Environmental, Social & Governance Sustainability Plan • 2023

MARYLAND ZOO

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EXECUTIVE SUMMARY

The Maryland Zoo is committed to the next level of sustainability in environmental, social, and governance (ESG) performance. Today's successful leaders understand that investing in ESG sustainability can strengthen an organization's overall performance and help it contribute to healthy, resilient communities for both people and wildlife.

The Maryland Zoo's ESG Sustainability Plan recognizes several goals and associated strategies in the categories of:

- Organizational Governance & Foundations
- Energy Management
- Water Management
- Waste & Procurement
- Transportation & Fleet Management
- Site & Facilities

Completion of a materiality assessment and stakeholder engagement survey helped to identify and prioritize areas of focus. The most relevant environmental impacts of the Zoo's operations result from energy and water consumption along with wastewater treatment, solid waste generation and disposal, and through the supply chain. By benchmarking energy and water consumption and focusing on waste reduction and responsible procurement policies, the Zoo can better understand and manage its ESG performance and impact by making smart investments in sustainability, environmental health, and occupant comfort.

The goals of this plan align with the programs of the Association of Zoos and Aquariums, city, state, and federal climate targets as well as the international United Nations Sustainable Development Goals. The Zoo endeavors to enhance local municipal and nonprofit partnerships and take advantage of financial incentives of recent federal legislation like the U.S. Inflation Reduction Act and the Bipartisan Infrastructure Bill to support ongoing sustainability and decarbonization initiatives.

The development of this plan included the on-line survey of four internal Zoo stakeholder groups, the board of trustees, the senior staff leadership team, staff and volunteers. With a 38% overall response rate, this survey showed that limited time to dedicate to sustainability programs was the most agreed upon barrier to the Zoo's efforts. There was consensus among all respondents that waste reduction and energy efficiency were the two most important goals for the Zoo to pursue out of ten goals presented. This reinforces the recognized need to have a dedicated internal staff position that handles ESG sustainability within the Zoo.

Stakeholder engagement revealed other general thought trends among respondents. Most notable was the general agreement among most respondents that sustainability considerations should be fully integrated into the organization's decision-making calculus and carry equal weight as other considerations.

The chart ranks the five most important sustainability goals out of ten choices based on aggregated selections of all individuals surveyed.

Foundations & Governance

For this plan to be successful, it is imperative that the principles and practices for optimizing ESG performance be supported by executive leadership and integrated into the Zoo's organizational culture. It is important that sustainability considerations are layered into the decision-making process and that each department evaluate standard operating procedures to identify how regular tasks may be adjusted to use less fuel, water, electricity and materials. Several goals, and this plan itself, aim to raise awareness about the Zoo's impacts and the value of improving sustainability performance among various stakeholders. Sustainability is also about reinforcing valuable relationships with municipal and community partners for collective impact and investment in staff happiness. The Maryland Zoo Sustainability Committee's (MZSC) role has been refined, and with support from Zoo leadership, will champion this ESG sustainability plan and serve to guide its implementation.

Energy & Water Management

Energy and water data are now tracked in the Energy Star Portfolio Manager platform that provides greenhouse gas metrics from electricity, fuel, and water consumption and guides the establishment of performance targets.

Electricity and natural gas and propane consumption data were tabulated for analysis. 2022 was selected as the baseline year for benchmarking of electricity and fuel use. Goals for energy conservation and decarbonization will be achieved through electrification of fuel using equipment and systems wherever feasible. Energy auditing will aid in the identification of building systems to be addressed. While a significant portion of the Zoo campus is densely wooded, there are a few areas that may be suitable for photovoltaic solar array installation in the future.

The Zoo endeavors to better understand the flows of water through the campus and monitor consumption and discharge from its facilities. Baltimore's aged water infrastructure and the shared delivery infrastructure between buildings within Druid Hill Park present challenges in isolating the water consumption from Zoo operations alone. A vendor has been engaged to submeter a portion of the system to monitor more granular data. Regardless of the data reliability, there are noted sources of excessive water use that the plan addresses through reduction strategies like regular monitoring and preventative maintenance, the use of only air-cooled equipment, the establishment of green building design and construction standards, the adjustment of workplace operating procedures, and diligence in the maintenance of facilities and water systems. The recommendations for performance improvement in zoo transportation & fleet and site & facilities management follow from the same principles used to increase efficiency and decarbonize energy and water using systems. and exploration of opportunities for renewable energy sourcing will aid in decarbonization. The Zoo endeavors to understand the flow of water through the campus and better monitor consumption and discharge throughout facilities. These goals will be accomplished through building system audits, regular preventative maintenance, the establishment of green building design and construction standards, the adjustment of workplace standard operating procedures, and a renewed focus on maintenance of energy and water systems in the work request system.

Waste & Procurement

The decomposing of waste in landfills releases methane (CH4), a very powerful and dangerous gas greenhouse gas, into the atmosphere. Much of the Zoo's waste is incinerated at a facility in South Baltimore near residential areas known to have poor respiratory health outcomes. The Zoo's goal of zero waste by 2030 will be achieved by reducing waste generation and increasing the circularity of waste through diversion methods like composting and effective recycling.

The Zoo and its concession and retail partners have made notable strides in waste reduction by transitioning to durable, reusable products and materials like paper, cardboard, and aluminum to minimize the generation of plastic waste that can be efficiently recycled and retain value. Behind the scenes, the commissary stocks cleaning solutions in large vats and refills reusable bottles for delivery to each area. The Zoo produces a portion of its food on-site and a significant amount of food scrap waste - some of which is also composted on-site. 30% of the Zoo's manure is picked up by a third-party compost vendor for delivery to a commercial compost facility. Efforts are currently underway to fund the installation of a large-scale, on-site compost system to handle organic waste including manure. Compared to landfill disposal, a compost system would reduce harmful greenhouse gas emissions by 50% per ton of organic waste. Diverting 90% of waste from Baltimore's municipal solid waste system is essential to achieving zero waste certification and would also eliminate the resulting emissions of greenhouse gases, heavy metal neurotoxins, and respiratory irritants that have been linked to poor health outcomes in South Baltimore residents. A waste audit will be conducted to identify additional opportunities for improvement. Responsible procurement policies and practices will also help to reduce waste management challenges.

Committing to a procurement program that focuses on vendor transparency and of product life-cycle impacts will position the Zoo to minimize solid waste, carbon emissions, and potential reputational risk from potential imprudent behavior of supply chain partners and manufacturers. The commissary will continue to seek out product and supplier data and consider responsible sourcing and sustainability among the integral factors to product selection. Achieving zero waste certification would also eliminate the resulting emissions of greenhouse gases, heavy metal neurotoxins, and respiratory irritants that have been linked to poor health outcomes in South Baltimore Residents.

Responsible procurement policies and practices will also help to reduce the challenges of waste disposal.

ENERGY BENCHMARKS

- **Grid Electric Use = 5,013,136 kWh**
- **2022 Area of Conditioned Space = 186,698 ft²**
- **Grid Natural Gas Use = 1,459,469 kWh**
- **On-site Propane Use = 702 kWh**
- **CY 2022 Total Energy Use = 6,473,308 kWh = $203,345.99**
- **CY 2022 Site Energy Use Intensity 2022 = 118.3 kBtu/ft²**
- **Energy Cost Intensity = $1.09/ft²**
- **Greenhouse Gas Emissions from Energy Use = 1755 metric tons CO_2e**

2030 ENERGY USE INTENSITY REDUCTION TARGET
30% Reduction to 82.8 kBtu/ft²

WATER BENCHMARKS

- **FY 2021 Potable Water Consumption = 15,425,845 gallons = $71,561.07**
- **FY 2021 Water Use Intensity = 83 gallons/ft²**
- **FY 2021 Sewer Consumption = 15,345,488 gallons = $186,484.61**
- **Water Cost Intensity = $1.38 gallons/ft² (includes cost of water delivered and sewer discharged per gallon)**
- **Greenhouse Gas Emissions from Water & Sewer Consumption= 24.5 metric tons CO_2e**

2030 WATER USE INTENSITY REDUCTION TARGET
15% to 74 gal/ ft2

The Zoo's mission is to engage people in the wonders of the living world through personal encounters with animals, fostering empathy and lifelong support for conservation of wildlife and wild places.

THE MARYLAND ZOO

ENGAGING PEOPLE FOSTERING EMPATHY CONSERVING THE WILD

Founded in 1876, the Maryland Zoo sits on 135 wooded acres within downtown Baltimore's expansive Druid Hill Park. The land is owned by the City of Baltimore and leased to the State of Maryland for the use by the Zoo. Originally operated through the Baltimore Department of Recreation & Parks, management of the Zoo was turned over to the private, nonprofit Maryland Zoological Society in 1984. The Zoo features over 130 animal species in four primary exhibit regions: the Maryland Wilderness, Northern Passage, African Journey, and Penguin Coast. The Zoo is open to the public 339 days per year and in Fiscal Year 2021, 395,293 visitors made their way through its gates. Through the Maryland Zoo's outreach programs, including *Zoo to You*, its mission of stewardship is heard far and wide.

Accredited by the Association of Zoos & Aquariums (AZA), the Maryland Zoo participates in several conservation and breeding programs as part of AZA's Saving Animals From Extinction (SAFE) and Species Survival Plan (SSP) programs and is renowned for its husbandry expertise and conservation leadership with African penguin and Panamanian golden frog programs. To strengthen its animal and habitat conservation efforts, the Zoo strives to enhance its environmental and social performance through the development of this sustainability plan.

Sustainability is not a new concept for the Zoo. Over the past two decades, staff have undertaken significant efforts to improve environmental performance in zoo operations and facilities. This Sustainability Plan endeavors to better coordinate this work, providing benchmarks for measuring progress, targets for improvement operation, and methods for effectively integrating sustainable practices into the organizational culture. Zoo sustainability is managed under the purview of the senior director of animal health, conservation, and research and is supported by a sustainability committee comprised of participants from various departments. As the Zoo enhances its commitment to conservation, research, and sustainability, dedicated sustainability manager and coordinator positions will be established.

INTRODUCTION
to Environmental, Social, Governance Sustainability (ESG)

Although we refer to this document as a sustainability plan, it addresses a broad suite of topics that constitute an Environmental, Social, and Governance (ESG) program like those increasingly adopted by public companies. This approach embraces the concept that a truly sustainable organization must not only care for the planet in daily operations, but also address issues of social equity and economic prosperity among Zoo stakeholders. The management of ESG echoes the three pillars of sustainability - people, planet, and prosperity - often referred to as the triple-bottom-line. An organization must recognize the interdependence of these three pillars to truly thrive**.** While this plan primarily addresses the Zoo's on-site operational performance, it also examines at how the Maryland Zoo affects its local and global communities.

This plan outlines specific goals and strategies to improve the Zoo's environmental, social and governance performance; however, the organization's culture will enable these strategies to be successfully executed. It is essential that ESG principles and practice are integrated into a culture where employees feel energized and engaged by a shared purpose. Every Zoo department and team member shares the responsibility of supporting the organization's sustainable performance by incorporating the principles of ESG into their work plans. The Maryland Zoo's human resources department and senior director of DEAI initiatives maintain policies and activities that ensure workplace diversity, equity, accessibility, and inclusion. They additionally implement systems to ensure productivity and quality of work life among staff. The Zoo's information technology team works to maintain privacy and security of personal and financial information as well as the Zoo's electronic data management systems. The Zoo's education department helps stakeholders connect sustainability efforts with the Zoo's conservation mission. ESG touches each department and role in the Zoo and only collaborative efforts can truly integrate sustainability into the organizational culture.

Environmental Sustainability

A materiality assessment was conducted to identify and prioritize which environmental aspects (interactions between zoo operations and the environment) have significant impacts that are important to address.

