughlin Landfill	I	66.40	987,592	2057	2022
	Reid Gardner Flyash Disposal	III	393.33	8,890,000	2030	2019
	Timet J-2 Landfill	III	15.99	77,600	2034	2019
	Wells Cargo Industrial Landfill	III	550.04	38,143,439	2050	2020
Elko	Elko City Landfill	I	186.07	23,679,458	2102	2020
	West Wendover City Landfill	I & III	24.78	421,128	2032	2019
Esmeralda	Goldfield Sanitary LF	II	6.31	264,527	2138	2020
Eureka	Eureka Sanitary LF	II	9.66	1,175,500	2141	2017
	TS Power Plant Landfill	III	24.41	1,372,633	2169	2020
Humboldt	Humboldt County Regional Landfill	I	87.48	898,507	2039	2020
	North Valmy Station-Ash Landfill	III	210.62	18,825,420	2248	2021
Lander	Battle Mountain Landfill	II	141.30	1,891,000	2101	2017
Lincoln	Crestline Class II Landfill	II	14.38	437,103	2038	2015
	Mesquite Municipal Waste Landfill	I	139.58	1,037,604	-	2022
	Western Elite	I & III	1,608.32	7,398,475	2027	2019
Mineral	Hawthorne Landfill	I	21.78	1,068,518	2035	2020
	Hawthorne Army Depot	III	2.30	394,907	2063	-
Nye	Pahrump Valley Landfill	I	212.44	1,455,529	2038	2017
	Round Mountain Disposal Site	II	23.85	229,880	2035	2022
	Tonopah Landfill	II	51.08	271,645	2033	2017
Pershing	Pershing County Landfill	II	17.03	3,073,647	2139	2019
Storey	Lockwood Regional Landfill	I & III	3,333.41	264,538,460	2139	2020
White Pine	Ely City Landfill	I & III	43.70	3,336,334	2070	2018
Federal	Area 5 NV NSS Asbestiform	III	0.16	-	-	-
	NTS - Area 6 Hydrocarbon Site	III	4.70	-	-	-
	NTS - Area 9 U10c Class III	III	10.77	-	-	-
	NTS - Area 23 Landfill	II	0.99	-	-	-
	Tonopah Test Range	II	2.78	476,339	2106	2019

Notes: Data was obtained from the State Solid Waste Database. Blank cells indicate no data in the State database; however, the data may exist with the SWMA that the landfill is regulated by. Data for the Clark County landfills came from the SNHD's database.

Landfill Requirements & Current Practices

All municipal waste landfills in Nevada are required to conform to the established state regulations and the federal standards adopted under the Resource Conservation and Recovery Act (RCRA) Subtitle D.

Liners

A composite liner (composed of clay and a layer of plastic membrane) is required for all new or expanding landfills that receive an average of more than 20 tons of waste per day (i.e., a Class I landfill facility). Landfill owners/operators may apply to the SWMA for the approval of an alternative liner design if the landfill owners/operator can demonstrate that the alternative design is sufficiently protective of the waters of the State against degradation caused by the introduction of landfill pollutants and/or contaminants.

Dry Tombing

The standard approach to landfill design in Nevada is what is commonly known as "dry tomb" landfilling. It is achieved by the exclusion of liquids from buried waste resulting in the minimization of leachate generation. Dry tomb landfilling has been criticized by some researchers contending that, because it delays waste decomposition, the waste will always present a threat to groundwater. To address this threat, an alternative technology has emerged, the "bioreactor" landfill. Bioreactor landfills promote waste decomposition by recirculating the leachate inherently produced by the waste mass with controlled application of additional liquids. This technology is already in use in several other states; however, whether bioreactor designs prove to be a safe and economical landfill alternative in Nevada, with its arid climate and its unique hydrogeologic conditions, remains to be seen. Until a bioreactor landfill is proposed and receives SWMA approval, dry tombing is likely to continue.

In March 2004, the EPA revised its municipal landfill criteria to allow states to issue Research, Development and Demonstration (RD&D) permits with associated variances from the standard criteria and requirements (specifically those concerning landfill design, operation, final cover, and closure/post-closure care). In general, the EPA envisioned that RD&D permits would be issued for a three (3) year period, and extendable up to a maximum of 12 years. For Nevada to be able to offer the flexibility to try new technologies such as the "bioreactor" landfill, the solid waste regulations would have to be amended to adopt the RD&D rule.

Final Cover Design

The current prescriptive standard for a MSW landfill's final cover consists of two elements: an "infiltration" layer which contains at least 18-inches of compacted clay, topped by a 6-inch erosion layer of soil capable of supporting vegetation. The purpose of the clay layer is to provide a moisture percolation barrier to impede water seepage into the waste mass. The final cover material must have a permeability less than, or equal to, the bottom liner/layer. However, landfill researchers have determined that atmospheric wetting-drying cycles cause cracks to develop in the clay layer, causing the current prescriptive cover to fail within only a few of these wetting-drying cycles. Nevada's existing regulations allow SWMAs to approve alternative final cover (AFC) designs that achieve an equivalent reduction in percolation as the

The long-term integrity of the final cover is a concern, especially as natural forces act on it over time (e.g., wind, rain, dryness, cold/heat, geologic shifting).

prescriptive cover design; however, few of the landfill applications received to date have proposed incorporating AFC designs.

Post Closure

After landfill closure, owners are required to provide post-closure care for a 30-year period. In general, post-closure care involves, but is not limited to, the following activities: maintenance of the final cover, monitoring and management of explosive gas, groundwater monitoring, and maintenance and operation of the leachate collection system. While the 30-year post-closure period is the standard in Nevada regulations, SWMAs have the authority to alter the timeframe. A shorter period may be approved if the owner demonstrates that it is sufficient to protect the environment; a longer period may be required if the authority determines that it is necessary to protect the environment.

Landfill Gas and Groundwater

Landfill gas is a natural byproduct of the decomposition of organic material in landfills, and it is composed of 50-55% methane, 45-50% carbon dioxide, and a small amount of non-methane organic compounds.[14] In 1996, the New Source Performance Standards (NSPS) and Emission Guidelines (EG) were adopted under provisions of the federal Clean Air Act (CAA) to reduce emissions of air pollutants resulting from waste decomposition at municipal landfills. Landfill gas requirements are written primarily to prevent explosions at landfills caused by methane gas generation, regulate gas emissions produced from landfills, and prevent the migration of gas into other sources such as groundwater.

Gas emissions produced at landfills can pose several issues, like groundwater contamination, increased fire and explosion risk, and methane emissions. Landfills in Nevada are permitted and regulated to ensure that the risks involved are minimized. Groundwater contamination risk from landfills in Nevada is minimal, because Nevada receives very little precipitation, especially in Southern Nevada, and the water table is generally very deep throughout the state. This reduces the risk of leachate and methane infiltrating groundwater sources. Landfills are also reviewed to determine whether a liner is needed to protect the groundwater.

During the permitting process, it is determined whether a landfill will require gas monitoring. Gas monitoring is used to help monitor gas levels within the landfill. This helps to reduce the risk of fires and explosions in landfills by allowing landfill operators to determine the amount of methane in the landfill and take necessary steps if levels become too high.

Two of Nevada's largest landfills, Apex Landfill in southern Nevada and Lockwood Landfill in northwest Nevada, collect gas from their landfills through gas-to-energy facilities located on their sites. This helps to reduce methane emissions while turning the gas into an energy source for the community. Lockwood is currently producing 3.2 megawatts of energy, providing enough power for about 2,000 homes.[15] Apex's gas-to-energy facility produces 12 megawatts of energy, enough to service about 11,000 homes.[16] [17]

[14] EPA. (2022, April 21. Basic Information about Landfill Gas. https://www.epa.gov/lmop/basic-information-about-landfill-gas

[15] Waste Management. (n.d.). Environmental Stewardship. https://lockwoodlandfill.wm.com/enviromental-stewardship.jsp

[16] EPA. (2022, March 16). Project and Landfill Data by State. https://www.epa.gov/lmop/project-and-landfill-data-state

[17] SWANA. (2021, April 22). PBS Overview Airs Apex Landfill Episode. https://swana.org/news/newsletters/article/april-22-2021/pbs-overview-airs-apex-landfill-episode

Challenges to Solid Waste Management

There are many challenges to improving solid waste management and aligning the system with SMM practices.

Landfill Challenges

A random sample of 130 inspection reports were reviewed to identify common challenges and trends.[18] This review only included facilities within the 15 counties of NDEP's SWMA jurisdiction. It did not include facilities in Washoe or Clark County, which are managed by their health districts. Further research would be needed to identify trends in these two counties.

The following items were common challenges and trends experienced across facilities – especially amongst Class I and II sites:

Windblown litter within the facility's footprint and on adjacent properties: Most landfills utilize the Nevada Division of Forestry's (NDF) Camp Crews for litter clean up, but the crews are often unavailable due to wildfires or other projects. This can lead to debris buildup. Some sites have tried hiring local companies to pick up the scattered debris, while others have worked with the court system. However, availability of workers from local companies can be unpredictable, and some counties saw an increased number of thefts and vandalism (e.g., cut fences) when citizens were sent to the landfill from court.

Recordkeeping issues and challenges: Operators and owners often have difficulty producing required facility records upon inspector request. Issues with recordkeeping at these sites are typically caused by not having records kept in a central location.

Reporting issues and challenges: High readings from gas monitoring and ground water monitoring are often not reported in a timely manner. There is not an established procedure for how to proceed with high readings, nor is there a designated timeframe for reporting. Permits have not required facilities to report; rather, facilities only must have the data available for review at inspections. As permits are renewed, there is a shift to have all sites submit quarterly data to BSMM. Also, there are instances of unreported site fires.

In addition to the common trends and challenges listed above, the following were items that were specific to landfill type:

Class II/County landfill challenges: County landfills–typically Class II sites—lack some of the more technical tools such as scales to account for most accurate tonnages, cameras for assisting with inspecting load contents, and budgets for full staffing 7 days a week. High turnover rates, and more recently the pandemic, have disrupted training cycles as most in-person trainings were cancelled. Additionally, scrap metal piles at Class II sites are commonly large. If facilities are not on main routes of travel, then consistently scheduled pickups are not cost effective. This can lead to large piles stored on site, which are not always maintained.

Overall, inspectors note that rural landfills are unable to obtain needed relevant training due to a lack of budget or limited availability of affordable training.

[18] Of the 130 inspections: 17 were Class I facilities, 13 Class II, 9 Class III, 16 Class III Waiver, 4 compost facilities, 60 waste bins, and 11 transfer stations.

C3W Challenges: C3W sites are unique, because they do not have set NACs/NRSs to use as guidance for inspection. Per NAC 444.731, waivered sites are only allowed to accept materials that have been approved by the BSMM during the application process. Accepting waste(s) not allowed per the site's agreement is an area of concern at the C3W sites. Also, most of the 101 C3W sites are associated with mining operations, and regulating and inspecting these sites can be challenging. Bureau of Mining Regulation and Reclamation (BMRR) ultimately oversees the end-of-life management of mines.

Other Facilities Challenges

Transfer Stations: Common issues identified at these sites include excessive litter, incorrect labeling, and drainage issues.

Public Waste Bins: Due to their rural location, these have the least amount of oversight. There are some challenges with litter control, incorrect waste storage, green waste, and worn signs at these sites.

Recycling Facilities: While recycling and recycling-related facilities are part of the solid waste management system, recycling is covered separately in the next section of the Plan to provide adequate discussion and planning.