Social Sustainability

Social well-being includes assessment of employee relations, compensation, equity, diversity, health and safety, and workplace happiness. It also looks more broadly at stakeholders that may be affected by the organization's operations, including its contribution to the fabric of the local community.

Governance Sustainability

A focus on sustainability within organizational governance assures stakeholders that the leadership is accountable and makes decisions that advance the Zoo's financial and business success while supporting the wellbeing of stakeholders, society, and the restoration of environmental health.

Environmental Examples

- Climate Risk & Resilience
- Decarbonization
- Waste & Pollution Management
- Water Conservation
- Energy Conservation
- Land Use
- Biodiversity

Social Examples

- Supply Chain Responsibility
- Community Relations
- Diversity, Equity, Accessibility, and Inclusion
- Working Conditions
- Social Impact
- Privacy & Data Security
- Employee Compensation
- Health & Safety

Governance Examples

- Regulatory Compliance
- Labor Policies
- Accounting & Legal Practices
- Reputational Risk Management
- Equitable Compensation
- Leadership Diversity
- Leadership Integrity
- Organizational Transparency
- Stakeholder Engagement
- Government Relations

The Value of ESG Management

Competitive advantage
Reputation in the community and industry (license to operate)
Ability to attract and retain workers, volunteers, members, and visitors
Staff happiness, productivity and retention
Interest from funders
Stakeholder relationships
Risk assessment & management
Organizational resilience

ESG Reporting, Alignment & Regulatory Compliance

Identifying areas of alignment between the Zoo's sustainability plan and the goals of government agencies and like-minded organizations creates opportunity for a synergy of actions resulting in collective impact that amplifies sustainability progress.

Association of Zoos & Aquariums

The Zoo contributes annual sustainability and performance data through the AZA Green Practices Survey as required to maintain its accreditation. The AZA also provides basic resources and tools to guide member organizations in establishing and working toward environmental performance goals in the form of their published Green Guide Volumes 1 & 2. The AZA does not, however, establish any prescriptive or performance-based efficiency targets or requirements for environmental or social performance. With an average of 183 million people visiting AZA institutions annually in the U.S., there is a tremendous opportunity to raise awareness of environmental and social issues as well as influence behavior through collective impact.

> *"Saving animals starts with saving habitats, and by choosing to act responsibly in our business practices, we provide support for our field conservation work around the world and our conservation education programs at home. We cannot, as an industry, be serious about saving wildlife without being serious about natural resource conservation."*
>
> *- Wanda Evans, former chair of AZA's Green Scientific Advisory Group – 2016*

State of Maryland

In 2021, approximately 28% of the Zoo's annual operating funds were provided by the State of Maryland. Specific funds for sustainability investments and initiatives are are also available through state grant opportunities. Maryland's environmental health and climate goals were considered during the establishment of Zoo sustainability performance goals and targets.

Maryland's Climate Solutions Now Act of 2022 (SB0528) sets a goal to reduce greenhouse gas emissions 60% by 2031 and establishes 2045 as the state's target for carbon neutrality. Additionally, it requires large commercial and residential buildings to report and reduce their emissions to achieve net-zero emissions by 2040. This law further calls for the expansion of the state electric vehicle and school bus fleets, as well as associated infrastructure. It also includes investments to promote environmental justice and relieve overburdened, under-served communities.

Baltimore City

There is significant alignment between the Baltimore City sustainability goals and those of the Maryland Zoo. Specific funds for sustainability investments and initiatives are also available through state grant opportunities.Maryland's environmental health and climate goals were considered during the establishment of Zoo sustainability performance goals and targets.

Baltimore City has set a series of aggressive environmental performance targets to reduce carbon emissions 30% by 2025, 60% by 2030, and to achieve full carbon neutrality by 2045.

In December of 2021, Mayor Brandon Scott released his first term Action Plan for Baltimore. The tool is organized into five core pillars:

- Building Public Safety
- Prioritizing Youth
- Clean and Healthy Communities
- Equitable Neighborhood Development
- Responsible Stewardship of City Resources

Areas of alignment, wherein the Zoo's ESG efforts can directly contribute to city sustainability goals, are summarized as the following pillars state:

Pillars

Pillar 03
Clean & Healthy Communities

Pillar 3 outlines goals and actions to reduce public health disparities across the city by decreasing environmental hazards and improving air quality through the decommissioning of the use of waste incineration within the next decade and moving the city to zero waste through more sustainable waste management practices like recycling and composting. These practices, alongside investment in Baltimore's tree canopy, are aimed at reducing asthma rates among the city's residents, especially its youngest. This pillar addresses the need for clean, safe streets and calls for investment in Baltimore's public green spaces and the creation of community greening hubs to expand local knowledge and share expertise to advance community sustainability and resilience. The city will review its internal carbon footprint to identify opportunities to improve energy efficiency and sourcing, waste management, focusing on single-use plastic and construction waste, and resilience to climate disruption through code enhancements. The Baltimore Office of Sustainability has documented the city's improved sustainability performance for certification as a U.S. Green Building Council LEED® City at the gold level.

Pillar 04
Equitable Neighborhood Development

Pillar 4 specifically considers the need to support the opportunity for partnership and collaboration between Baltimore City and local business owners, the arts community, and the city's institutional economic drivers to achieve successfully and sustainably strengthen our communities and our city.

> *From the start of my administration, I have made it clear that sustainability and improving the lives of all residents is a priority. Ensuring that Baltimore is carbon neutral by the earliest possible date is a key part of my administration's work to build Clean and Healthy Communities. Our young people deserve the chance to grow up and enjoy everything that our city and our planet have to offer.*
>
> *-Mayor Brandon M. Scott, January 18, 2022*

ESG Reporting, Alignment, and Regulatory Compliance

U.S. Federal Government

The United States government has also made commitments to mitigate our country's contribution to the climate crisis and help vulnerable communities build resilience. President Joe Biden's first-ever, cabinet-level National Climate Task Force has established an ambitious set of climate goals that rely heavily on the electrification of industry, transportation, and building systems in combination with the transformation of the utility grid with increasingly cleaner renewable energy sources.

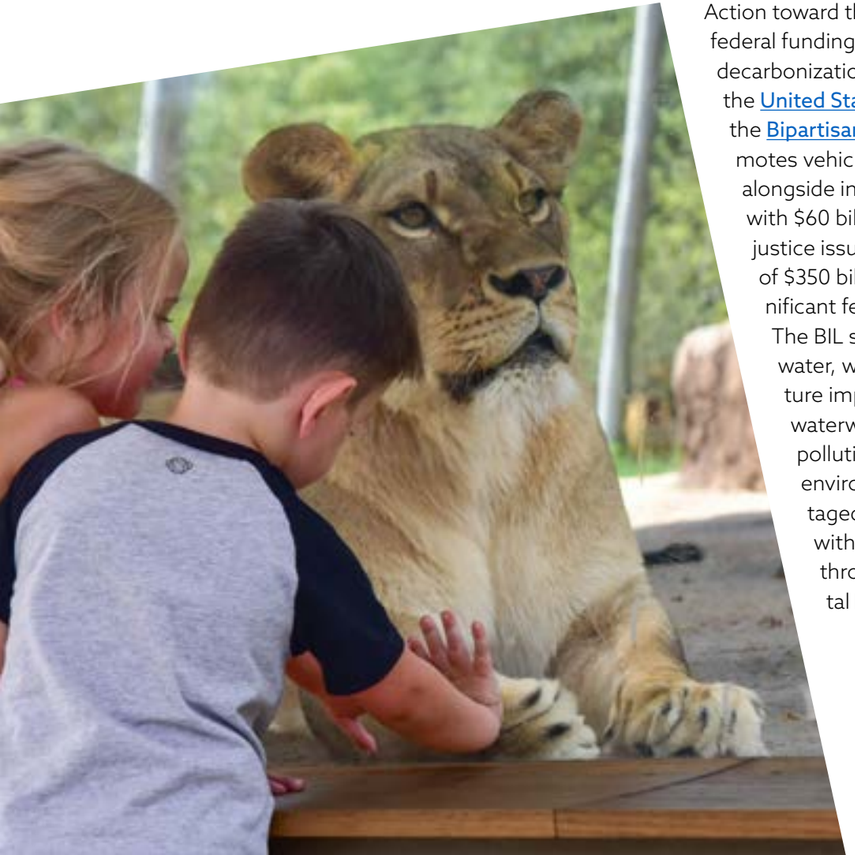
The National Climate Task Force Goals

Reducing U.S. greenhouse gas emissions 50-52% Below 2005 levels by 2030

Reaching 100% carbon pollution free electricity by 2035

Achieving a NET-ZERO emissions economy by 2050

Delivering 40% of the benefits from federal investments in climate and clean energy to disadvantaged communities.



Action toward these goals presents opportunities for federal funding towards investments that advance decarbonization and community resilience through the United States Inflation Reduction Act (IRA) and the Bipartisan Infrastructure Law (BIL). The IRA promotes vehicle, appliance, and building electrification alongside investments in clean, renewable energy with $60 billion allocated to address environmental justice issues and community resilience. At a total of $350 billion, the IRA represents the most significant federal climate legislation in U.S. history. The BIL supports investments in safe drinking water, wastewater and storm water infrastructure improvements, and protection of regional waterways. This law also includes funding for pollution prevention with an emphasis on environmental justice in historically disadvantaged communities. The funding associated with the IRA and BIL is primarily administered through tax incentives and U.S. Environmental Protection Agency (EPA) grants.

Global Community

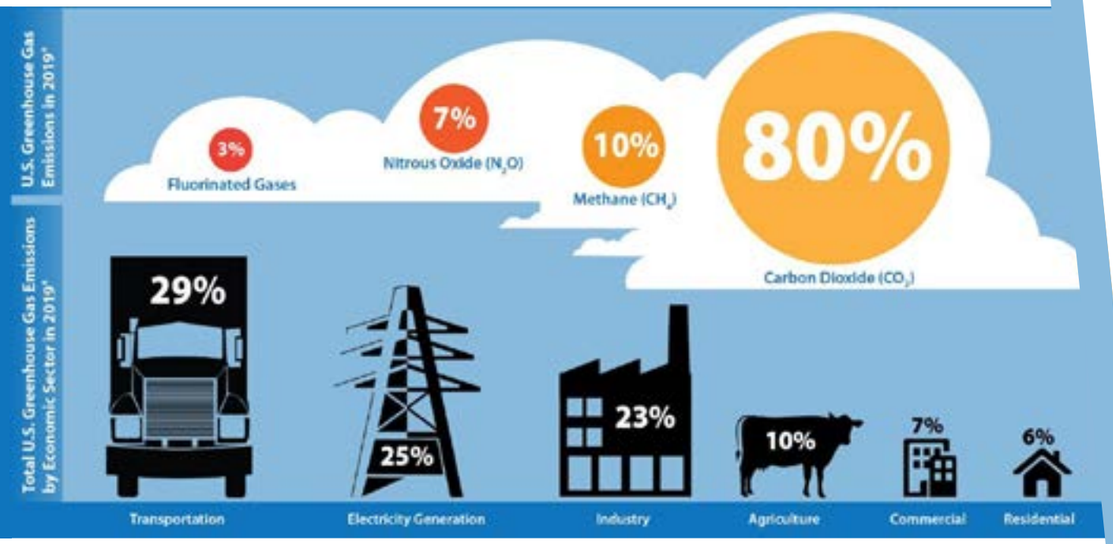
SUSTAINABLE DEVELOPMENT GOALS

The United Nations (UN) Sustainable Development Goals (SDG) were developed by the UN General Assembly in 2015 as part of "Transforming Our World: the 2030 Agenda for Sustainable Development" also known as Agenda 2030. These 17 interdependent goals are outlined in the UN road map to a better, more sustainable, and equitable future for all the world's citizens. These goals address global challenges, including those related to poverty and inequality, as well as climate and environmental disruption to create greater global prosperity, peace, and justice. Within the 17 goals, there are 169 total targets, each with its own set of indicators to help guide actions that contribute to the SDGs. The icons representing the goals most relevant to each section of this plan are shown to illustrate how the Zoo's efforts contribute to solving global challenges.