Illegal Dumping

Nevada's rural and urbanized areas alike suffer from one common and persistent problem: illegal, or open, dumping. Because it is fundamentally local in nature, planning at the municipal solid waste management level is seen as best suited to address this problem. NRS 444.621 through 444.645 provides municipal governments with the authority to prosecute and penalize illegal dumpers. Unlawful dumping is classified as a misdemeanor crime subject to penalties/fines, community service, and/or revocation of a business license.

Progress toward controlling illegal dumping activity depends upon the citizens and their elected municipal officials putting a high priority on having a clean community. The City of Elko is an outstanding example of a rural Nevada community that has embraced this concept. The City of Elko has led a concerted effort to reduce illegal dumping by involving its citizens and civic leaders in community cleanup events, free dump days and single stream recycling. In Clark County, the SNHD holds regular public meetings for the purpose of hearing solid waste violation cases, such as illegal dumping.

Open Burning

Open burning of household garbage and non-vegetation refuse is not only illegal, and a public nuisance, but it also presents a threat to public health and the environment due to the risks of wildfires and toxic substance emissions. The EPA determined that open burning constitutes the largest source of dioxins released to the environment in the United States, far exceeding emissions from commercial waste incinerators. Dioxins are carcinogenic (cancer-causing) substances that persist in the environment and can be taken up into the food chain. Exposure routes for dioxins include inhalation and absorption by ingestion of contaminated food. Fire smoke can carry and drop dioxins onto crops, where they are absorbed and ultimately consumed by animals and humans.

In 2004 the NDEP Bureau of Air Quality tried to address this problem by proposing new regulations limiting the open burning of solid wastes. As a result of opposition expressed to this change, it was determined that additional public information and education is needed before this issue will be resolved statewide. The proposed amendments were withdrawn, but some local ordinances were adopted to address this issue.

Special Wastes

"Special wastes" are those that require special handling or disposal because of their physical, chemical, or biological characteristics. Examples of special waste types include waste vehicle tires, spent vehicle batteries, used oil, used antifreeze, household hazardous waste, medical (bio-hazardous) waste, liquid waste (septic pumping), petroleum contaminated soil, large appliances (white goods), junk automobiles, and electronic wastes. For the most part, Nevada's municipal waste programs have developed adequate procedures and facilities for management of these wastes; however, there are a few persistent, and new, emerging problems with special wastes. Having accessible programs that handle these waste streams at the end of their life helps protect the environment and public health. Additionally, encouraging the recycling and minimization of these wastes (when applicable) leads to a more sustainable materials system.

Household Hazardous Waste (HHW): Solid wastes that have hazardous waste characteristics are exempt from hazardous waste regulation if generated by households. However, it is still ideal to keep these wastes out of landfills. Some barriers to reducing HHW in MSW include the inconvenience of some drop-off services, lack of public knowledge, and limited services in rural communities. The level of convenience and access to HHW programs depend on the county. For example, while NRS 444A.040 requires municipalities with populations greater than 45,000 to establish programs for HHW management, the structure of these programs can vary by location. In some counties, these HHW drop-off services may be free. In other counties, private companies may provide HHW management services for a fee. It is unlikely that the paid versions efficiently serve the purpose of diverting HHW from the municipal waste stream. Residents are far less likely to use such a service if they must pay. Also, some sites may be in inconvenient locations or require appointments to drop off the waste. Furthermore, it has been observed that some franchise-based programs have been accepting fewer types of HHW and that counties need to ensure that the terms of the franchise agreements relating to the acceptance criteria of HHW are being enforced. Finally, as is often the case, rural counties collect used vehicle batteries and oil for recycling, but few have established comprehensive HHW programs.

Creating convenient and free or low cost drop-off options for HHW are key elements of successful HHW programs.

Electronic Waste (E-Waste): With the growing consumption and shorter lifespans of electronic products, e-waste is being generated in increasing quantities. E-waste can be a source of toxic chemicals. Thus, there are environmental concerns with landfilling this waste stream. Additionally, precious metals in these materials cannot be recovered once landfilled. Currently, Nevada relies on a voluntary collection system of local collection facilities, special collection events, retail take-backs and trade-ins, mail-ins, and on-line trade-ins. In 2011, NDEP conducted a study of this existing system. At the time, the study found that the system could manage most of the e-waste and that about 95% of Nevada's population had access to some form of existing e-waste recycling services. However, over a decade has passed since this study, and the nature of the e-waste stream and collection system may have changed.

Two emerging waste streams of concern include solar panels and lithium-ion batteries.

Solar Panels: Solar panel waste is an emerging waste stream of concern. Some solar companies are recycling through a network of e-waste recyclers. However, some solar panels are being disposed of in landfills, and there are concerns of solar panels starting landfill fires. Additionally, glass composes about 75% of the weight of a solar panel, and thus it is recyclable.[19] Solar panel waste will continue to grow over the decades, especially as older models reach the end of their lives (~20-30-year lifespan) or newer, more efficient models replace less efficient models. With many solar facilities already built and more under construction, solar panel waste will become a pressing concern in the near future. Some larger solar facilities have hundreds of thousands to millions of panels.

Lithium-Ion Batteries: Lithium-ion (Li-ion) batteries are used in a variety of products, including electronics, toys, appliances, power tools, and electric vehicles. These batteries are showing up in more products, even smaller products. Residents may not know that a particular product contains a Li-ion battery or may not know the proper way to dispose of the battery. These batteries must be handled properly at the end of their useful life, because they can cause harm to human health or the environment. One of the major concerns with the disposal or recycling of Li-ion batteries is the risk of fire. There has been an increase of battery-initiated fires reported at waste and recycling facilities across the country.[20] In addition to the fire risk, some Li-ion batteries exhibit characteristics of hazardous waste. Due to these risks, Li-ion batteries should not be thrown in the trash or the recycling bin. For small, consumer Li-ion batteries, residents can bring them to recycling drop-off locations, such as qualified electronic recycling centers or retail stores participating in a battery recycling program.

Medical Waste: Infectious medical waste generated by hospitals, doctors' offices, veterinary clinics, and similar health care facilities can be disposed in a permitted landfill. However, prior to disposal, medical waste must be stored in watertight, tightly covered, and clearly labeled containers that are inaccessible to the public per NAC 444.662. Additionally, medical wastes must be transported separately from other solid wastes to an approved disposal site. Household medical waste, such as sharps (e.g., needles, lancets, and other medical instruments), are exempt from these requirements. Sharps can present a route of blood-borne pathogen infection to other household residents as well as to sanitation workers who manage household waste at municipal waste facilities. While fully eliminating sharps from the municipal waste stream may not be possible, services that encourage separation from the municipal waste stream and an increased use of sharps containers could further reduce the hazards to sanitation workers.

Waste Tires: Waste tires that are illegally dumped, improperly buried, or improperly stored may pose a serious threat to public health and safety, as well as to the environment. Waste tires can serve as a nesting area for pests and a breeding ground for mosquitoes which can spread numerous illnesses. Waste tires can also catch fire and release toxic smoke and residue. To minimize these problems and to protect the environment, waste tires must be properly managed. With this in mind, alternatives to landfilling are encouraged to conserve natural resources, to create new markets for the recycling and reuse of waste tires, and to preserve the State's landfill capacity while, at the same time, ensuring that illegal dumping is not exacerbated.

[19] EPA. (2022, January 11). Solar Panel Recycling. https://www.epa.gov/hw/solar-panel-recycling

[20] EPA. (2022, March 28). Used Lithium-Ion Batteries. https://www.epa.gov/recycle/used-lithium-ion-batteries

Although space is not a limiting factor for most landfills in Nevada, the physical properties of tires make landfilling them a very inefficient use of landfill space. This issue will become increasingly important as the volume of solid waste increases and as landfills become more difficult to site and more costly to permit and operate. Another disadvantage of landfilling is that the value of the tire as a "product" is lost. Landfilling may not be the most economical solution when considering the resource value that is lost when a tire is buried. To recover the resource value of a waste tire and eliminate the potential environmental problems associated with burying them, landfill disposal of whole or volume reduced tires should be discouraged as a long-term disposal alternative and only used where other feasible alternatives do not exist.

One key element of BSMM's mission is to promote sustainable resource management, and waste tires are no exception. The management of waste tires is based on the premise that waste tires are a resource, not a waste. BSMM encourages the solid waste management authorities to find environmentally beneficial and economically viable alternatives to the disposal of waste tires in a municipal solid waste landfill, such as shredding or grinding the tires for use in rubberized asphalt, playground mulch, road embankments, and/or civil engineering applications. Based on the mission of the BSMM and the 25% state recycling goal, it is our opinion that if a waste tire can be legitimately recycled and used in an effective manner (as approved by the solid waste management authority) then landfilling should be considered as a last resort.

Appendix 9 provides more details regarding the management of waste tires.

Product Design

Many products are designed to have a relatively short lifespan, or their usefulness becomes obsolete with the introduction of new and improved products. While Nevada does not have state-specific data regarding the disposal amounts of products with a short lifespan, there is national data. According to the U.S. EPA, over 45% of MSW generated in 2018 consisted of products with relatively short life spans. 28.1% of MSW consisted of containers and packaging which is often disposed of soon after a product is purchased, and 17.3% of MSW consisted of nondurable goods which generally lasted less than three years.[21] Not only do these products have short lifespans, they also may not be made of materials that are easily recyclable or reusable. In other words, they were not designed for sustainability. This adds a layer of complexity when trying to curb waste generation, because product design is beyond the consumer's level of control.

Cross Jurisdictional Communication

With multiple government agencies and entities managing their jurisdictions, the waste management system is susceptible to compartmentalization and siloed communications. This can create barriers to communication and produce situations where individual organizations have access to pieces of information, but no one has the full story. A system cannot function efficiency and effectively if all parts are not communicating properly to each other. Each

[21] EPA. (2021, July 2). Guide to the Facts and Figures Report about Materials, Waste, and Recycling. https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/guide-facts-and-figures-report-about#Products

governmental agency and entity involved in solid waste management has good intentions to protect the environment and human health, and by continuing to integrate these organizations and their missions, the State, counties, and municipalities will be able to provide the best possible services to the public.

Managing Recyclable Materials

Recycling is an essential aspect of Nevada's materials and solid waste management systems. It reduces the amount of waste sent to the landfill, conserves natural resources, saves energy, and provides jobs to our communities.

Recycling Program Requirements

Per NRS 444A.040, a county's population determines what types of recycling programs are required (Table 2).

Table 2: Recycling Program Requirements

County Population Threshold	Program Components
100,000 or more	The county shall make a program available for use to: • Provide curbside recycling from residential premises and public buildings • Establish recycling centers as needed • Provide for collection and disposal of household hazardous wastes • Encourage businesses to recycle and reduce solid waste where possible
45,000-100,000	The county shall make a program available for use to: •Establish recycling centers as needed • Provide for collection and disposal of household hazardous wastes The county may: • Provide curbside recycling from residential premises and public buildings
Less than 45,0000	The county may make a program available for use to: • Provide curbside recycling from residential premises and public buildings • Establish recycling centers as needed • Provide for collection and disposal of household hazardous wastes

Clark and Washoe counties exceed the 100,000-population threshold. The populations of Carson City, Douglas, Elko, and Lyon counties are over 45,000 but less than 100,000. Additionally, based on the recent 2020 Census, Nye County's population now exceeds 45,000.

Recycling Trends

Data Collection

With the passage of Assembly Bill (AB) 320 in 1991, Nevada adopted a recycling goal of 25% for counties with recycling programs. The goal was to be reached within two years of adopting the recycling standards; however, as will be discussed, some counties have struggled to reach this goal.

To assess the counties' and the State's overall progress toward the recycling goal, the NDEP conducts an annual survey of recyclers and businesses to determine the recycling rate. Prior to 2020, county and health district personnel collected recycling data from recyclers and businesses using a standard form. This county data would then be complied to calculate the State recycling rate. In 2020, the NDEP began to electronically collect recycling data through Re-TRAC Connect. Recycling centers and material generators now directly report their recycling data to the State.

While all recycling centers are strongly encouraged to participate in this annual survey, only those in counties with recycling programs are required to report. Between 2010 to 2020, six counties met this requirement: Carson City, Clark, Douglas, Elko, Lyon, and Washoe. However, Lyon County has not yet adopted a recycling program. Although regulations require recycling centers in these counties to report, there are no State penalty provisions for failure to submit data.

Of note is SNHD's permitting process for recycling facilities in Southern Nevada. The SNHD can take enforcement action for facilities that fail to report.

While reporting the quantities of all the recycled materials may seem straightforward, it demands the combined efforts and cooperation of the State and municipal governments, recycling centers, and disposal services to gather, record, and report accurate data. Often, the NDEP does not receive complete and accurate reports in a timely manner, thus requiring prompting and follow-up with the recycling centers.

The NDEP must also take measures to ensure that double counting of materials is avoided. This happens when a recyclable material generator and the receiving recycling center both report the same material as recycled. However, recycling centers and generators often do not report on destinations for their recycled material, which makes addressing double counting difficult. Additionally, any abnormal or inconsistent numbers are flagged, which then necessitates NDEP staff to contact the reporting facility for additional information or clarification to resolve the discrepancies.

The NDEP and the SWMAs have partnered with EPA Region 9 to develop consistent recycling data reporting among the Pacific-Southwest states. This helps to resolve recycling measurement issues by providing means to produce uniform and comparable data. Also, the NDEP provides reporting guidance using the EPA's definitions to help differentiate between solid waste types.

Recycling Rate & Diversion Quantities

The recycling rate is the ratio of recycled MSW to total MSW generated (in tons), which is comprised of recyclables, household waste, and commercially generated waste. It is calculated using the following equation:

$$Recycling\ Rate = \frac{MSW\ Recycled\ Tonnage}{MSW\ Recycled\ Tonnage + MSW\ Disposed\ Tonnage}$$

Between 2003 and 2010, the recycling rate for Nevada remained steady at 20-22%. From 2011 to 2013, the rate met or exceeded the 25% goal. From 2014 to 2019, the rate returned to about 21-22%. In 2020 and 2021, the rate jumped to 24.3% and 24.0% respectively. This recent increase may have been related to reporting process changes that occurred in 2020 as well as the COVID-19 pandemic's impact on waste streams and recyclables. Figure 10 shows the change in the State recycling rate from 2009-2021.

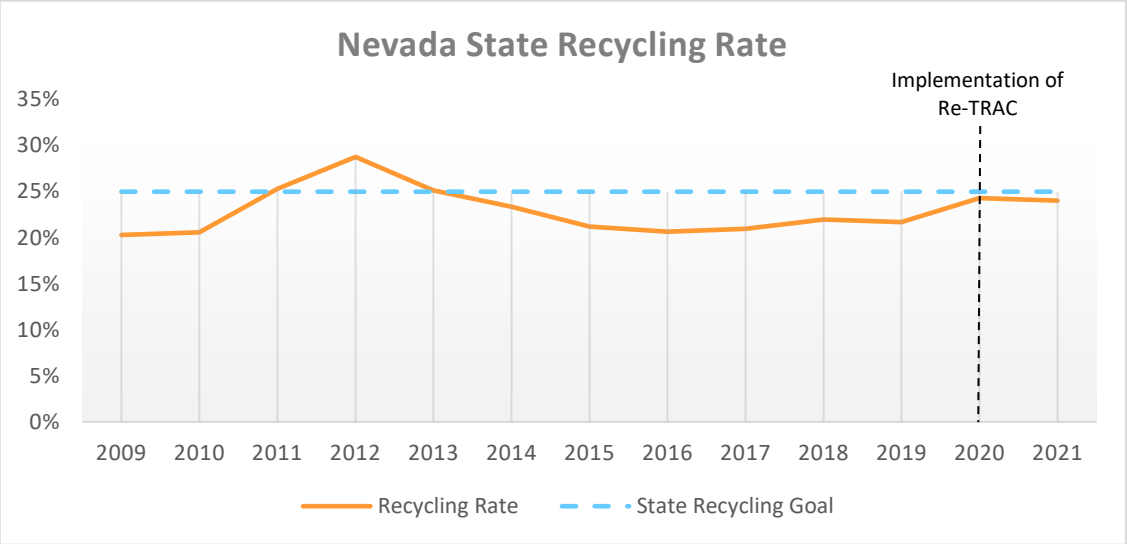

Figure 10: The state recycling rate from 2009 to 2020 has remained relatively consistent over time. The black dashed line indicates the switch to Re-TRAC Connect, an electronic reporting system, for collecting recycling survey responses by NDEP.

As depicted in Table 3, the recycling rate for each county varies. This is mainly due to the types of recycling programs that are available to households and the type of waste streams generated in an area. For example, despite it not having curbside collection of recyclables, Douglas County has consistently had the highest recycling rate in the State, largely because of the composting programs that operate in the county. Additionally, Carson City's rate increased from 25% to 35% after the city implemented single-stream recycling, green waste collection, and mandatory waste pickup for single-family residents beginning in July 2019.

Both Clark County and Washoe County moved to single stream collection starting in 2016. It is important to note that as Nevada's most populated county, Clark County's diversion and disposal rates significantly affect the State's recycling rate.

Finally, while curbside recycling is available to Elko residents in single-family homes, other communities in the county have limited or no opportunities to recycle locally. Elko Sanitation closed its recycling drop-off center in 2019 due to high contamination rates after repeated failed efforts to clean up the material stream. Additionally, rural counties' recycling rates are often impacted by the amount of collected scrap metal.

Table 3: Recycling Rate by County from 2017-2021

	2017	2018	2019	2020	2021
Carson City	26.69%	24.92%	35.20%	32.41%	19.37%*
Clark	19.90%	19.61%	19.71%	23.31%	23.37%
Douglas	51.60%	66.59%	54.14%	51.29%	49.68%
Elko	6.70%	3.86%	3.39%	8.13%	3.10%
Lyon	0.13%	0.00%	0.93%	6.83%	2.58%
Washoe	24.62%	29.58%	33.09%	27.43%	29.42%

*Notes: *The large drop in Carson City's recycling rate was mainly from one facility that reported about 20,000 tons less of recycled organics in 2021 compared to 2020.*

While the recycling rate provides a general indication about the proportion of waste the State is diverting from the landfill, it is also important to look at the reported recycled material tonnage trends. For example, even though the State has seen increases in the total tonnage of collected recyclable materials over the last several years, Nevada has struggled to hit the 25% recycling rate goal. This is because landfilled MSW tonnage has also risen (Figure 11). Therefore, a relatively stagnate recycling rate paired with these trends may indicate recycling stream changes, recycling system limitations, market difficulties, and/or missed opportunities.

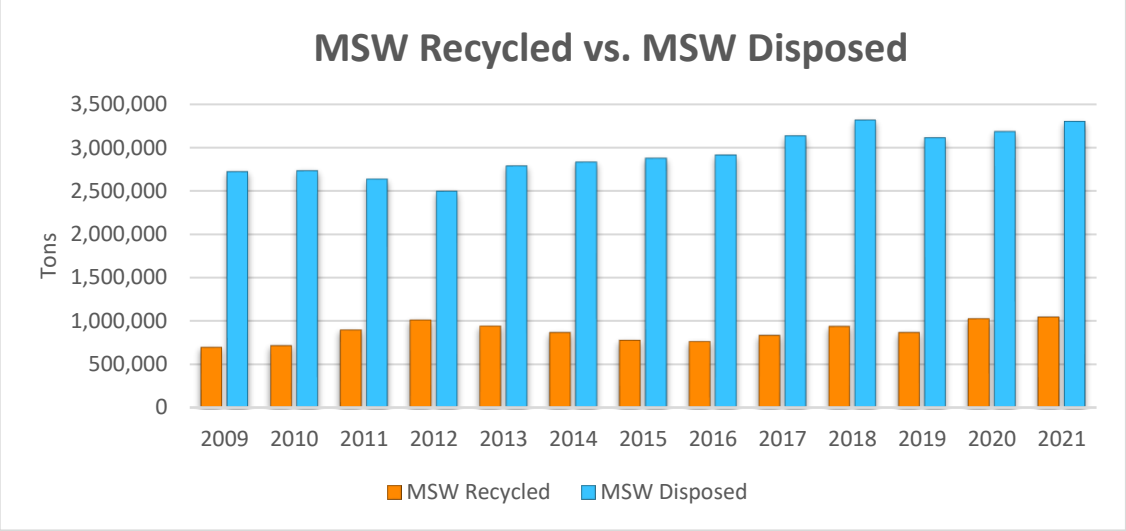

Figure 11: The recycling rate is affected by both the amount of MSW recycled and MSW landfilled. Even if recycled MSW increases, the recycling rate will not increase if MSW disposed also increases. Landfilled MSW tonnage has generally increased since 2009 despite increases in the amount of MSW recycled. Note: The graph only includes tonnage data from the six reporting counties (Carson City, Clark, Douglas, Elko, Lyon, and Washoe).

Moreover, because the State does not characterize its MSW, recycling rates for each type of material cannot be estimated. If the State could determine which materials have low recycling rates, it could focus on those problematic waste streams to increase the recycling rate.

Composition of Recyclable Materials

The main categories of recycled MSW materials include scrap metal, organic material, paper, plastic, special wastes (e.g., used oil, antifreeze, batteries, and paint), glass, and textiles. As Figure 12 on the next page depicts, three materials make up over 90% of the recycled tonnage collected in Nevada: scrap metal, organic material, and paper products (including cardboard).

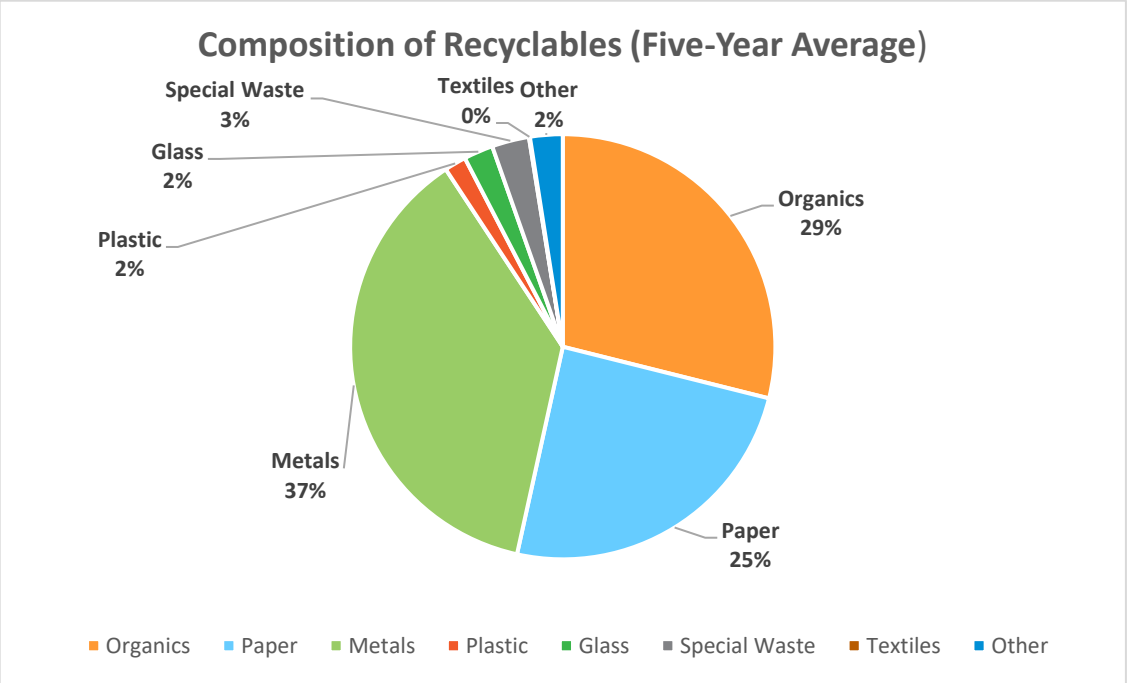

Figure 12: Scrap metals, paper, and organic materials make up over 90% of the recycled tonnage collected in Nevada.