Click the wheel to learn more

Greenhouse Gas Emissions 101

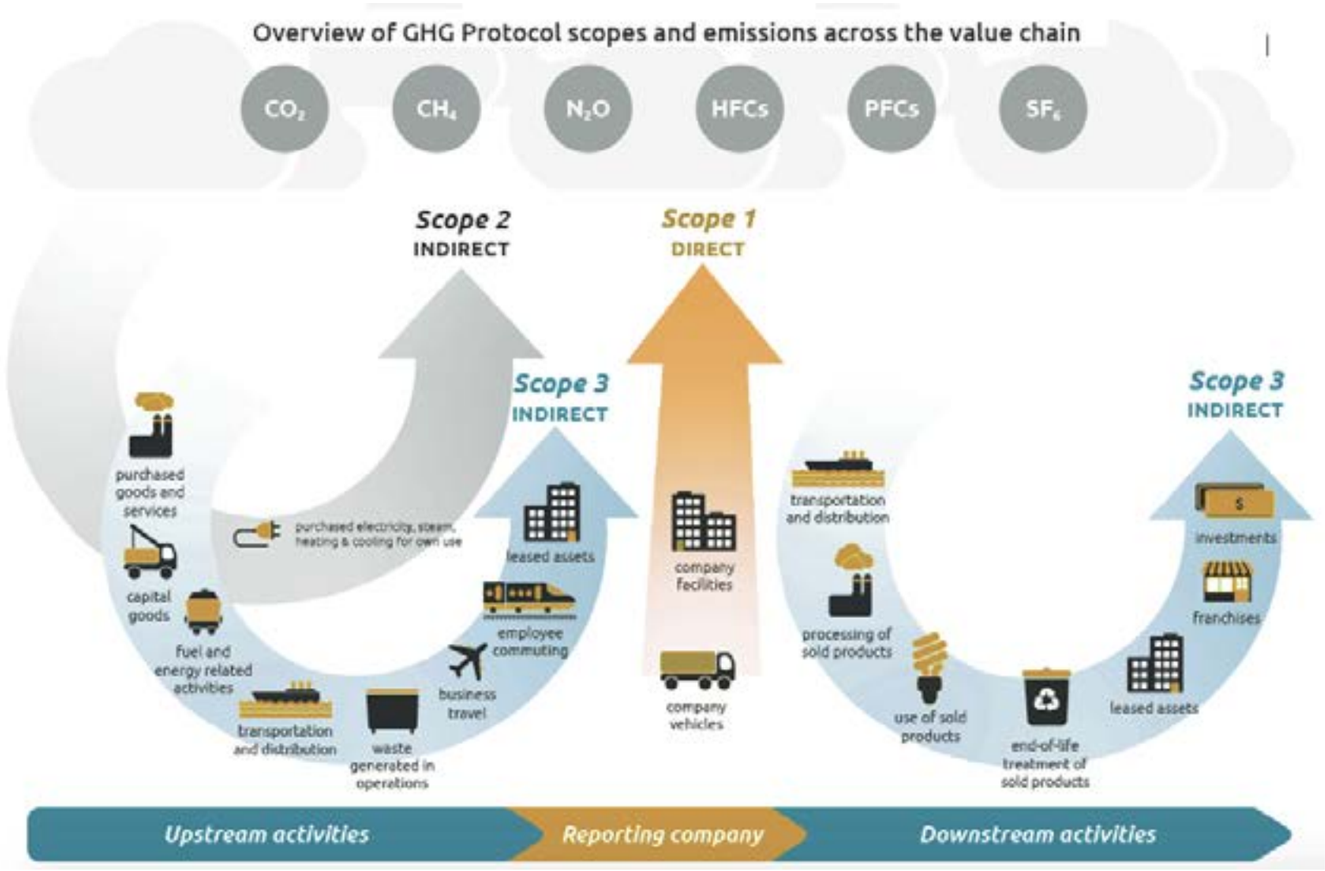
While several molecules are considered greenhouse gases, the U.S. EPA is primarily concerned with carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated gases (HFCs, PFCs, SF_6) as the most significant contributors to anthropogenic climate change. These molecules vary in their global warming potential or capacity to contribute to atmospheric warming. To simplify the quantification of these gases, scientists have converted each into terms of the characteristics of CO_2 and compared them using a common unit called carbon dioxide equivalents, abbreviated CO_2e.



Source: U.S. EPA

Measuring Carbon

Carbon is the most prevalent metric in sustainability. With the effects of climate disruption mounting globally, it is urgent to consider the carbon impact of all aspects of organizational operation. Although we outline specific efficiency metrics and targets, decarbonization is the ultimate goal of most of the sustainable practices recommended in this plan.



While a complete greenhouse gas inventory was not within the boundary of this plan, the carbon contribution of the Zoo's overall water consumption and a portion of the Zoo's solid waste was calculated using the United Nations Framework on Climate Change (UNFCC) Greenhouse Gas Emissions Calculator v02.1-December 2021. 2022 energy data was tabulated through the U.S. EPA's Energy Star Portfolio Manager tool to determine the Zoo's energy intensity and carbon emissions contributions. These evaluations will continue as various plan strategies are further implemented and additional waste, transportation, and building systems data is available.

Greenhouse gas calculator spreadsheets are equipped with formulas to automatically calculate the CO2e from various operational sources like electricity and fuel use, water delivery and wastewater treatment, and the disposal of various waste materials. This report presents these estimates in metric tons of CO2e for the available zoo data sources within each section.

The Maryland Zoo's Environmental Impacts

Materiality Assessment

Because every organization is different, there is no one-size-fits-all set of sustainability actions. Materiality assessment is the process of identifying and prioritizing social and environmental impacts to determine which should be examined and addressed in a company's sustainability strategy. This materiality assessment not only examined activities and impacts on the campus, but also recognized the impact of Zoo operations through the supply chain.

> *"Integral to ESG is the identification of relevant material issues that are important to an organization's stakeholders, the creation of goals and targets to positively address these issues, and the public reporting on a firm's progress toward these targets and metrics."*
>
> *-Timothy J. McClimon, Business Executive & Management Consultant*

Environmental Aspect (Activities that interact with the environment)	Current Activity	Environmental Impact
Emissions to Air	Purchased electricity. ◊ On-site fuel combustion. ◊ Vehicle transportation: fleet vehicles, staff commuting, visitor & professional travel & animal transport. ◊ Air & rail transportation, professional, travel & animal transport. ◊ Rides (train). ◊ Gaseous byproducts of animal digestion (methane). ◊ Supply chain emissions.	◊ Adverse effects on air quality & associated human morbidity, mortality, and related economic losses. ◊ Emissions contribute to disruption in earth's climate and ecosystem services.
Effluent to Water	◊ Contaminated site runoff carries pollutants from salts, ice melts, pesticides, fertilizers & other chemicals through storm drains and tributaries into the Chesapeake Bay.	◊ Pollution of local waterways contributes to poor Baltimore Harbor water quality and aquatic ecosystem health. ◊ Excessive nutrient effluent causes ocean eutrophication & acidification reducing their capacity to act as a carbon sink.
Emissions to Soil	◊ Animal waste. ◊ Pollutants from salt, snow melt, herbicides, pesticides & fertilizers, and other chemicals.	◊ Potential contamination & spread of pathogens through site ecosystems. ◊ Harm from chemicals infiltrating soil, contaminating groundwater and vegetation, and accumulating up the food chain.
Resource Consumption	◊ Utility grid energy & fuel inputs and on-site fuel combustion.	◊ Release of emissions that contribute to climate change. ◊ Resource depletion and associated economic and geopolitical consequences, including shortages & price fluctuation. ◊ Utility grid infrastructure stress.
	◊ Potable water is used for drinking, cleaning, and process uses.	◊ The delivery and heating of water and processing of wastewater consumes energy. ◊ Stress on water treatment facilities and infrastructure. ◊ Future water insecurity.
	◊ Facility construction, operations & maintenance inputs.	◊ GHG emissions released throughout material life cycle and embodied carbon contribute to climate change disruptions yielding negative human and ecosystem health effects. ◊ Environmental and social harm from global raw material sourcing & extraction.
Material Waste Production	◊ Construction & operations waste. ◊ Concessions waste. ◊ Animal waste. ◊ Guest waste.	◊ Emissions from waste incineration and landfills harm air quality and human health. ◊ GHG emissions (primarily methane) contribute to climate change.
Excessive Noise & Light	◊ Exterior night lighting for safety and events. ◊ Excessive noise is limited and unlikely to extend beyond the Zoo perimeter.	◊ Light pollution disorients & disrupts activities of crepuscular & nocturnal wildlife species and animal migratory patterns.
Transparent exhibit glass	◊ Causes bird-strikes on exhibit and building glass.	◊ Results in wild bird injury and death.
Biodiversity	◊ Forest preservation area positively contributes to the City's tree canopy, reduces urban heat, provides wildlife corridors & habitat and atmospheric carbon sink.	◊ Contributes to healthy ecosystem function and supports native & migratory wildlife populations. ◊ Absorbs carbon to help mitigate climate change.

STAKEHOLDER ENGAGEMENT

Stakeholder engagement is integral to successful ESG program development. To establish a comprehensive plan that suits the organization and will be enthusiastically adopted, we must gather information on the awareness, opinions, needs, and habits of those individuals involved in the governance, leadership, and day-to-day operations of the organization.

Four internal stakeholder groups were identified: the board of trustees, senior leadership staff, line and management staff, and volunteers. An on-line survey questionnaire was created for each group and distributed through the Zoo email system. This report presents only a portion of the most relevant results. Survey data not only informed the development of this plan but has also been organized for use in future comparisons to mark progression of sustainability performance and stakeholder attitudes over the course of plan implementation. External stakeholders, including zoo members, visitors, funders, and community organizations and members may be surveyed in the future.

Summary of Survey Response Rates

Cohort	Individuals in Cohort	Responses in Cohort	Response Rate
Zoo Board of Trustees	40	16	**40%**
Zoo Senior Staff	14	11	**79%**
Zoo Staff	186	66	**35%**
Zoo Volunteers	162	60	**37%**

Most Significant Survey Responses

The most highly agreed upon significant barrier to the Zoo's Sustainability Program is the limited staff time to dedicate to sustainability initiatives. While this is a recurring theme in organizational sustainability, Zoo leadership plans to address this by hiring dedicated sustainability staff to coordinate the implementation of this plan and ongoing performance improvements.

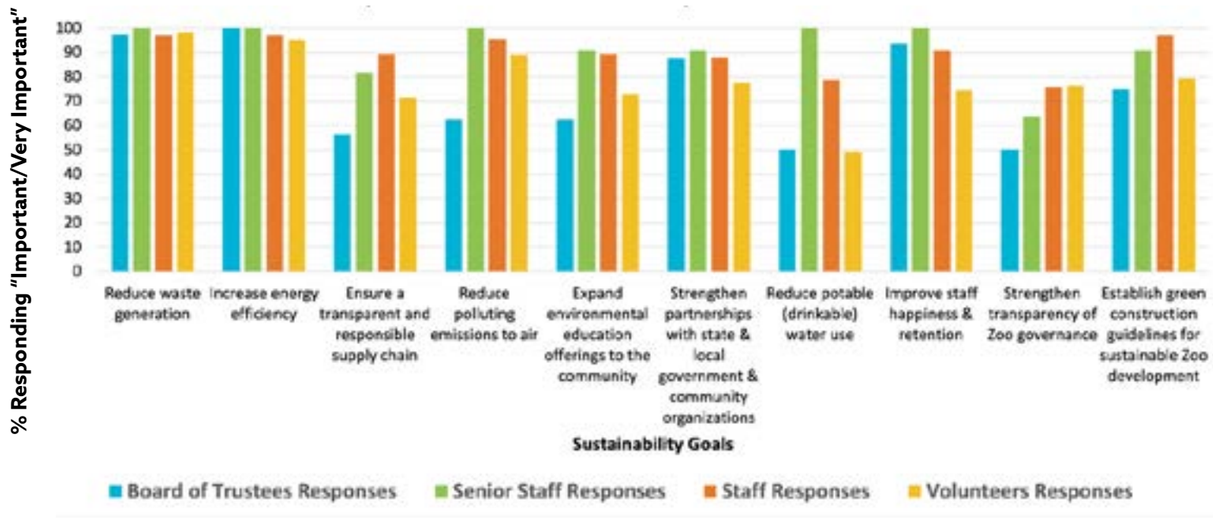
There is consensus among all groups that the Zoo should prioritize goals related to energy efficiency and reduction in waste generation. The senior staff also recognized the importance of reducing emissions to the air and potable water use and also maintained that improving staff happiness and retention is equally important. Behind energy efficiency and waste generation, Zoo staff reported that establishing green construction guidelines for sustainable development is among the most important pursuits.