The collection of recyclable materials is impacted by the trends and changes within the domestic and international commodity markets – i.e., markets for selling primary (virgin) and secondary (scrap and recyclable) materials. Like many other conventional recycling programs across the nation, Nevada's are built around these volatile commodity markets. For example, if the cost to collect, transport, and process a recyclable material is greater than the cost to extract, transport, and process the raw material, then there is little incentive to collect and process that particular recyclable material. However, if recyclable and scrap materials provide cost, energy, and environmental savings when used instead of raw materials, then manufacturers perceive these secondary materials as valuable and drive-up demand.[22] These recycled commodity values change over time based on supply, demand, and other market factors. Except for high-density polyethylene (HDPE) plastics and glass, there has been a general downward trend in recycled commodity values in the U.S. from 2010-2018.[23] However, while recycled commodity values for HDPE and glass have increased, HDPE values have been volatile, and glass values remain some of the lowest of the recycled materials.[23]

Due to these volatile markets, recycling programs can benefit from policies and programs that help spur demand for recyclables – such as requiring the government procurement of products containing recycled materials. Currently, Nevada has a few legislative requirements to help spur the demand for products with recycled material. Such legislative requirements involve the State procurement of recycled paper and the use of recycled aggregate, recycled bituminous pavement, and recycled rubber from tires in certain Department of Transportation projects (e.g., construction, maintenance, and repair of highways).

[22] Institute of Scrap Recycling Industries. (2020). 2019 Recycling Industry Yearbook. https://www.isri.org/recycling-commodities-old/recycling-industry-yearbook

[23] EPA. (2020). Historical Recycled Commodity Values. https://www.epa.gov/sites/default/files/2020-07/documents/historical_commodity_values_07-07-20_fnl_508.pdf

Scrap Metal

The reported recycled metal tonnage reached a high in 2012 at more than 526,000 tons (Figure 13). Recycled metal drastically declined in the following years, but the downward trend began to reverse in 2015. Since 2015, the reported recycled metal tonnage has increased by 40% to over 357,000 tons.

Organics Material

There has been an overall increase in reported recycled organic material, from over 138,000 tons in 2012 to over 325,000 tons in 2022 (i.e., a 135% increase) (Figure 13). This rise is mainly due to an increase in the collection and processing of yard debris and biosolids. Worth noting is the recent implementation of Carson City's green-waste recycling program. As part of a new waste management franchise agreement, Carson City began a green waste recycling program to collect residents' yard waste in 2019. From July 2019 to June 2020, 23,844 cubic yards of useable green waste were turned into compost, soils, and mulches.[24] Additionally, Carson City's recycled organic material increased from 4,755 tons in 2018 to over 15,300 tons in 2019 to just under 30,000 tons in 2020.

Paper

With more people working from home during the COVID-19 pandemic, the composition of recyclables changed, especially within the recycled paper stream. 35% less office paper was reported as recycled in Nevada in 2020 compared to 2019. Additionally, the increase in e-commerce activity during the pandemic has led to a surge in corrugated paper being recycled in the State. Similar trends were reported throughout the U.S.[25]

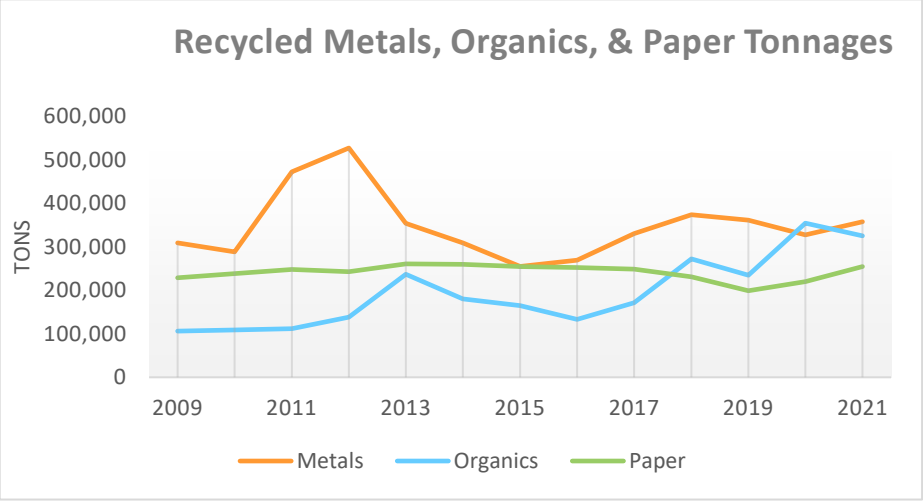

Figure 13: Recyclable materials experienced varying trends over the last decade in Nevada. In the last five years, organics and scrap metals saw general growth.

[24] NDEP. (2020, October 9). The Capital City celebrates one year of yard waste recycling services. https://ndep.nv.gov/nevada-recycles/events/the-capital-city-celebrates-one-year-of-yard-waste-recycling-services

[25] EPA. (2021, November 15). National Recycling Strategy: Part One of a Series on Building a Circular Economy for All. https://www.epa.gov/system/files/documents/2021-11/final-national-recycling-strategy.pdf

Plastic & Glass

The reported quantities of recycled plastic and glass have varied over the last decade and have shown an overall downward trend in total tonnages recycled. Since 2012, plastic has seen an overall 63% decrease in reported tonnage, and glass has seen a 43% decrease (Figure 14). The yearly variations for collected plastics and glass may be due to volatility in the commodity markets. Additionally, markets have historically been poor for recycled glass. Also, glass may be used as alternative daily cover (ADC) at landfills. If glass is diverted for ADC, it is not reported as recycled.

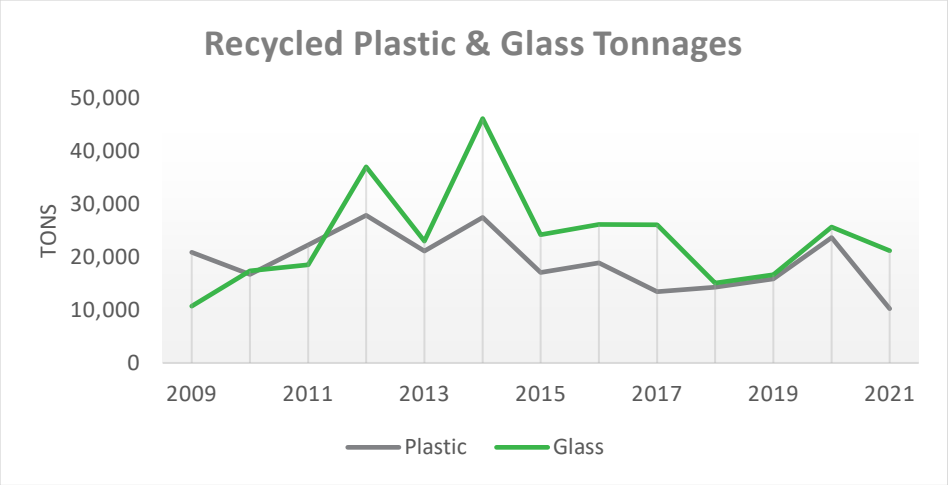

Figure 14: Recyclable materials experienced varying trends over the last decade in Nevada. Recycled plastics and glass saw general declines in reported tonnages since 2012.

Recycling, Composting, & Other Diversion-Related Facilities

As part of its *2030 State of Nevada Sustainable Materials Management Strategic Plan*, the NDEP BSMM has taken inventory of the recycling and processing facilities within Nevada based on available data in the State solid waste database, Re-TRAC Connect database, and search engines. This inventory is not all-encompassing, but it best reflects the counts of permitted operating facilities as of mid-2022. Table 4 on the next page depicts a summary of the BSMM's inventory, which has been categorized based on the facilities' recycling or diversion activities.

Table 4: 2022 Snapshot of Recycling & Diversion-Related Facilities in Nevada

Recycling & Diversion-Related Facilities by Type	Number
Animal By-Product/Used Cooking Oil Recycling	8
Auto Retail/Services with Collection/Recycling Program	16
Automobile Salvage/Recycling	21
Battery Collection/Recycling	13
Electronics Collection/Recycling	67
Food Scraps Recycling (Livestock)	1
Hazardous Waste Recycling (e.g., solvents)	2
HVAC/Refrigerant Recycling/Reclamation	6
Materials Recovery Facility (MRF)	3
Metals Collection/Recycling	23
Pallet Recycling	9
Paper Recycling	5
Permitted Composting	7
Recycling Center/Recycling Service*	29
Recycling Drop-Off Location/Transfer Station	10
Retail/Store (Recycling Drop-Off/Collection)	105
Styrofoam Recycling	1
Thrift Store/Donation Center	85
University Campus Recycling Center	2
Used Oil/Used Antifreeze Recycling	7
Other	29
Total	**438**

Note: This data was collected from the State solid waste database, Re-TRAC Connect database, search engines, and inspector knowledge. The databases do not categorize facilities by type of recycling or diversion activity. Categories were designated using best knowledge of the facility.
**Recycling Center/Recycling Service includes facilities that handle a wide range of materials.*

Recycling Challenges

Not only has Nevada struggled to reach a 25% recycling rate, but it falls far behind the national average of 32%.[26] Improving Nevada's recycling rate has been difficult to achieve for many reasons:

Market volatility and low commodity values: As mentioned, if it costs more to collect and process recyclable materials than it does to extract and process raw materials, then collection and processing of recyclable materials will remain low. Moreover, markets are not always stable or predictable; they respond to world events, demand, and supply. However, there is

[26] EPA. (2022, March 22). National Recycling Goal: Recycling Rate Measurement Comment Period. https://www.epa.gov/recyclingstrategy/national-recycling-goal-recycling-rate-measurement-comment-period

an opportunity to increase demand and develop local demand for certain recyclable materials, such as organics, within the State.

Transportation costs to get materials to market: Especially the case with rural areas, transporting recyclable materials long distances may not be financially feasible in the current market. On potential solution involves setting up a hub and spoke recycling system. Hubs serve as regional collection and processing centers in the larger communities, while spokes are collection points in smaller communities that deliver their recyclables to these hubs. By understanding the hub and spoke recycling model, Nevada may be able to find innovative ways to make recycling more cost-effective in these rural communities. While some progress has been made in this area, a lack of infrastructure and transportation options has limited widespread expansion or adoption of hub and spoke programs in Nevada.

High contamination rates of recyclable materials: Although single-stream collection increases participation and volume of materials, it can also result in much higher levels of contamination, reaching 25-30% at material recovery facilities. This often occurs when residents, and even visitors to the area, are unsure of what materials can go in their recycling bins.