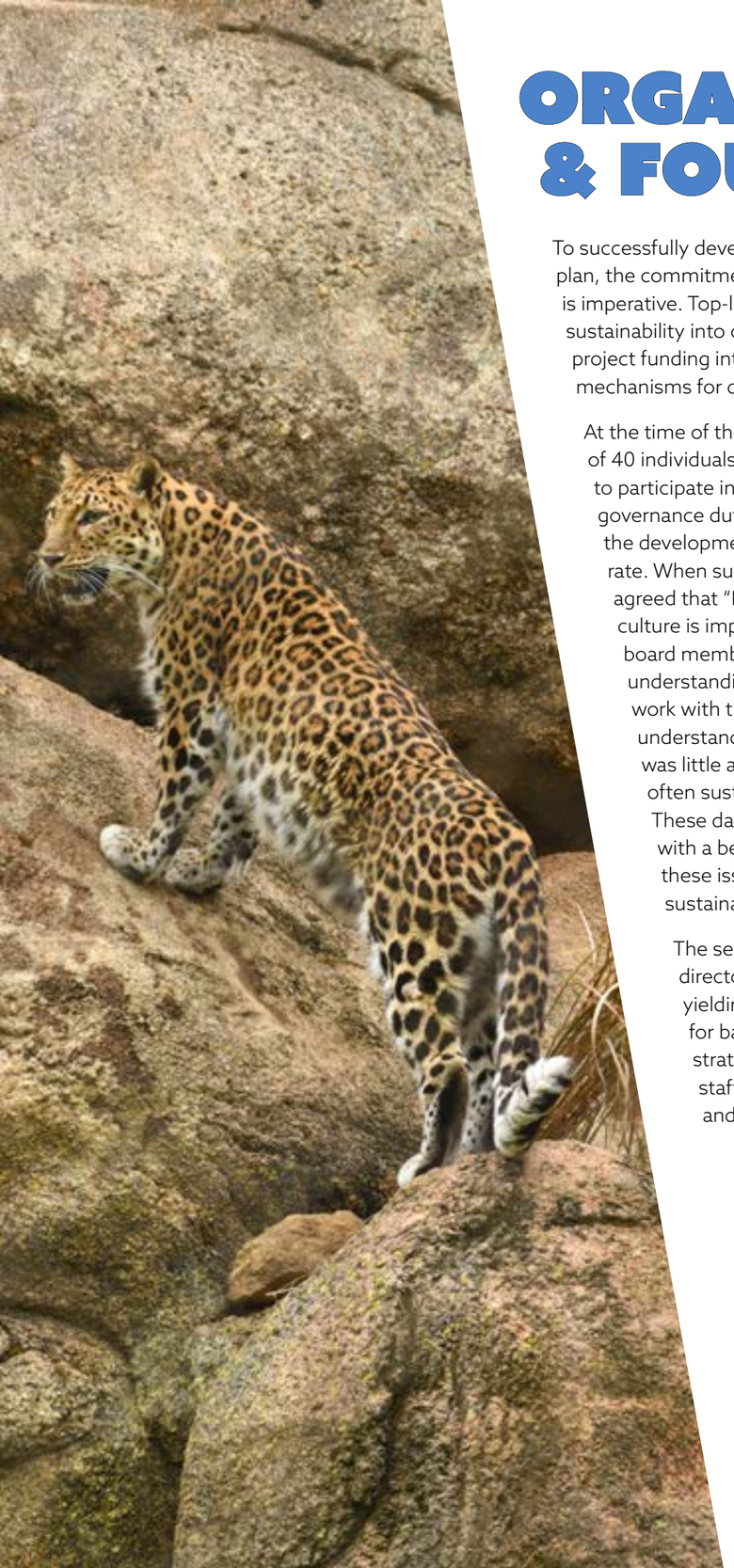
Significance of Barriers to the Zoo's Sustainability Program

Left: The chart shows which barriers respondents think significantly limit the Zoo's sustainability program development and success.

Below: The chart illustrates respondents' opinions of which sustainability goals are most important for the Zoo to pursue.

Importance of Sustainability Goals to Pursue



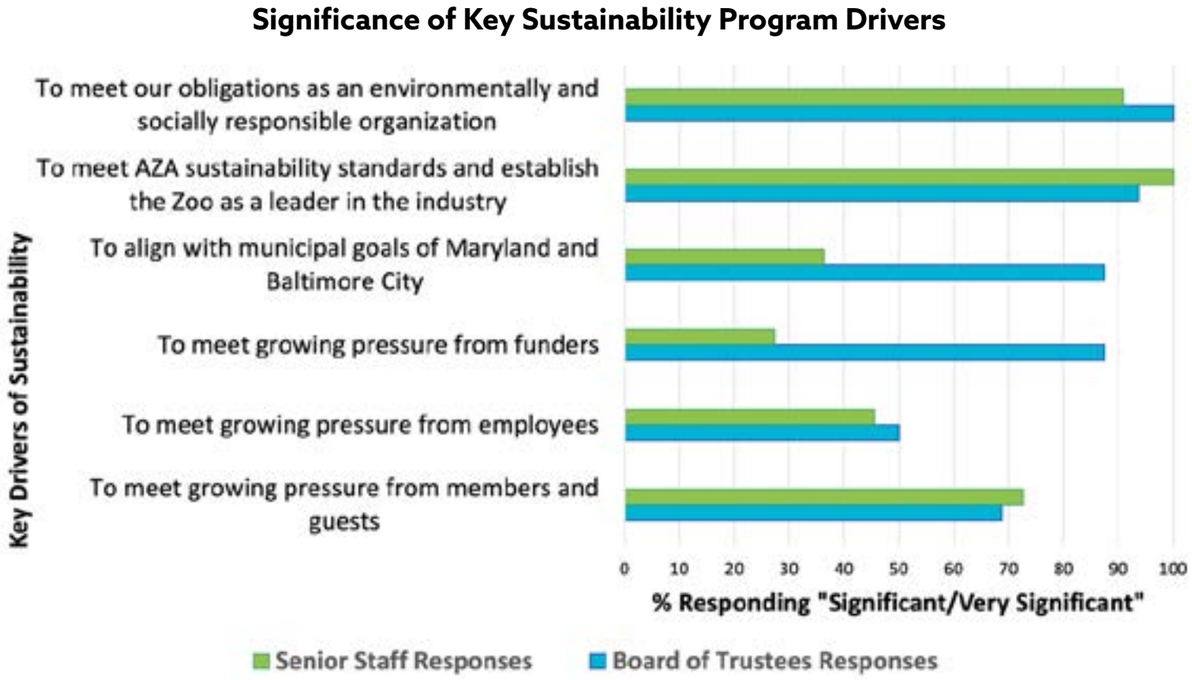


ORGANIZATIONAL GOVERNANCE & FOUNDATIONS

To successfully develop and implement an organizational sustainability plan, the commitment of executive leadership and the governing body is imperative. Top-level staff set the tone and support the integration of sustainability into organizational culture. They ensure the inclusion of project funding into operations and capital budgets as well as establish mechanisms for decision-making and accountability.

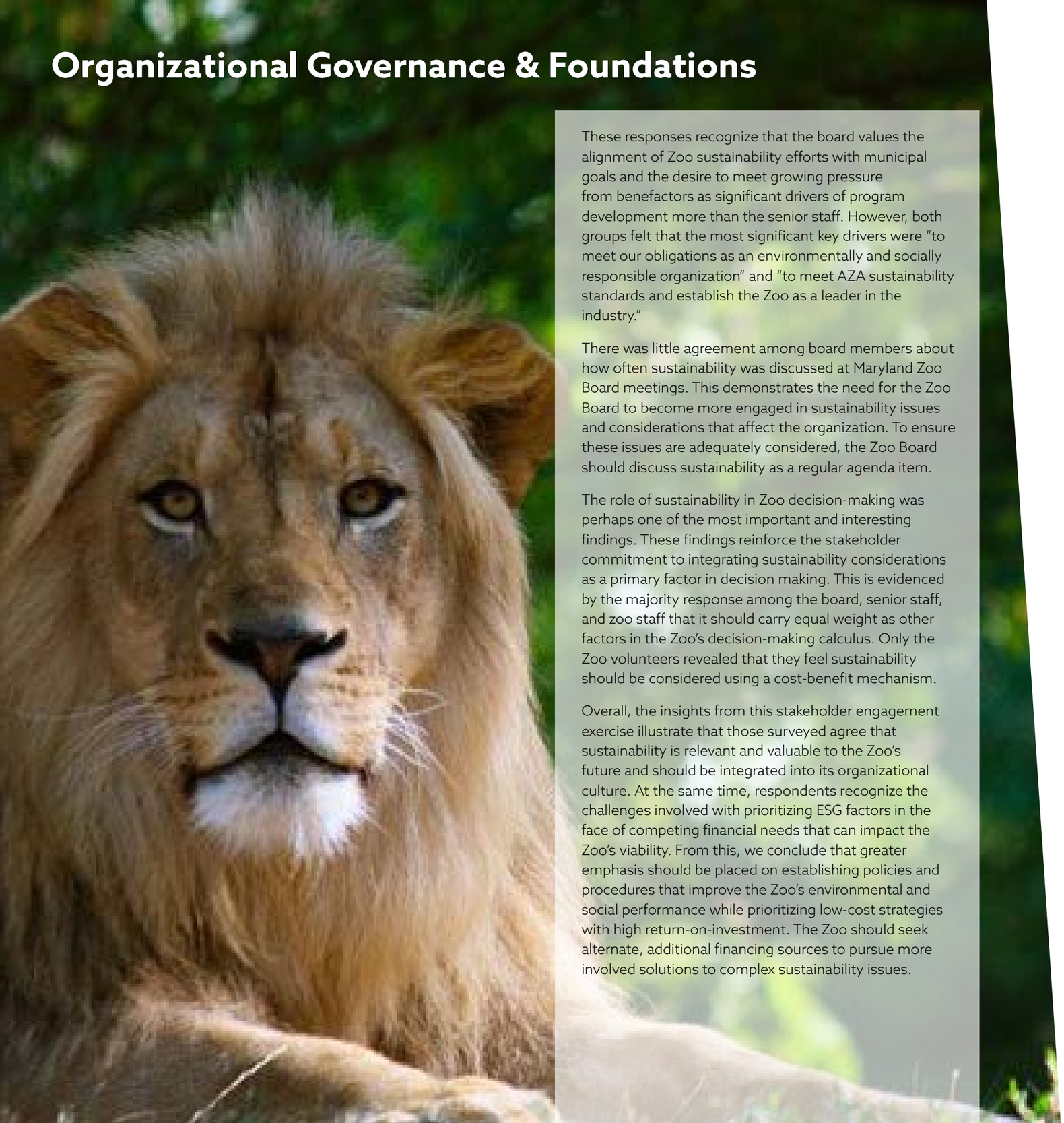
At the time of the survey, the Maryland Zoo Board was comprised of 40 individuals from the local community, who meet monthly to participate in various sub-committees in fulfillment of their governance duties. The board of trustees was surveyed as part of the development of this plan and achieved a robust 40% response rate. When surveyed, all board members agreed or significantly agreed that "Integrating sustainability into the organizational culture is important to the Zoo's business success." Most board members responded that they have a good or general understanding of sustainability issues as they relate to their work with the Zoo, but none claimed to have a significant understanding of sustainability issues in a general sense. There was little agreement among board respondents as to how often sustainability issues are discussed at board meetings. These data reveal an opportunity to provide board members with a better understanding of how the Zoo is addressing these issues and encourage regular briefings on relevant sustainability topics.

The senior staff team is composed of 14 vice-president and director level leaders, 11 of whom responded to the survey yielding a 79% response rate. This team is responsible for balancing the Zoo's daily operations with long-term strategies for success. The commitment of the senior staff team is integral to successful plan implementation and performance improvement.



The graph compares responses between the Board and the senior staff regarding the key drivers of the development of a sustainability plan.

Organizational Governance & Foundations



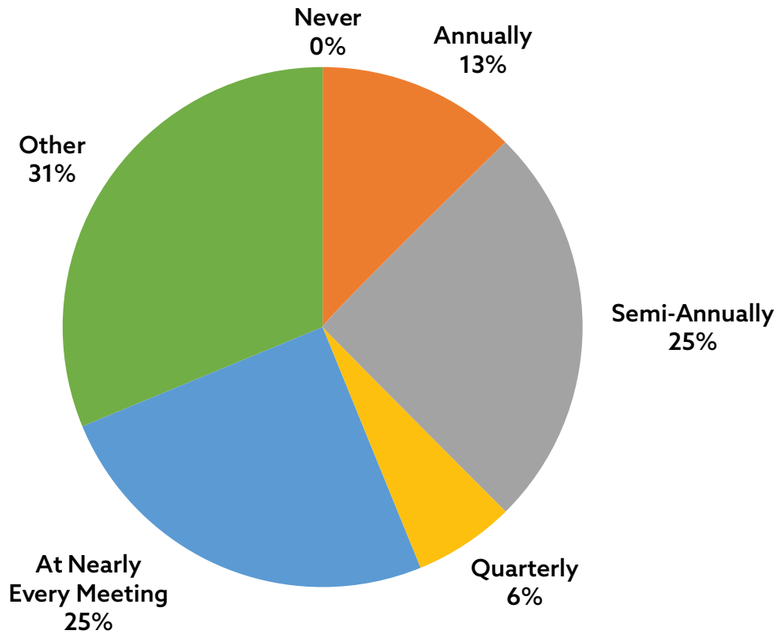
These responses recognize that the board values the alignment of Zoo sustainability efforts with municipal goals and the desire to meet growing pressure from benefactors as significant drivers of program development more than the senior staff. However, both groups felt that the most significant key drivers were "to meet our obligations as an environmentally and socially responsible organization" and "to meet AZA sustainability standards and establish the Zoo as a leader in the industry."

There was little agreement among board members about how often sustainability was discussed at Maryland Zoo Board meetings. This demonstrates the need for the Zoo Board to become more engaged in sustainability issues and considerations that affect the organization. To ensure these issues are adequately considered, the Zoo Board should discuss sustainability as a regular agenda item.

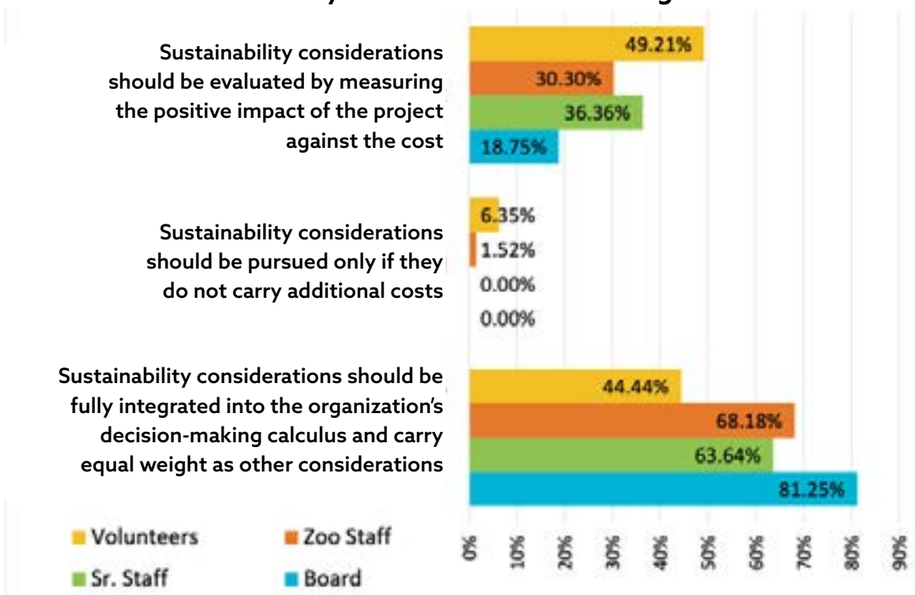
The role of sustainability in Zoo decision-making was perhaps one of the most important and interesting findings. These findings reinforce the stakeholder commitment to integrating sustainability considerations as a primary factor in decision making. This is evidenced by the majority response among the board, senior staff, and zoo staff that it should carry equal weight as other factors in the Zoo's decision-making calculus. Only the Zoo volunteers revealed that they feel sustainability should be considered using a cost-benefit mechanism.

Overall, the insights from this stakeholder engagement exercise illustrate that those surveyed agree that sustainability is relevant and valuable to the Zoo's future and should be integrated into its organizational culture. At the same time, respondents recognize the challenges involved with prioritizing ESG factors in the face of competing financial needs that can impact the Zoo's viability. From this, we conclude that greater emphasis should be placed on establishing policies and procedures that improve the Zoo's environmental and social performance while prioritizing low-cost strategies with high return-on-investment. The Zoo should seek alternate, additional financing sources to pursue more involved solutions to complex sustainability issues.

Frequency of Sustainability Discussions at Board Meetings



What Role Do You Feel Sustainability Should Play in Zoo Decision-Making?



Goals & Strategies • Organizational Governance & Foundations

GOAL: Integrate sustainability principles and practices into organizational culture to enhance performance

Strategy: The Zoo Board and its subcommittees should regularly discuss sustainability topics during meetings and should include sustainability as a consideration in planning and decision-making discussions.

Strategy: Zoo leadership should encourage department heads to discuss sustainability regularly at meetings, incorporate sustainability considerations into their operational work plans and standard operating procedures to advance the program goals and communicate progress to senior staff.

Strategy: By December 2023, update Employee and Volunteer Handbooks to include a statement on the role of staff in the Zoo's sustainability program mission.

Strategy: By December 2023, incorporate information on the sustainability program into staff, volunteer, and trustee on-boarding programs.

Strategy: By December 2023, update 100% of job descriptions to reflect the role of employees in contributing to the Zoo's sustainability mission.

Strategy: By December of 2023, introduce a process to integrate sustainability considerations into the organizational decision-making process.

Strategy: Develop an evaluation mechanism for assessing sustainability considerations and cost in capital expenditures using principles of life cycle cost analysis (LCCA).

Strategy: Incorporate designated funds for sustainability investments and cost premiums into the annual budget. Dedicate 0.5% of annual budget on investments toward sustainability plan goals each year through 2025 then progressively increase reinvestment into the program thereafter.

Strategy: Evaluate standard operating procedures in all departments to identify efficiencies that will improve performance.

GOAL: Improve environmental literacy among internal stakeholders to broaden understanding about the Zoo's role in sustainability and how they can best support this plan.

Strategy: In autumn of 2023, present sustainability plan to the Board of Trustees. Present brief updates annually thereafter.

Strategy: Present to stakeholders biannually on sustainability plan implementation progress, challenges, and next steps.

Strategy: Provide regular information on program activities and progress in ZooPad, at all staff meetings, and at departmental or area-wide meetings.

GOAL: Reduce the environmental impact of all Zoo-sponsored and facility rental events

Strategy: Further develop a process for evaluating sustainability considerations for on-site events.

Strategy: Develop process for zero waste events that feature durable or compostable service items and 3-stream waste stations.

Strategy: Limit Zoo and corporate giveaways to responsibly sourced, useful items that encourage sustainable lifestyles.

Strategy: Encourage and facilitate alternative transportation to events at the Zoo.

GOAL: Maintain a Continuous Improvement Cycle.

Strategy: Improve document management and establish review and revision of policies and procedures in all departments on regular cycles.

Strategy: Provide brief annual written updates on the sustainability plan progress.

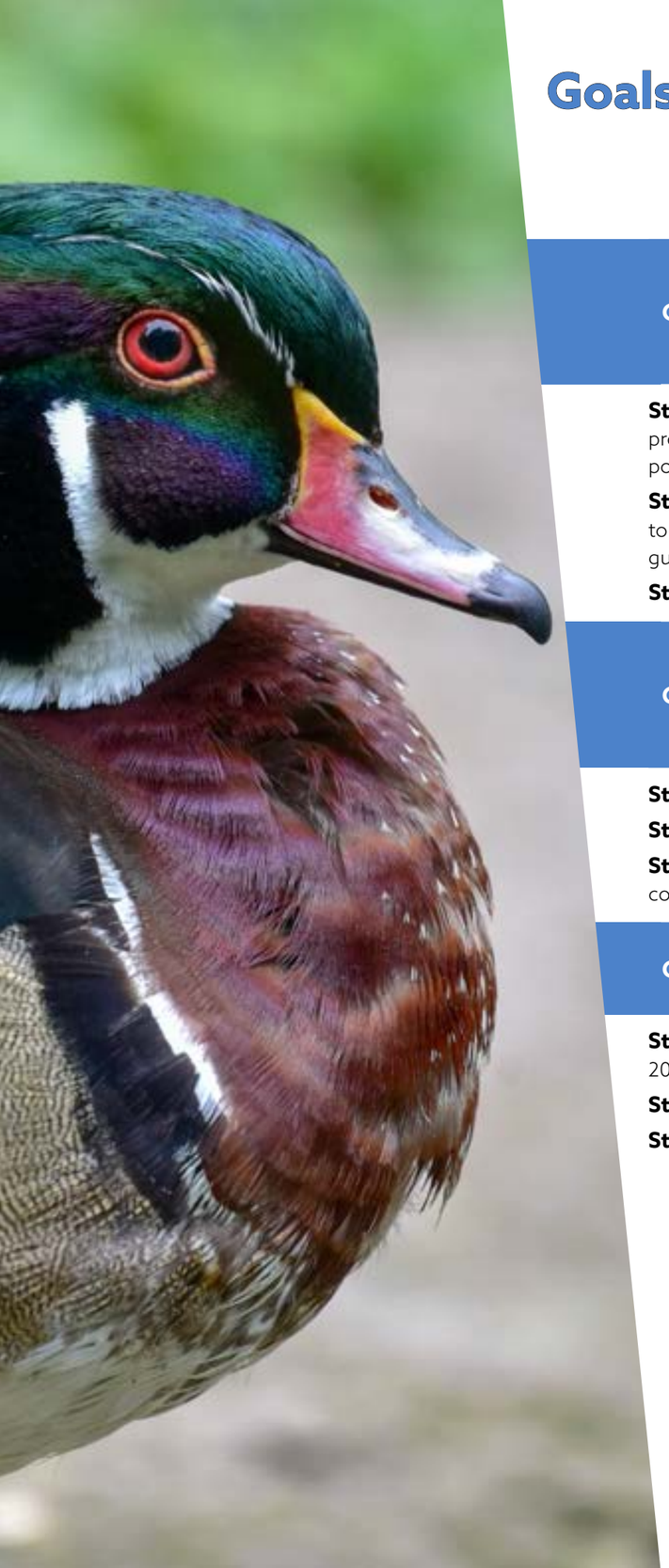
Strategy: Reevaluate sustainability planning process at 5-year intervals.