Lack of programs or policies targeting specific materials with unique opportunities or problems: Since the State does not characterize its MSW, it cannot estimate the tonnage amounts for the main categories of MSW materials. If the State did this, it could estimate a general recycling rate for each material type. The recycling rate for each material type would provide insight into which materials could benefit from targeted programs and policies, such as policies that spur demand for these materials or programs that incentivize waste minimization of that waste stream.

Lack of emphasis on and incentives for waste prevention: Assuming MSW generation stays the same, increasing the collection of recyclable material is just one way to raise the recycling rate. Focusing on programs and policies that reduce the denominator of the recycling rate equation (i.e., total MSW generated) will also improve the recycling rate. This is especially important for materials that have weak end-use markets or have no feasible methods to be recycled.

Lack of collection services for commercial properties, multi-family buildings, and rural communities: As waste haulers charge extra for recycling at multi-family complexes and commercial properties, only a small percentage of these buildings have access to recycling. Additionally, rural communities face some unique obstacles that limit recycling access: lack of infrastructure for collection, basic processing, and storage of materials, long transportation distances to existing recycling centers, and a relatively small volume of materials generated.

Low tipping fee at landfills: When it's cheaper to dispose of a material rather than recycle it, there is less incentive to recycle. For example, one barrier to commercially composting organic material is the cost of the tipping fee. When landfill tipping fees are cheaper than compost facility tipping fees, organic matter is more likely to be landfilled than recycled.

Managing Hazardous Waste

Previous iterations of the Solid Waste Management Plan did not cover the management of hazardous waste, because hazardous waste is managed under separate Federal regulations. This Federal program has been delegated to the State of Nevada through a state authorization process. However, to support a shift to a comprehensive, SMM approach and to place a stronger emphasis on reducing the toxicity of waste, the management of hazardous waste is addressed in this Plan.

State Hazardous Waste Program & Regulation

Hazardous waste is waste with properties that make it dangerous or capable of hurting human health or the environment.[27] With the passing of the Resource Conservation and Recovery Act (RCRA) of 1976, the U.S. EPA developed a regulatory definition and process that identifies specific substances known to be hazardous and provided objective criteria for including other materials in the regulated hazardous waste universe. This Federal framework for regulating hazardous waste mainly applies to the industrial, commercial, defense, and public sectors. Additionally, it is important to note that household hazardous waste (HHW) is not regulated under this framework. HHW is generated by residents in their homes or other household-like areas. HHW consists of household products that, when disposed of, can catch fire, react, or explode under certain circumstances or are corrosive or toxic.[28] Common HHW includes items such as paints, cleaners, oils, batteries, and pesticides.

The State of Nevada's authority for managing hazardous waste originates from RCRA and adopting the Federal regulations. The EPA requires an authorized state's hazardous waste regulations to be at least as stringent as those established at the Federal level. To accomplish this, Nevada adopts by reference, with certain modifications, Federal hazardous waste regulations. To remain authorized and receive Federal funding, the State must periodically update the existing State regulations to reflect changes approved by the EPA.

NRS 459.400 to 459.600 gives the NDEP the authority to run the State hazardous waste program and regulate hazardous waste. The purpose of the State hazardous waste program is to protect human health, public safety, and the environment from the effects of improper, inadequate, or unsound management of hazardous waste. This is accomplished by establishing programs that regulate the generation, storage, transportation, treatment, and disposal of hazardous waste and enforce the hazardous waste statutes and regulations.

The Nevada Administrative Code (NAC) 444.842 to 444.976 sets forth the regulations for facilities that manage hazardous waste (e.g., generators, transporters, and treatment, storage, and disposal facilities).

Generators

Generators of hazardous waste in Nevada are regulated based on the amount of hazardous waste they generate in a calendar month and are classified as Very Small Quantity Generators (VSQGs), Small Quantity Generators (SQGs), and Large Quantity Generators (LQGs).

- **VSQG**: Generates less than 220 pounds of non-acute hazardous waste per calendar month and less than 2.2 pounds of acutely hazardous waste

[27] EPA. (2021b, June 16). Learn the Basics of Hazardous Waste. https://www.epa.gov/hw/learn-basics-hazardous-waste#:~:text=Simply%20defined%2C%20a%20hazardous%20waste,human%20health%20or%20the%20environment

[28] EPA. (2022, May 14). Household Hazardous Waste (HHW). https://www.epa.gov/hw/household-hazardous-waste-hhw

- **SQG**: Generates between 220 pounds and 2,200 pounds of non-acute hazardous waste per calendar month and less than 2.2 pounds of acutely hazardous waste
- **LQG**: Generates 2,200 pounds or more of non-acute hazardous waste per calendar month or more than 2.2 pounds of acutely hazardous waste

Of these three categories, LQGs must meet the strictest standards of hazardous waste management and are inspected on a biennial basis by the NDEP BSMM. SQGs have less stringent standards to meet and are inspected at least every four years. VSQGs have the least stringent standards.

SQGs and LQGs are required to notify the NDEP of their regulated waste activity by obtaining an EPA identification (EPA ID) number. While VSQGs are not required, many do obtain an EPA ID. As of April 2022, Nevada had 3,446 VSQGs, 371 SQGs, and 179 LQGs. However, generator status can change from month-to-month, and these numbers do fluctuate over the year.

Transporters

Transporters of hazardous waste are individuals or entities that move hazardous waste from one site to another by public road, highway, rail, water, or air.[29] Typically, transporters haul hazardous waste from generators to treatment, storage, and disposal (TSD) facilities. The EPA and the U.S. Department of Transportation (U.S. DOT) jointly developed hazardous waste transporter regulations. Hazardous waste transporters must obtain an EPA ID.

Hazardous Waste Treatment, Storage, & Disposal (TSD) Facilities

The NDEP permits and inspects hazardous waste treatment, storage, and disposal (TSD) facilities. Currently, there are six actively permitted TSD facilities in Nevada. These facilities provide services to industries and local governments for safe management, treatment, and disposal of their hazardous waste. The permits ensure that TSD facility design, construction, maintenance, and operations protect people and the environment. A TSD facility must meet the conditions of its permit and comply with State and Federal regulations during its operation, as well as when it ceases operations and closes.

Nevada's largest TSD facility is a 480-acre commercial hazardous waste landfill located near Beatty, Nevada. It is sited on State-owned land and receives most of the State's imported hazardous waste.

Other Related Programs

In addition to the regulatory program, the NDEP partnered with the Nevada Small Business Development Center at the University of Nevada to develop the Business Environmental Program (BEP). The BEP provides technical assistance to help businesses address

[29] EPA. (2021, May 16). Hazardous Waste Transportation. https://www.epa.gov/hw/hazardous-waste-transportation

environmental compliance concerns, implement best practices, and identify waste minimization opportunities.

Hazardous Waste Generation Trends

Data Collection

Because most hazardous waste is tracked from the time it is generated until the time it is recycled or disposed of, there are detailed datasets for hazardous waste generation and management. For example, LQGs must submit biennial reports regarding the nature, quantities, and disposition of the hazardous waste generated at their facility.[30] Additionally, manifests for the shipment of hazardous waste provide details about how much waste a facility generates and where they send their waste for treatment or disposal. Such data is stored in the RCRAInfo database. The following sections utilized data from RCRAInfo to understand hazardous waste generation trends.

Generator Trends

Over the last decade, the total number of reporting LQGs and SQGs has slightly increased (Figure 15). The rise of LQGs between 2015 and 2017 is likely tied to a pharmacy chain notifying its stores as LQGs for the first time. The number of reporting VSQGs has also increased (Figure 16). Although the VSQGs outnumber the SQGs and LQGs, the LQGs generate the majority of hazardous waste in Nevada (Figure 17). In 2019, LGQs generated 97% of the total reported hazardous waste.

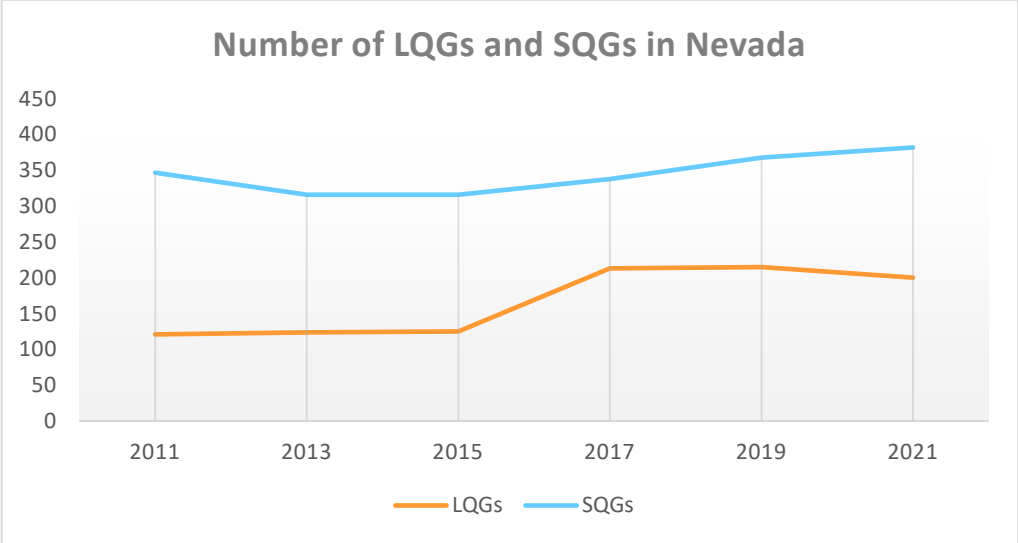

Figure 15: The number of LQGs and SQGs in Nevada has slightly increased over the last decade. Note: The generator status was taken on December 31st of the year listed and might not be consistent with the generator status throughout the year. Statuses may change month to month.

[30] EPA. (2021, October 21). Biennial Hazardous Waste Report. https://www.epa.gov/hwgenerators/biennial-hazardous-waste-report

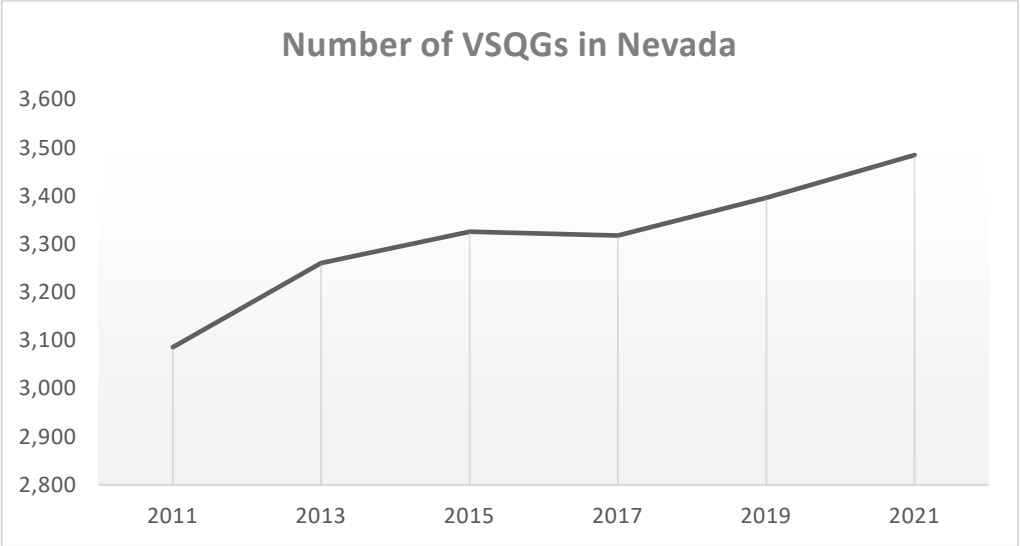

Figure 16: The number of VSQGs in Nevada has increased over the last decade. Note: The generator status was taken on December 31st of the year listed and might not be consistent with the generator status throughout the year. Statuses may change month to month.

Hazardous Waste Generation

In 2019, approximately 29,000 tons of hazardous waste was generated and shipped in the State. Over the last decade, hazardous waste generation has varied from year to year. However, there is an overall increasing trend. There are many reasons for the fluctuations in the amount of generated hazardous waste that is reported. These factors include the hazardous waste rule and regulation adoptions, changes to business operations, new facilities reporting, and facility closures. As depicted in Figure 17, the larger increase between 2015 and 2017 may be partially influenced by the large number of pharmacies that notified as LQGs and subsequently had to report on their hazardous waste generation for the first time.

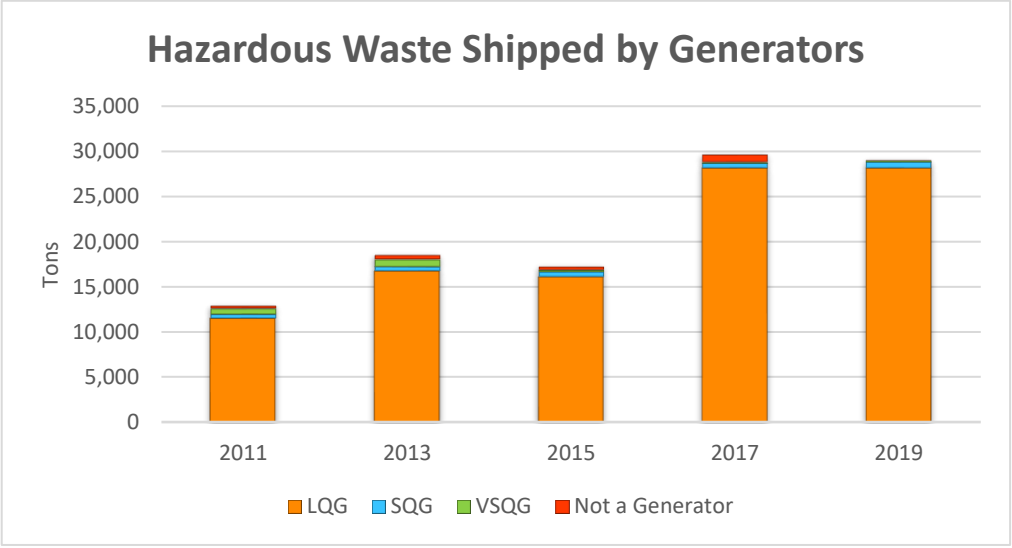

Figure 17: Tons of hazardous waste shipped by generators has increased since 2011.
Note: This data uses waste tonnages received by TSD facilities and reported in the Biennial Report.
The generator status was taken on December 31st of the year listed and might not be consistent with the generator status throughout the year. Statuses may change month to month. "Not a Generator" may mean the facility was a generator earlier in the year and became a non-generator by December 31st of that year. 2021 is excluded because the Biennial Report data was not finalized as of the time of this Plan.

Recurrent waste generation makes up the majority of hazardous waste generated in Nevada and comes primarily from ongoing production and service processes. Non-recurrent events can also change the overall generation of hazardous waste (Figure 18). Non-recurrent has been defined as a site with 3 or fewer years of generated waste between 2001 and 2019.

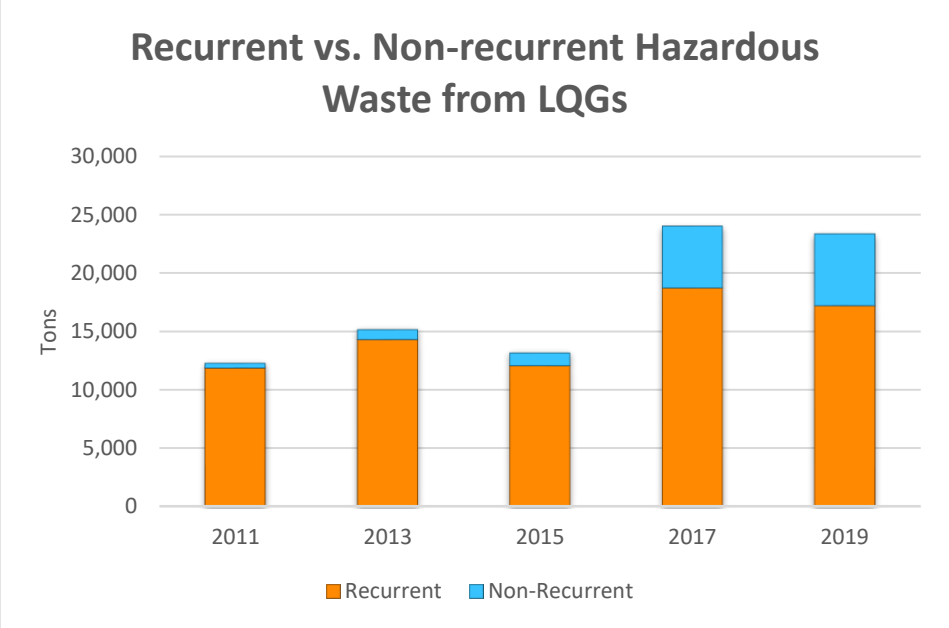

Figure 18: Combined tons of hazardous waste generated annually by recurrent or non-recurrent generation, 2011–2019. Note: The non-recurrent is calculated by a site with 3 or fewer years of generated waste over the last 20 years. 2021 is excluded because the Biennial Report data is not finalized. Data is specific to LQGs and is captured from their Waste Generation and Management Form as part of their Biennial Reporting.

Hazardous Waste Imports & Exports

Hazardous waste imported from other states has varied over the last decade with more waste being imported in the 2017 and 2019 reporting cycles (Figure 19). Based on the 2019 Biennial Reporting (BR) data, Nevada received 86,032 tons of hazardous waste from other states, and it shipped 13,814 tons out of state in 2019.[31] Approximately 82% of imported hazardous waste came from California.

[31] EPA. (2021, April 15). Interstate Movement of Hazardous Waste. https://rcrapublic.epa.gov/rcra-public-web/action/posts/1

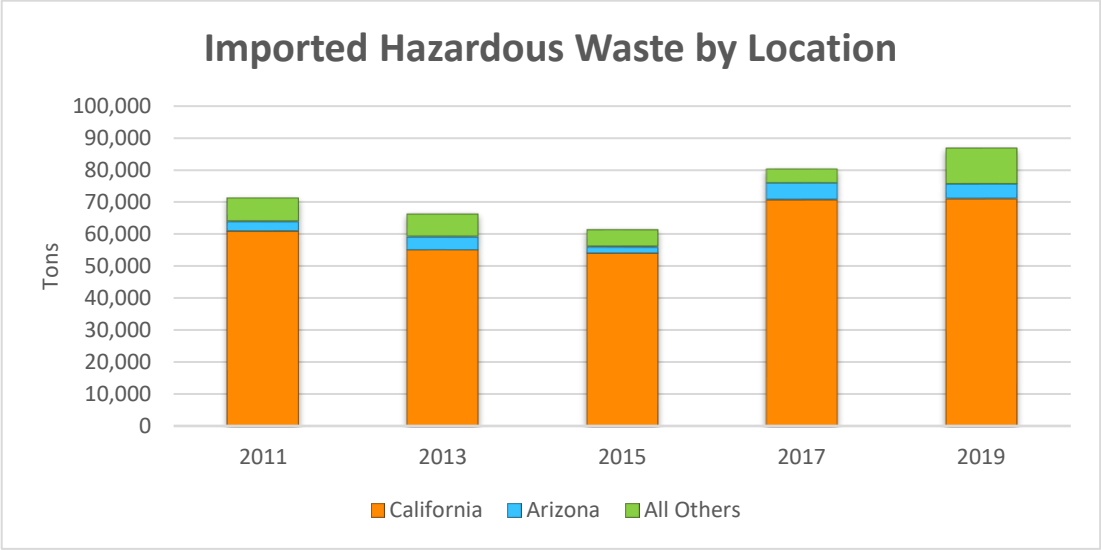

Figure 19: Hazardous waste imported from other states has generally increased, with California shipping the most hazardous waste to Nevada.

Current Practices in the Management of Hazardous Waste

The most preferred method of a hazardous waste management program is to reduce the quantity and toxicity of the waste. If source reduction cannot be achieved, then reclaiming or recycling the materials for another productive use is desired. However, not all hazardous waste streams currently have feasible source reduction or recycling solutions. Thus, safe and effective treatment and disposal options are needed.

Treatment

The selection of the proper treatment of hazardous waste depends on its constituents and characteristics. General categories of treatment include biological, chemical, physical, and thermal.

- **Biological**: Includes landfarming
- **Chemical**: Includes methods such as neutralization, precipitation, oxidation and reduction, and ion exchange
- **Physical**: Includes solidification, encapsulation, filtration, evaporation, and sedimentation
- **Thermal**: Includes incineration, distillation

Also, should a hazardous waste stream need to be landfilled, it must first meet specific Land Disposal Restrictions and any required treatment prior to disposal.

In 2019, 96,866 tons of hazardous waste were received by Nevada TSD facilities. Table 5 depicts the main management methods used by these facilities. Most of this hazardous waste was landfilled with prior treatment and/or stabilization.

Table 5: Waste Received by Nevada TSD Facilities Categorized by Management Type (2019 Biennial Reporting)

Management Method	Tons of Hazardous Waste
Metals Recovery	96.08
Other Recovery or Reclamation for Use	13,359.36
Open Burning/Open Detonation	5,675.53
Chemical Treatment	597.21
Physical Treatment Only	40.30
Neutralization Only	535.91
Landfill (With Prior Treatment and/or Stabilization)	70,687.41
Storage, Bulking, and/or Transfer Off Site	5,874.28
Total	**96,866.08**

Note: Data came from RCRAInfo's 2019 Waste Received by Management Report for Nevada. It includes hazardous waste shipped from both Nevada generators and out-of-state generators.

Challenges in Hazardous Waste Management

Based upon hazardous waste inspector knowledge and recent interactions with the regulated community, common trends and challenges were identified.

Lack of State-led hazardous waste source reduction policies or initiatives: Historically, NDEP has been focused on compliance and enforcement. While these are essential elements of the hazardous waste program, more emphasis could be placed on targeted efforts to research and pro-actively encourage source reduction methods for different industries.

Employee turnover at regulated facilities: Employee turnover often leads to gaps in training and inconsistent handling of hazardous waste. While certain industries are more susceptible to turnover, the COVID-19 pandemic exacerbated this issue. Additionally, many businesses faced labor shortages during this time. Being short staffed can create opportunities for mistakes and oversight of issues.

Pandemic disruptions and incinerator backlog: Across the nation, many hazardous waste incinerators became unable to accept hazardous waste in mid-2021. This was due to many compounding reasons, including the pandemic and its associated labor shortages and transportation disruptions as well as planned and unplanned facility shutdowns due to winter storms and maintenance.[32] This affected a few generators in Nevada, as they needed to get

[32] EPA. (2021, August 10). Regulatory Options for Addressing the Temporary Backlog of Containerized Hazardous Waste Needing Incineration. https://rcrapublic.epa.gov/rcraonline/details.xhtml?rcra=14939

extensions from NDEP to hold their hazardous waste on site for longer than their allowed accumulation time periods (e.g., 90 or 180 days).