GOAL: Develop and maintain community and municipal partnerships to facilitate implementation of the sustainability plan and generate positive collective impact for Baltimore.

Strategy: Designate a liaison to participate in informational sessions, open meetings, and initiatives of the Baltimore Office of Sustainability and Commission on Sustainability.

Strategy: Identify the most valuable local nonprofit groups whose sustainability missions best align with the Zoo's to help reinforce messaging and mobilize resources.

Strategy: Expand relationships with other Baltimore cultural institutions that face similar challenges to leverage the power of collaboration.



Goals & Strategies • Organizational Governance & Foundations

GOAL: Maintain an organizational culture that works to advance diversity, equity, accessibility, and inclusion (DEAI) in all aspects of governance and talent management, guest engagement, and staff relations.

Strategy: Establish and fill a position that dedicates a minimum of 0.5 FTE to DEAI programming to integrate these principles and practice into organizational culture and policy.

Strategy: This position should serve as a member of the Zoo's Sustainability Committee to lend expertise to the implementation of the internal social aspects of this plan and help guide the integration of ESG principles and practice into the organizational culture.

Strategy: Maintain activities of the Employee Resource Groups (ERG).

GOAL: The Human Resources Department will set an annual employee retention goal and actively endeavor to improve job satisfaction and staff happiness to increase retention.

Strategy: Engage in listening sessions with staff about workplace improvements.

Strategy: Maintain transparency in Zoo operations.

Strategy: Provide managers with appropriate tools and training to develop positive and communicative working relationships with staff.

GOAL: Enhance transparency with internal stakeholders.

Strategy: Enhance understanding of the Zoo financial standing by 10% when compared to 2022 survey data.

Strategy: Review annual budget with all staff at annual meeting.

Strategy: Provide access to monthly financial reports on the intranet.

GOAL: Enhance consideration of social responsibility and impact in compensation.

Strategy: The human resources department will explore options for socially responsible investment fund offerings for zoo-sponsored retirement plans.

Strategy: Zoo leadership will regularly evaluate and prioritize the ability to provide staff wage increases to keep up with inflation and the cost of living.

Strategy: Zoo leadership will evaluate and maintain equity in organizational pay ratios such that the executive pay ratio between the CEO and median, full-time employees does not exceed 10:1.

GOAL: Maximize efficiency and effectiveness of Zoo's Sustainability Committee.

Strategy: Refine the composition, purpose, and responsibilities of the Maryland Zoo Sustainability Committee (MZSC).

Strategy: Clearly convey commitment and expectations of participation to members and their supervisors before they sign on.

Strategy: By 2025, hire full-time staff to coordinate the implementation of this plan and expand partnerships to facilitate progress toward the Zoo's ESG goals.

87% *of survey respondents who participate in the Zoo's 401k would like to have a socially responsible investment fund option.*

ENERGY MANAGEMENT

Energy Background

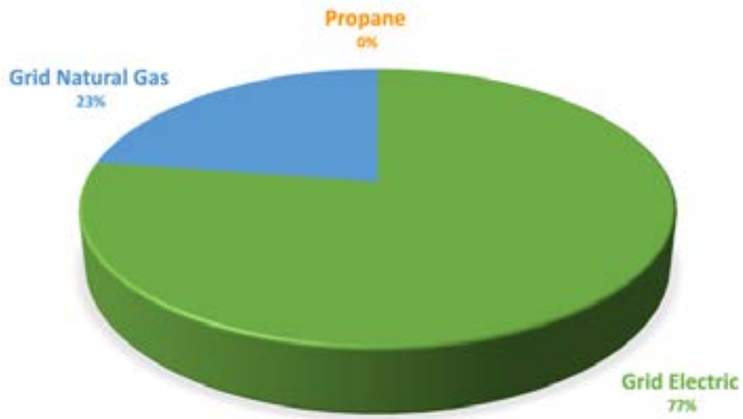
Forty percent of all energy use in the United States can be attributed to the built environment. Focusing efforts on improvements in building efficiency, energy management, and clean sourcing has significant potential to improve the Zoo's environmental performance as it relates to natural resource conservation and the greenhouse gas emissions that contribute to our warming climate.

As part of the Climate Solutions Now Act of 2022, Maryland introduced the development of building energy performance standards (BEPS) to help large buildings over 35,000 ft^2 increase energy efficiency and reduce carbon emissions. Building owners will be required to report energy usage data annually beginning in 2025, achieve a 20% reduction in greenhouse gas emissions by 2030, and achieve net-zero greenhouse gas emission by 2040. The Maryland Department of Environment (MDE) will also establish energy use intensity targets that buildings will be required to meet.

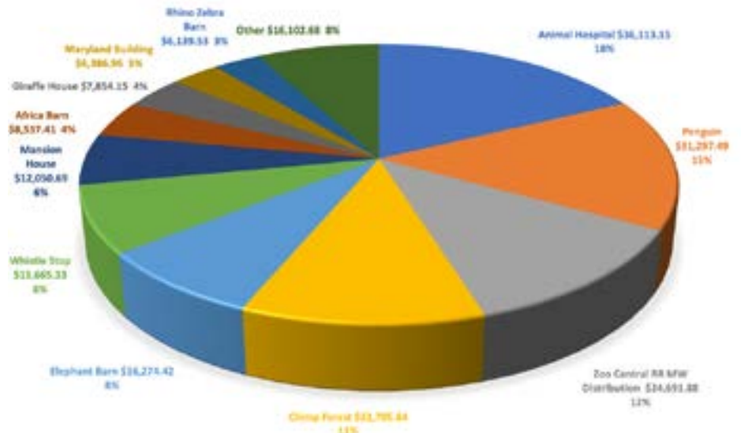
Baseline Energy Consumption

While small amounts of propane are used in select areas like supplemental building heating of the maintenance shop, water heating in the grain barn, and cooking at the Sidetrack restaurant, most of the campus energy demand is met by the local utility grid. Electricity and natural gas consumption is billed through the City of Baltimore based on data from 27 electricity meters and 7 natural gas meters around the Zoo. Due to the complexity of the park infrastructure and the billing system, prior to 2022, Zoo leaders did not have access to energy data from Baltimore Gas & Electric (BGE). Through the BGE Business Energy Management Program, data is available via secure, third-party on-line platform and meters have been identified and labeled by Zoo staff to correspond with the areas they track. Calendar year 2022 was the first in which 12 full months of energy data were available for monitoring. The accuracy of energy may be questionable given the age of the infrastructure, irregularity of meter reading and billing, and the Zoo's location within a large urban park that also houses Baltimore City Recreation & Parks offices and public facilities. Regardless of whether this data is 100% accurate, it still provides a valuable baseline for energy use to identify significant trends.

2022 Energy By Source



2022 Top Energy Using Meters By Cost



Energy Benchmarking

2022 was selected as the energy benchmark year as it illustrated the most complete gas, electric, and propane consumption data available. The site energy use intensity (EUI) indicates building energy efficiency in terms of 1,000 British thermal units per square foot (kBtu/ft^2) of building area that is ventilated, conditioned, or heated. This metric allows for consistent measurement of energy efficiency even as an organization expands its campus facility footprint. As more efficient building systems come on-line, the energy use intensity of the campus will decrease. Using 2022 energy data and the aggregate building areas cited in the Zoo Master Plan, a site EUI of 118.3 kBtu/ft^2 for the campus for 2022 was calculated. The U.S. Environmental Protection Agency (EPA) Energy Star Portfolio Manager program recognizes the median site EUI for zoo and aquarium facilities as 56.2 kBtu/ft^2; however; this number includes several different entertainment-oriented building types like movie theaters and is likely too low to accurately represent the energy intensity of facilities that require animal life support. The AZA has not provided guidance or information on typical EUI or other efficiency rates for accredited zoos and aquariums.

Energy Analysis

The total 2022 combined electricity and fuel consumption for the Maryland Zoo was 6,473,307.72 kWh. The 5,013,136.49 kWh of electricity consumption from the grid accounts for 77% of total energy use. Natural gas consumption was 1,459,469.41 kWh, which accounts for 23% of total 2022 energy use. Propane consumption for FY22 was 1730.4 gallons yielding 46,721 kWh energy, which accounts for only .01% of total energy use. The most significant energy consuming areas were the animal hospital, penguin area, Zoo Central, chimp building, and elephant barn. Of these top consuming areas, the animal hospital, penguin area, and elephant barn all use fuel (natural gas and/or propane) as a supplement to building heating systems.

2022 Energy Use by Source	Grid Electric	Grid Natural Gas	Propane	Total Energy Use
Total kWh	5,013,136.49	1,459,469.41	701.83	6,473,307.72
Total kBtu	17,108,832.20	4,980,877.20	2,395.20	22,092,104.60
Total Cost	-	-	-	**$203,345.99**

Goals & Strategies • Energy Management

GOAL: Improve data reliability and granularity from the utility company and improve data monitoring by December 2023.

Strategy: Develop relationship with BGE account manager to clarify discrepancies and map infrastructure to which meters track each facility.

Strategy: Review monthly utility data regularly for inconsistencies.

Strategy: Track monthly energy consumption using Energy Star Portfolio Manager.

GOAL: Reduce campus energy use intensity by 30% from 2022 baseline by 2030.

Strategy: Review building automation system (BAS) settings for all facilities with occupants and adjust set points and controls schedules.

Strategy: Inspect buildings for envelope energy losses in both heating and cooling seasons and resolve each.

Strategy: Conduct a systems energy analysis (likely ASHRAE Level II) on a minimum of one building per year.

Strategy: Integrate advanced energy efficiency design standards for future facility development including target EUI.

Strategy: Establish & implement a preventative maintenance schedule for energy efficient equipment & appliance use.

Strategy: Establish procurement standards for energy efficiency in appliance and equipment.