Inspector turnover: Like regulated facilities, governmental inspector turnover and staffing shortages are also challenges for the hazardous waste management system. This has been especially true with the COVID-19 pandemic. Through inspections and enforcement actions, inspectors help ensure that hazardous waste is being appropriately managed and disposed of in a way that is protective of the environment and human health. Additionally, experienced inspectors often have the expertise and knowledge to go beyond regulation and enforcement and offer best management and source reduction recommendations. This experience, knowledge, and the continuity of relationships with the regulated community are often lost with inspector turnover and staffing shortages.

Objectives, Strategies, & Recommendations

To address challenges to the solid waste and recycling systems and to align these systems with SMM practices, this section outlines eight primary objectives as well as multiple strategies and recommended action items. These recommendations are provided for decision-makers' consideration but require additional analysis prior to being actionable items.

Assessment of Needs & Development of Objectives

Previous sections of this Plan analyzed the current status of waste and materials management in Nevada and identified challenges that need to be addressed to improve the current waste and recycling systems and achieve the Plan's vision of aligning these systems with SMM practices. Using these findings, the BSMM conducted a needs assessment and identified several needs relative to achieving this vision. These needs can be categorized into general themes, which include the need for:

1. Better collaboration and communication between solid waste jurisdictions, county and tribal governments, and other key stakeholders
2. More quality data as well as more useful metrics to measure the sustainability of waste and materials management efforts in the State
3. Increased incentive, education, and outreach for Nevadans (e.g., residents, businesses, governments, and other key stakeholders) to better adopt and implement SMM practices (e.g., source reduction, reuse, and recycling)
4. Programs to better manage special wastes and prepare for emerging problematic wastes
5. Improved access to recycling programs and information about those programs
6. Focused emphasis on source reduction strategies to reduce the amount of waste generated and the level of toxicity of the waste
7. Updated solid waste and recycling regulations to better protect the environment and improve the effectiveness of enforcement efforts
8. Sustainable, long-term funding

Considering these needs, the BSMM organized these needs into eight primary objectives and then identified strategies and recommended action items to achieve these objectives. The following are the eight primary objectives:

1. **Improve collaboration and communication between stakeholders**
2. **Improve data collection and reporting for solid waste, recycling, and relevant SMM efforts**
3. **Enhance and expand education and outreach efforts**
4. **Develop or improve programs for special wastes and emerging problematic wastes**
5. **Improve the effectiveness of and access to recycling programs**
6. **Promote source reduction strategies for both solid waste and hazardous waste**
7. **Update and establish solid waste and recycling regulations to align with SMM practices and to better protect the environment and public health**
8. **Identify and create sustainable, long-term funding opportunities and grants to address solid waste and recycling infrastructure needs, special wastes, illegal dumping, and SMM planning**

Objectives, Strategies, & Recommendations

Objective 1: Improve collaboration and communication between stakeholders

1. Develop a platform for coordination, communication, and collaboration amongst solid waste jurisdictions, counties, and tribal and local governments to discuss solid waste challenges and to encourage the adoption and implementation of SMM practices.

    1.1. Create a specific working group for solid waste jurisdictions, counties, and tribal and local governments to regularly meet and discuss waste and SMM challenges, opportunities, and solutions. Leverage the PSN network to help solve problems and capitalize on opportunities.

    1.2. Develop a consistent communication schedule and utilize already existing communication channels (e.g., NDEP's solid waste Listserv) to provide regular communication, solution ideas, funding opportunities, and other key updates.

    1.3. Create and maintain a current list of solid waste, recycling, and SMM contacts (e.g., counties, health districts, etc.).

    1.4. Encourage the sharing of best practices that may be useful to the rest of the solid waste management and SMM community.

Objective 2: Enhance data collection and reporting for solid waste, recycling, and other relevant SMM efforts

1. Narrow solid waste data gaps by improving data reporting and collection through standardized procedures.

    1.1. Conduct outreach with counties and landfills to determine how solid waste measurements are currently taken and then develop standardized guidance for measuring, waste categorizing, and reporting.

    1.2. Implement a centralized database for solid waste and recycling data collection.

    1.3. Conduct a high-quality, standardized, statewide waste characterization study that identifies types of materials in the waste stream and estimates amounts of each category. The study should also sample commercial and residential waste streams to determine problematic materials that are specific to each source.

    1.4. Identify waste streams that have the highest impact on the environment.

2. Narrow recycling data gaps by improving the data reporting and collection process.

    2.1. Establish a mechanism to address non-reporting and late reporting from recycling facilities.

    2.2. Provide detailed reporting guidance to recyclers to facilitate the capture of more reliable and standardized data.

    2.3. Use a statewide waste characterization study to identify waste streams where recycling efforts could be improved or adjusted.

3. Expand beyond the recycling rate and MSW generated per capita as the metrics to measure the progress of sustainability in solid waste management.

    3.1. Identify other useful metrics for measuring source reduction efforts, reuse, and other diversion practices. Determine ways to gather data to calculate these identified metrics.

    3.2. Identify other metrics for measuring the sustainability and impacts of the solid waste management and recycling systems (e.g., GHG emissions and energy-use footprints for consumed and end-of-life material streams and GHG savings by materials recycled or reused).

    3.3. Determine the best metrics and criteria for developing information regarding the best end-of-life options for problematic and hard-to-recycle materials based on environmental impacts and feasibility.

Objective 3: Enhance and expand education and outreach efforts

1. Structure education and outreach programs to address a lack of public awareness in SMM practices.

    1.1. Engage counties and local governments to best understand what education and outreach materials are needed to improve the awareness of SMM practices, especially topics like source reduction, waste minimization, reuse, and environmental impacts.

    1.2. Collaborate with counties and other stakeholders to develop a common and easily understood message for SMM.

    1.3. Ensure information on the NDEP BSMM website is up to date, and work with other counties and local governments to help keep information consistent and updated across communication platforms at all levels.

    1.4. Develop audience-specific informational outreach campaigns to raise awareness of SMM practices (e.g., school-focused, event-focused, business-focused, etc.).

    1.5. Educate the public about the relationships between climate change, waste generation, and materials management.

2. Reduce public confusion about recycling and composting.

    2.1. Provide residents information about the franchise agreement for their area and what materials are accepted in their recycling programs.

    2.2. Demystify recyclable material management by providing data and information about how recyclable materials are managed and the fate of these materials.

    2.3. Provide resources to residents to help reduce contamination in the recycling stream by addressing the confusion around what materials can be recycled.

    2.4. Educate the public about recycling's role in a SMM system, emphasizing the solid waste hierarchy and how recycling reduces the need to extract raw materials.

3. Develop a common training platform for solid waste operations.

    3.1. Provide more convenient and cost-effective training for landfill operators and landfill attendants, especially for rural areas.

    3.2. Use training as an opportunity to improve reporting consistency among different landfills.

    3.3. Promote consistency in landfill management practices and reduce violations.

4. Continue to educate and engage hazardous waste generators and TSD facilities to address knowledge gaps.

    4.1. Use NDEP's Listserv to send notices to the regulated community with information regarding major situations that impact hazardous waste deposal and treatment.

    4.2. Use NDEP's Listserv to provide the regulated community with regular updates (at least annually) regarding updated regulations, common compliance issues, source reduction, and other information useful for auditing their hazardous waste compliance programs.

    4.3. Keep the NDEP website updated with most current information regarding the management of hazardous waste.

Objective 4: Develop or improve programs for special wastes and emerging problematic wastes

1. Develop specific and proactive programs to address emerging waste streams, such as Li-ion batteries and solar panels.

    1.1. Study the end-of-life management options for Li-Ion batteries and solar panels as well as their associated barriers and infrastructure needs. Establish an order of preference for the end-of-life management options based on environmental impacts and feasibility.

1.2. Educate the public about the hazards associated with these products and how to properly manage them at their end-of-life.

1.3. Engage the PSN to help with research, establish an expert network, and identify opportunities for these waste streams.

2. Establish better management methodologies for problematic special wastes, such as waste tires, medical waste, and HHW.

2.1. Identify funding to establish and improve the convenience of HHW collection events in each county.

2.2. Encourage the shredding of tires and the use of shredded tires as alternative daily cover in landfills.

2.3. Encourage tire recyclers to come into Nevada.

2.4. Promote the development of community collection programs to address household-generated sharps and other medical waste.

2.5. Increase public hazard awareness associated with sharps and medical waste. Promote proper disposal of sharps by providing information on available local collection points and mail-in programs.

2.6. Continue to provide support for e-waste collection events.

2.7. Provide more consistent public education and outreach efforts to encourage public, residential, and business (or manufacturer) take-back programs for e-waste.

3. Improve the collection and end-of-life management of mercury.

3.1. Evaluate updating hazardous waste regulations to require larger generators of mercury to keep and provide an inventory of mercury held on-site.

3.2. Develop a more consistent and established mercury disposal program for the public.

3.3. Continue to develop public education programs and materials to explain the hazards of elemental mercury and the availability of non-hazardous alternative products.

Objective 5: Improve the effectiveness of and access to recycling programs

1. Improve recycling access to multi-family buildings

1.1. Work with counties, waste haulers, and the PSN to launch a recycling pilot program for multi-family buildings and gather data.

1.2. Provide information to landlords on how to start a recycling program and provide tenants information on how to engage landlords.

1.3. Evaluate a regulation change to require recycling at certain multi-family buildings.

2. Improve recycling access to rural areas.

   2.1. Develop a Hub and Spoke pilot program in rural Nevada.

   2.2. Identify funding mechanisms to help rural areas acquire recycling infrastructure.

   2.3. Identify stakeholders and needed educational and outreach resources for rural areas.

3. Assist counties to improve their recycling programs and recycling rates.

   3.1. Provide resources on developing effective franchise agreements to help counties make the best decisions.

   3.2. Develop resources to help counties review their recycling plans and make adjustments to improve their recycling rate and access to recycling

   3.3. When developing policies and programs to improve the recycling rate, encourage counties to think about how source reduction plays a role in increasing the recycling rate [i.e., a county can increase its recycling rate by reducing the denominator of the recycling equation (i.e., the total amount of MSW generated) and/or increasing the numerator (i.e., MSW recycled)].

4. Promote opportunities and programs that compost yard waste in areas of Nevada where it is practical to do so.

   4.1. Evaluate different collection methods (e.g., curbside, drop-off) for yard waste, as well as other organic waste materials, for landfill diversion.

5. Collaborate with State, county, and local jurisdictions to recruit and incentivize recyclable material processors and manufacturers to come to Nevada.

Objective 6: Promote source reduction strategies for both solid waste and hazardous waste

1. Develop hazardous waste minimization resources (such as a hazardous waste minimization plan) to recommend ways to reduce hazardous waste generation.

   1.1. Encourage the use of greener, less toxic chemicals (e.g., Safer Choice products) to reduce hazardous waste generation.

   1.2. Continue to develop factsheets to hand out during inspections and work with BEP to develop these resources.

1.3. Research and provide information on source reduction tactics such as inventory control, good operating practices, spill and leak prevention, process modifications, product modifications, cleaning and degreasing changes, and raw material modifications.

2. Promote better end-use of products, chemicals, and other materials, especially if they will become a hazardous waste when disposed.

   2.1. Evaluate the feasibility of a materials marketplace or exchange platform to facilitate the beneficial end-use of materials, chemicals, and by-products across industrial sectors.

3. Curb the growing MSW generation rate and its associated GHG emissions by emphasizing and promoting source reduction.

   3.1. Focus on promoting food waste prevention, food donation, food diversion to livestock, and composting (i.e., food recovery hierarchy).

   3.2. Partner with schools, casinos, and other facilities that handle large amounts of food to identify ways to best prevent food waste.

   3.3. Work with counties, health districts, the PSN, and businesses to help both the private and public sectors shift to durable, reusable, and less wasteful/toxic products.

   3.4. Utilize a statewide waste characterization study to identify problematic waste streams and research best strategies and policies to promote waste prevention and source reduction. Using these identified problematic waste streams, research topics such as reuse, repair, durable products, less wasteful and toxic alternatives, products with a lower carbon footprint, and the benefits of reduced consumption.

Objective 7: Update and establish solid waste and recycling regulations to align with SMM practices and to better protect the environment and public health

1. Strengthen the solid waste and recycling regulations by closing loopholes, eliminating ambiguous language, and ensuring requirements are grounded in current science and best management practices.

2. Identify regulations that are outdated and have become barriers to the adoption of effective SMM practices.

3. Review and update NAC 444.570-444.7499 (Solid Waste) to improve the management of solid waste and address current management issues. Evaluate the feasibility of the following topic areas:

   3.1. Create an enforcement mechanism to better address solid waste violations.

3.2. Review financial assurance requirements and determine if additional facilities that handle solid waste or recyclable material should require financial assurance.

3.3. Strengthen regulations related to the management of medical waste.

4. Review and update NAC 444A.005-444A.470 (Recycling) to improve the recycling system and address current recycling issues. Evaluate the feasibility of the following topic areas:

4.1. Strengthen recycling enforcement regulations to prevent long-term stockpiling and abandonment of recyclable materials.

4.2. Add a definition of recycling that includes a minimum percentage of material recovered or processed as criteria for any facility claiming to be a recycler. This would help eliminate sham disposal operations.

4.3. Evaluate regulation barriers to using recycled material in products and structures.

4.4. Develop new regulations to support the development of quality and sustainable composting processes and encourage the practice

Objective 8: Identify and create sustainable, long-term funding opportunities and grants to address solid waste and recycling infrastructure needs, special wastes, illegal dumping, and SMM planning

Many of the strategies and action items listed above will need some level of funding to implement. Potential funding sources include Federal grants (e.g., U.S. EPA's Pollution Prevention Grant and Environmental Education Grant Programs), changes to the tire fee, and the Nevada Recycling Grant Program. Furthermore, increasing the Nevada Recycling Grant Program would allow the State to offer more opportunities to fund projects.

Implementation Considerations

Before implementing the strategies and action items presented in the previous section, implementation considerations such as stakeholder roles, priorities, and environmental justice need to be addressed.

Nevada's Sustainable Materials Management Plan is meant to provide strategic guidance and actionable information to the State, counties, municipalities, and the SEC to move Nevada toward a more environmentally sound and sustainable management of materials. Before implementing the strategies and action items presented in the previous "Objectives, Strategies, and Recommendations" section, implementation considerations such as stakeholder roles, priorities, and environmental justice need to be evaluated to successfully attain and sustain this Plan's vision and primary objectives. This section expands upon these key elements:

- **Stakeholder Roles:** To build an effective SMM system, waste and materials must be managed effectively at all levels and across both the public sector (e.g., State, County, and City) and private sector (e.g., businesses, recyclers, and waste haulers). As detailed in the previous "Objectives, Strategies, and Recommendations" section, changes to current processes will be needed to enhance our current systems. Thus, commitment from and collaboration amongst all stakeholders are essential for progress. This section serves as a call-to-action for stakeholders to partner together to make the needed changes and develop a more environmentally sound management of materials.
- **Prioritization of the Plan's Action Items:** Given limited resources and an inability to undertake all proposed action items simultaneously, each recommended action item's relative importance must be assessed. Based on criteria, such as urgency, impact, feasibility, and stakeholder support, the NDEP BSMM assessed the relative importance of the Plan's recommended action items. This section will discuss the prioritization process and provide direction by identifying next steps for stakeholders.
- **Environmental Justice (EJ):** EJ "is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies."[33] As Nevada moves forward with building an effective SMM system and looks for ways to better protect the environment and public health, it will be important to evaluate waste and recycling policy, regulations, permitting, and other related action items through the lens of EJ. The goal of EJ is to ensure that no one group of people bears a disproportionate share of negative environmental or health consequences resulting from industrial, governmental, and commercial operations or policies. EJ also works to ensure that people have an opportunity to participate in decisions about activities that may affect their environment or health. This section will explain how EJ should be considered when implementing action items.

Stakeholder Roles

Successful waste and materials management is a shared responsibility between multiple stakeholders, including the State, health districts, municipalities, solid waste facilities, commercial waste generators, and residents. Nevada needs all stakeholders to work together to ensure an effective and sustainable system.

[33] EPA. (2021, September 22). Learn About Environmental Justice. https://www.epa.gov/environmentaljustice/learn-about-environmental-justice.

Role of NDEP BSMM

In addition to enforcing waste and recycling regulations, educating the public, and permitting facilities, NDEP BSMM will continue to take the lead and set the foundation for SMM programs in the State. BSMM will engage with stakeholders and stakeholder groups to find innovative ways to fund and implement the strategies and action items listed in this Plan.

Role of Other NDEP Bureaus

Because SMM involves studying and understanding the many environmental impacts of materials and their associated waste streams at various lifecycle stages, SMM encompasses the intersection of the many areas of expertise of the different NDEP bureaus. When trying to determine the impacts of various materials and waste streams, such as carbon emissions or water pollution, it may be necessary to partner with the respective NDEP bureau to make a comprehensive action plan for a particular problematic material or waste stream. This Plan encourages NDEP BSMM to continue to build strong relationships with the other bureaus and to lead discussions regarding SMM and the intersection of the multiple environmental disciplines.

Role of Health Districts, Counties, & Municipalities

Since most of the day-to-day work is done at the local level, the health districts, counties, and municipalities are indispensable partners to improving the current waste and materials management systems and aligning these systems with SMM practices. With the authority and responsibility to develop and implement specific solid waste management plans for their counties, health districts and counties are encouraged to consider ways to incorporate some of the strategies and action items listed in this Plan. Additionally, as we work to build a SMM system, integration of governmental entities will be crucial for finding resources, scaling programs, and sharing information. Thus, it will be important to improve communication and collaboration across the various governmental levels that handle waste and recycling.

Role of the Solid Waste & Recycling Industry

The solid waste and recycling industry will continue to play a significant role as Nevada works to align the management of solid waste and recyclable materials with SMM practices. Organizations within this industry are encouraged to continue to find innovative ways to collect, transport, recycle, and dispose of waste with less environmental and public health impacts.

Role of Businesses & Commercial Waste Generators

The private industry plays a unique role within a SMM system. Manufacturers, for example, can contribute to an effective SMM system by designing products with sustainability in mind (e.g., considering recyclability, toxicity, and amount of single-use plastic packaging used). Other businesses, such as retailers, suppliers, restaurants, and casinos, can also contribute by

looking for ways to reduce the waste generated from their operations and their upstream supply change.

Role of the Partners for a Sustainable Nevada (PSN)

PSN was created to bring together members of the public, non-profit, and private sectors and to improve communication and collaboration within and between these sectors to further implement sustainability initiatives within the State. Because SMM is a key component of sustainability overall, PSN serves as an ideal platform for SMM stakeholders. Health districts, municipalities, solid waste haulers, recyclers, State agencies, non-profits, and businesses are welcomed and encouraged to participate in this stakeholder group to develop SMM solutions and programs.

Role of Residents

The success of establishing and maintaining an effective SMM system relies on the active support and participation of individual residents. As consumers of materials and generators of waste, Nevadans share responsibility for the end-of-life management of the products and materials we use. This Plan encourages Nevadans to adopt SMM practices in their daily life, including recycling properly, composting at home, skipping single-use plastics, and, when able, changing buying habits to produce less waste. All Nevadans have a role to play. However, depending on the resources available, that role may look different for each of us. What matters is that we're staying informed and doing what we can. Every bit counts.

Prioritization of the Plan's Action Items

The "Objectives, Strategies, and Recommended Action Items" section lists several projects, changes, and efforts that need to be accomplished to improve the current waste and recycling systems and to align them with SMM practices. However, given limited resources and an inability to undertake all proposed action items simultaneously, the NDEP BSMM assessed each recommended action item's relative importance based on the criteria of urgency, impact, feasibility, and stakeholder support. Using a prioritization matrix, the BSMM scored each action item based on those four criteria.

Based on the results of the prioritization matrix, the below action items had the highest total scores (i.e., they scored relatively high for all four criteria). They should be focused on first:

1. Implement a centralized database for solid waste and recycling data collection
2. Provide more consistent communication with the regulated hazardous waste community, including providing more education and outreach
3. Identify and create sustainable, long-term funding opportunities to address solid waste and recycling infrastructure needs, special wastes, illegal dumping, and solid waste and SMM planning
4. Identify solid waste regulation changes to help align solid waste management with SMM practices and to better protect the environment and public health
5. Provide more convenient and cost-effective training for landfill operators and landfill attendants

6. Promote food waste prevention, food donation, food diversion to livestock, and composting (i.e., food recovery hierarchy)
7. Conduct outreach with counties and landfills to determine how solid waste measurements are currently taken and develop standardized guidance for measuring, waste categorizing, and reporting
8. Provide more consistent public education and outreach efforts regarding the end-of-life management of special wastes and their hazards
9. Create a specific working group for solid waste jurisdictions, counties, and tribal and local governments to regularly meet and discuss waste and SMM challenges, opportunities, and solutions
10. Collaborate with counties to create a common SMM message and identify needed educational materials to improve the public's awareness of SMM practices

Additionally, it is important to point out that the BSMM filtered the prioritization matrix results by the highest urgency scores. Many of the overall top 10 action items listed above made the top 10 urgent action items list. However, while not making the overall top 10 action items list, the following action items did have relatively high urgency scores and ranked 8th, 9th, and 10th for urgency. They should not be ignored in the long-term:

- Develop resources to help counties review their recycling plans and make adjustments to improve their recycling rate and access to recycling
- Identify waste streams that have the highest impact on the environment
- Develop a more consistent and established mercury disposal program for the public

These three action items had lower feasibility scores due to a lack of current funding, manpower, resources, and/or established network. By finding the correct resources, these action items would become more feasible to implement.

Environmental Justice

Improving the current waste and materials management systems and aligning these systems with SMM practices should be done in a way that considers the issues of environmental justice. Any action item pursued in this Plan or actions that are taken by solid waste and recycling regulators and policymakers should be evaluated to ensure that no one group of people bears a disproportionate share of negative consequences that might develop. As with any environmental challenge, the development and implementation of waste and materials management solutions involve trade-offs. The complete elimination of all consequences may not be possible. The State should work to appropriately eliminate or mitigate these consequences, especially if these consequences impact one population more than others.

Regarding SMM, two areas of particular focus for EJ involve the permitting of waste and recycling facilities and the development of policy. Through permitting, NDEP BSMM can work to ensure that solid waste and recycling facilities minimize negative impacts on their environment and communities. It can work to ensure that for potential impacts, no one group of people bears the burden of these consequences. This can be done by identifying, considering, and engaging with overburdened communities and underserved populations. Additionally, with the development of policy and regulations regarding waste, recycling, and SMM, it will be important to evaluate policy impacts on various groups of people and identify ways to eliminate or mitigate impacts.

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