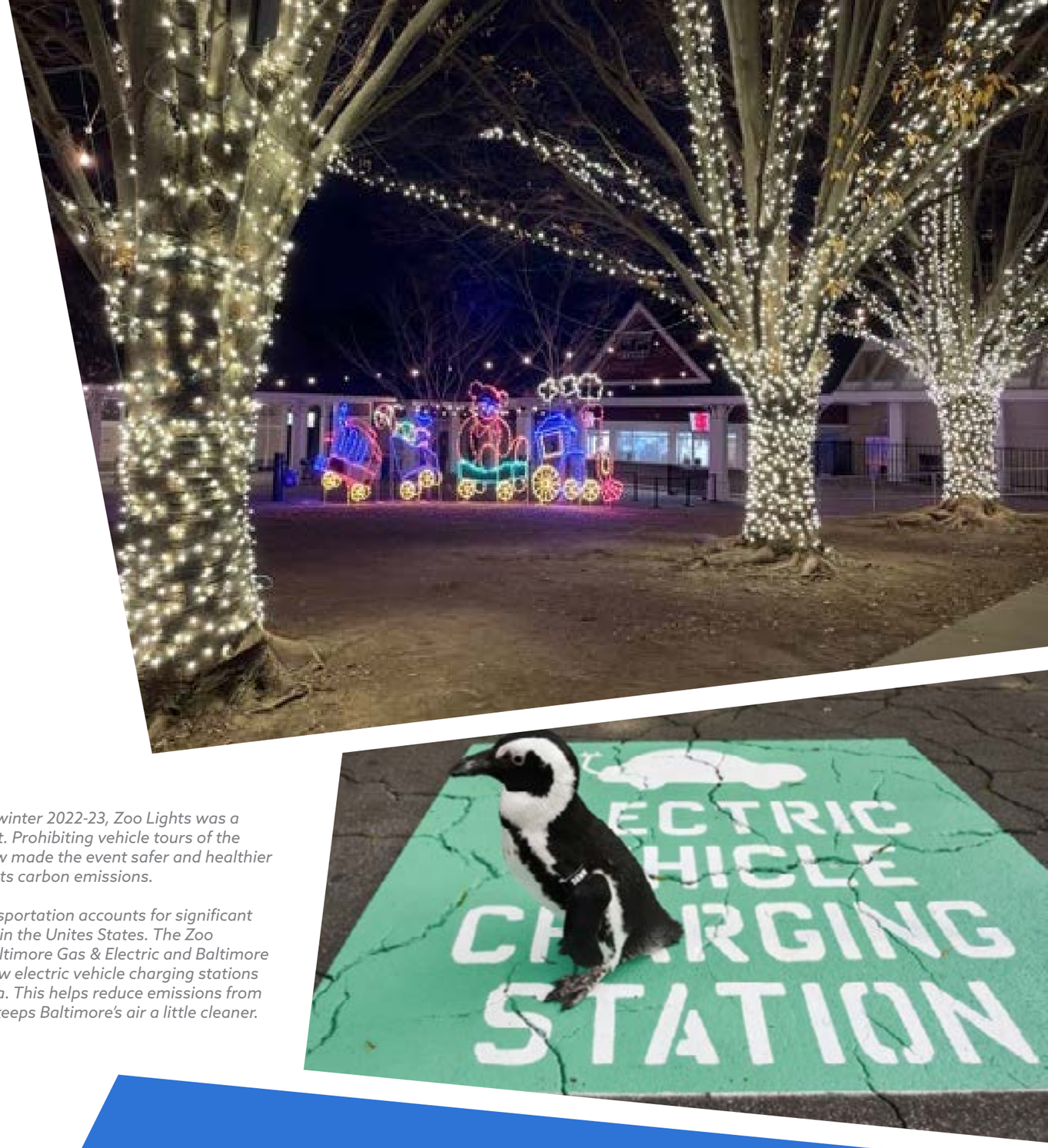
Strategy: Reduce reliance on on-site fuel combustion for building energy and target all-electric building design by 2030.

GOAL: Decarbonize energy systems.

Strategy: Include solar PV on new buildings whenever feasible and design all eligible future buildings to structurally support rooftop solar installations.

Strategy: Conduct a new feasibility study to assess the structural capacity and solar exposure patterns for potential photovoltaic (PV) solar installations on the roofs of the hospital and chimpanzee forest, and a solar canopy over parking lot C.

Strategy: Investigate power purchase agreements (PPA). Electrify energy-using systems to the extent possible to reduce the use of fossil fuels for regular building conditioning.



Upper Right: *The winter 2022-23, Zoo Lights was a walking only event. Prohibiting vehicle tours of the holiday lights show made the event safer and healthier and also reduced its carbon emissions.*

Lower Right: *Transportation accounts for significant carbon emissions in the Unites States. The Zoo partnered with Baltimore Gas & Electric and Baltimore City to install 6 new electric vehicle charging stations in the parking area. This helps reduce emissions from transportation & keeps Baltimore's air a little cleaner.*

WATER MANAGEMENT

Background

While water scarcity is not currently a significant threat in the Mid-Atlantic region, it is a challenge in other parts of the Nation and a worrisome global climate concern. Baltimore City water customers are experiencing a substantial rise in water and sewer rates. The city implemented a three-year, incremental rate increase in 2022, raising rates 3% per year for potable water delivery and 3.5% per year for wastewater removal through the sanitary sewer, both of which are measured by volume. These increases will be directed at improving the city's aging water infrastructure. The rate changes represent a 10.5% cost increase for municipal volume-based water services to the Zoo by fiscal year 2025. This is additional to the infrastructure fees that are based on service pipe size of branches that feed the Zoo plumbing, and the stormwater fees that are based on the site's impervious area.

Water customers pay for not only every gallon of water that is delivered but also the volume for wastewater that is routed through the city's sanitary sewer system and water treatment infrastructure. The city water bills display the volume of potable water delivered and consumed by the Zoo per 100 cubic feet, or 1 CCF, which equals 748 gallons. In fiscal year 2021, the Zoo paid an average total of $12.56 per 748 gallons of potable water that moves in and out of its facilities. By fiscal year 2025, these rates will increase such that the Zoo will pay $14.48 per 748 gallons of water used.

Fiscal Year 2021 Water & Sewer Rates	1 JAN - 30 JUN	1 JUL - 31 DEC	2021 Avg Price per CCF (748 GAL)
Water Consumption ($/CCF)	$3.30/CCF	$3.63/CCF	**$3.47**
Sewer Consumption ($/CCF)	$8.70/CCF	$9.48/CCF	**$9.09**

The table shows the cost of potable water delivery relative to sewer water removal in 2021 as the first of 3 annual rate hikes was implemented

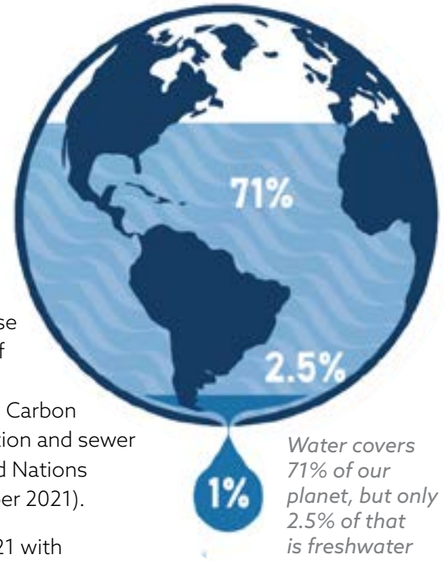
Water Benchmarking

Baltimore City's aged water conveyance and metering infrastructure and billing system present a challenge for water conservation. The accuracy of the Zoo's consumption data received from Baltimore City is unlikely to be 100% reliable but can identify trends to help determine strategies to enhance potable water efficiency and decrease consumption. The Zoo's capital projects department has engaged with a national water management firm, to examine a portion of the Zoo's water flows. A number of meters were installed to track water flows from the supply to corresponding local drains and sanitary sewer drains. The data is transmitted remotely as a gallon-per-day total and also reported at the more granular level of gallons per minute of water consumed each day. The metering system was commissioned to ensure proper function and data is available for regular review. This data will be analyzed and compared to monthly water bills to reconcile the readings, gain a better understanding of water flow through internal piping, and determine the accuracy of data from billing.

Zoo Baseline Water Consumption

The Zoo maintains 4 primary water and sewer meters as well as 1 additional water meter, the duck pond, that is not connected to the sanitary sewer. Because 12 full months of consistent water data was not available for the baseline year of 2021, they were not entered into Energy Star Portfolio Manager. Instead, water consumption and wastewater data were independently tabulated and analyzed. Carbon emissions from the Zoo's water system were determined by entering consumption and sewer data from 2021 bills into the Greenhouse Gas Calculator published by the United Nations Framework Convention on Climate Change (NFCCC) secretariat (v02.1-December 2021).

The Zoo meters showed a total water consumption of 15,425,845 gallons in 2021 with 15,345,488 gallons of wastewater processed at a cost of $186,848.61. No data was available for the Duck & Camel meter for September, October, and November.



Water covers 71% of our planet, but only 2.5% of that is freshwater and only 1% of that freshwater is available to us as potable (drinkable) water.

2021 Water & Sewer Consumption	CCF (748 Gal)	GAL	USD	Projected Water Cost @ FY2025 Rates
Water Consumption ($3.47/CCF)	20,622.79	15,425,845	$ 71,561.07	**$81,872.48**
Sewer Consumption ($9.09/CCF)	20,515.36	15,345,488	$ 186,484.61	**$215,616.43**
Total Cost	-	-	$ 258,045.68	**$297,488.91**

This table shows 2021 water and sewer consumption and projects the 2021 baseline in terms of 2025 rates reflecting the 15.29% increase that the Zoo will pay. This does not include infrastructure or stormwater fees which will also continue to increase.

Major water uses at the Zoo include drinking, restroom plumbing fixtures, concessions, kitchen use and associated appliances, exhibit life support systems, water features, landscape water needs, and animal area cleaning. There is some opportunity to reduce consumption by establishing appliance, equipment, and plumbing fixture standards and adjusting cleaning protocols to encourage dry cleaning before hosing animal enclosures, thereby decreasing the demand for water. The primary path to reducing water consumption requires evaluation of infrastructure condition, equipment efficiency, and life support systems along with the implementation of preventative maintenance and leak detection protocols including use of submeters.

Goals & Strategies • Water Management

Potable water delivered from the municipal system for use in Zoo operations contributed 8.70 metric tons CO_2e to the Zoo's 2021 carbon emissions. The treatment of wastewater removed from the Zoo through the sanitary sewer system to the Baltimore City treatment facility added 15.80 metric tons CO_2e to the atmosphere, more than twice the carbon associated with actual water delivery to the Zoo for use. Reducing water consumption on the campus will not only conserve water and save money but contribute to operational decarbonization efforts.

GOAL: Improve understanding and accuracy of water consumption data by December 2023.

Strategy: Examine internal water delivery infrastructure for proper functionality and develop a water service map to understand how water flows throughout the campus.

Strategy: Expand water submetering to improve data collection and monitoring accuracy.

Strategy: Maintain lines of communication with Baltimore City Department of Public Works to improve water use efficiency and monitoring accuracy.

GOAL: Reduce water use intensity (WUI) 15% by 2030 to reach 74 gallons per ft^2 annually.

Strategy: Engage in a robust leak detection program.

Strategy: Implement a preventative maintenance program for water systems and equipment.

Strategy: Develop facility design standards for water efficiency to achieve a minimum 30% water use reduction from the baseline code and consider other water conservation strategies in an integrated design process.

Strategy: Survey plumbing fixture counts and flow rates to calculate current facility design water use, including sensor-operated hand washing stations.

Strategy: Implement priority designation system for maintenance work orders that addresses repairs or improvements related to water-using equipment and infrastructure.

Strategy: Examine standard operating procedures in all departments to identify opportunities to decrease water demand.

Strategy: Establish procurement standards for new eligible water-using equipment and appliances to be EPA WaterSense® labeled (or equivalent 20% savings) or ENERGY STAR® rated and only use air-cooled systems for equipment temperature management.

WASTE & PROCUREMENT

Sustainable procurement and waste management are considered together because they are inherently linked. The products and packaging we consume today leave behind waste to be managed. Managing waste requires energy, land, and infrastructure and results in producing significant carbon emissions that are harmful to environmental and human health, including methane (CH_4), the powerful greenhouse gas. Deliberate, responsible purchasing can help reduce waste generation and improve the rate of waste diversion from disposal in the landfill and incinerator. The Zoo's scale of purchasing has potential to influence product supply chains toward responsible sourcing, manufacturing, packaging, and transport.

Waste Management

The product life cycle path from raw material to discarded waste item has traditionally been linear. To achieve zero waste, an organization must reduce waste generation at the source and exploit the principles of circularity for materials at the end of their intended life. Circularity, using waste from one process as an input for another, avoids natural resource and energy use associated with the extraction of virgin raw materials as well as the emissions resulting from product disposal and raw material sourcing.

Many packaging materials, like paper, cardboard, metals, and glass, can move efficiently and economically through a circular system retaining their value as a market commodity when reused or recycled. However, the collection, sorting, and processing of the many types of single-use plastics to become raw materials in the manufacture of new products is complex and expensive. Recycling plastics is not economical or efficient. There is little relative demand for recovered post-consumer plastics, and those products made from recycled plastic are sold at a premium cost. Because most plastics are not valuable in the circular economy and take many decades to breakdown, they persistently pollute our land, air, and oceans, even infiltrating our food supply. Avoiding the generation of plastic waste is the best way to prevent harmful effects throughout its life cycle from source through disposal.

WASTE HIERARCHY

The waste hierarchy illustrates that avoiding the generation of waste is the most valuable management strategy, while energy recovery and landfill disposal are the least preferable methods because they release polluted emissions and don't recover any material value or energy.

Zero Waste

is a goal that is ethical, economical, efficient, and visionary, to guide people in changing their lifestyles and practices to emulate sustainable natural cycles, where all discarded materials are designed to become resources for others to use. Zero waste means designing and managing products and processes to systematically avoid and eliminate the volume and toxicity of waste and materials, conserve and recover all resources, and not burn or bury them. Implementing zero waste will eliminate all discharges to land, water or air that are a threat to planetary, human, animal, or plant health.

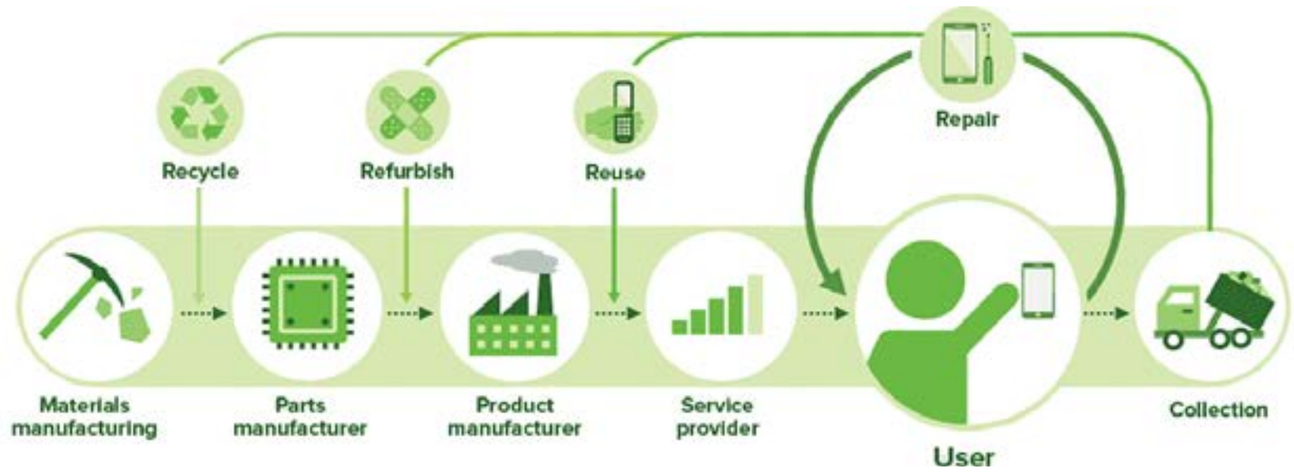
Waste Background

Municipal infrastructure plays a significant role in the Zoo's waste management. Commingled trash is collected by the Baltimore Department of Public Works (DPW), transported to the Northwest Transfer Station for compaction, then sent to the Quarantine Road Landfill or the privately-owned WIN Waste (formerly BRESCO Wheelabrator) for incineration. While the incineration of waste is often touted as an environmentally friendly method of recovering residual energy from solid waste, in truth, this practice is expensive, dirty, and causes significant point source pollution that contributes to Baltimore's poor air quality. While small amounts of energy may be captured from the waste combustion process, the byproducts include ash, steam, and toxins, making the incinerator the largest stationary polluter in Baltimore City.

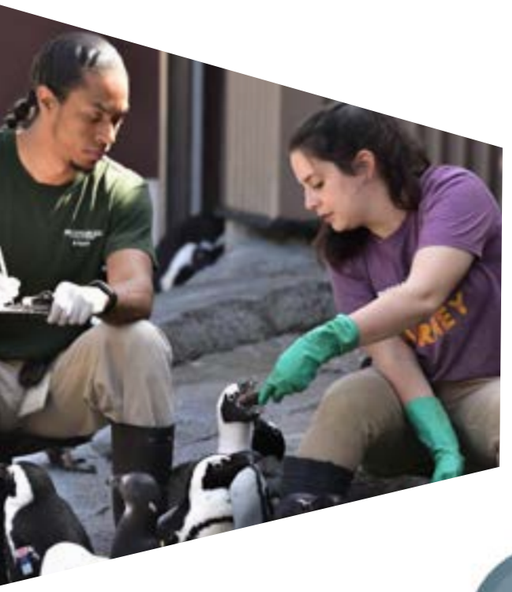
The Baltimore City WIN Waste incinerator emits enough sulfur dioxide (SO_2) to equal that released by 1.7 million cars annually. According to the EPA, even short-term exposure to this single pollutant can cause harm to the human respiratory system and make breathing difficult. People with asthma and other health vulnerabilities, particularly children, are sensitive to the effects of sulfur dioxide. Sulfur oxides and the particulates they form can contribute to acid rain that harms sensitive ecosystems and result in hazy conditions and decreased visibility. Data from the Tishman Environment and Design Center shows that about 40% of waste incinerators are in census tracts where both the percentage of people of color and the percentage of those living below the federal poverty line is above 25%. Neighborhoods surrounding the WIN Waste incinerator show some of the highest rates of childhood asthma in a city that already maintains adult and pediatric asthma rates much higher than the state and national averages.

Mayor Brandon Scott's administration aims to change the status quo of how Baltimore City manages waste. In its transition report, the administration recommended curbing Baltimore Department of Public Works' (DPW) dependence on the WIN Waste incinerator (BRESCO) by 2024 and committing to achieving Zero Waste (90% waste diversion from landfill/incinerator) by 2040. DPW is in the final stages of the master planning process to develop new waste solutions. These efforts echo the 2019 Baltimore Sustainability Plan waste goals as well as those of the 2018 Baltimore Food Waste & Recovery Strategy to reduce food waste by 50% and divert 80-90% of food waste from disposal to composting and digestion by 2040.

The incinerator handles 75% of municipal waste collected by DPW. Due to the City's low recycling rate of 15%, there is substantial plastic contamination in the waste that is incinerated. When burned, these plastics contribute to the most significant of the harmful health and environmental effects. For every 100 tons of waste burned in the incinerator, 30 tons of ash with concentrations of these leftover toxic pollutants are trucked to the Quarantine Road landfill for burial rather than being handled as toxic waste. In 2019, Baltimore sent 422,049 tons of waste to the incinerator. The decomposition of landfill waste results in significant methane emissions, a powerful contributor to climate change.



Circularity in waste management focuses on maintaining longevity of products and their component materials by designing for easy repair, reuse, and refurbishment. Products made from recyclable materials can be disassembled so their parts can be recycled and used as raw materials for new products.



Waste Management

The Zoo's trash as well as single-stream and commingled recyclables are collected by the Baltimore DPW and sent to the Northwest Transfer Station to be compacted for transport. Recycling is decontaminated, sorted, and bailed by commodity type (plastic, glass, cardboard, metal, etc.) by third-party vendor, Waste Management, at its Recycle America Material Recovery Facility (MRF).

The Zoo maintains an independent contract for paper and cardboard recycling and returns wooden pallets from bulk product delivery for reuse. Prior to the introduction of this sustainability plan, the Zoo established the goal of "Zero Waste" by 2030. The accepted definition of Zero Waste is a 90% diversion from disposal to a landfill or incinerator. It favors source reduction and diversion into the circular economy through recycling, salvage, and reuse. Meeting this target will require diligent attention to the end-of-life disposal options for all purchased goods and their packaging. This would also require the Zoo to discontinue waste collection through Baltimore DPW and pursue alternative waste management strategies that focus on material recovery circularity rather than disposal.

Strides to Zero Waste

The Maryland Zoo and its concessions vendor, SSA, have made great strides in reducing solid waste generation.

The Zoo orders cleaning solutions in bulk quantities to avoid single-use plastic waste.

The concession vendor uses durable rather than disposable food service items that can be washed, sanitized, and reused continuously.

Beverages including water are packaged in aluminum bottles or cans because it retains value in the post-consumer recycling market compared to post-consumer plastics.

To reduce single-use plastic from purchased water, bottle-filling stations have been installed and guests are encouraged to bring their own refillable water bottles on their visit (top right).

Between 2017-2020 the Zoo returned pallets for reuse or recycling, avoiding 51.62 metric tons of CO_2e. This is equivalent to taking 261 cars off the road for a year.

The Zoo composted 1200 pounds of food scraps in 2021.

The Zoo's gift shop has eliminated the use of plastic bags and is focusing on carrying sustainable products with minimal plastic packaging.

All Zoo staff are given a set of re-usable utensils.

The Maryland Zoo has been the reigning champion of the international Plastic Free July Challenge 6-years running!

Goals & Strategies • Waste Management

GOAL: Understand 100% of campus waste flows – material types, sources, and amounts generated on campus - December 2023.

Strategy: Conduct a campus-wide waste analysis.

Strategy: Increase vendor collection and delivery to Prince George's County Organics Compost facility.

Strategy: Conduct a packaging analysis for products received by the commissary and other delivery hubs, including concessions and gift shop.

GOAL: Divert 100% of animal manure waste and food waste from the Baltimore City waste management system by 2027.

Strategy: Secure funding for the purchase and installation of a large-scale, on-site compost system to process manure, food scraps, and PBI-certified compostable products.

Strategy: Increase vendor collection and delivery to Prince George's County Organics compost facility.

GOAL: Achieve Zero Waste (90% diversion) by 2030.

Strategy: Identify any material waste products that could serve as valuable inputs to another system. Examine opportunities for circularity within the Zoo and among community partners.

Strategy: Identify suppliers that could implement a reusable packaging takeback program.

Strategy: Establish and enforce a minimum diversion rate or a maximum waste generation rate (in pounds per square foot) for all construction and demolition waste.

Strategy: Increase organic waste diversion through current composting systems on-site and through the third-party vendor.

Strategy: Install a large-scale compost or digester system for food scraps, eligible animal waste, and other organic materials.

Strategy: Work with vendors, clients, and sponsors to transform all Zoo events into zero waste events.

GOAL: Eliminate 90% of single-use plastics from the Zoo campus by 2025.

Strategy: Inventory remaining products that are delivered in single-use, disposable plastic containers or that are wrapped in plastic film. Work with suppliers to determine if bulk purchasing or alternative packaging is available, or whether a packaging take-back program could be developed.

GOAL: Be a part of the Baltimore waste infrastructure conversation.

Strategy: Designate a Zoo staff liaison to engage with the Baltimore City Waste Commission.

GOAL: Divert 25% of commingled waste from the Baltimore City waste management system by June 2025; 50% by 2027; 75% by 2029; and 90% by 2030 from a 2023 baseline.

Strategy: Explore alternative disposal opportunities for the currently commingled Zoo waste materials.

GOAL: Improve waste management compliance in public and staff areas by 50% from 2023 baseline.

Strategy: Clearly mark recycling, compost, and landfill/incinerator waste receptacles with material disposal instructions.

Strategy: Engage in an education & awareness campaign to increase understanding of what happens to waste after it leaves our hands.

Strategy: Offer discounted admission for every guest who brings their reusable bottle with them on their Zoo visit.

Strategy: Conduct regular waste sampling and analysis to gauge progress on grounds and at events.

*Food waste is the largest single component of landfill waste at **24%** - U.S. EPA*

Zoo Teen volunteers educate guests about composting waste. The Zoo's on-site compost area provided 200 pounds of nutrient-rich soil to fertilize its gardens.

Landfilling organic waste is the most carbon-intense disposal option yielding 400kg (882 pounds) CO_2e per ton of organic waste, while composting yields only 40kg CO_2e per ton. Anaerobic digestion composting yields even less carbon. Application of compost output as fertilizer can also help avoid emissions effluent associated with traditional chemical fertilizers that cause eutrophication and acidification of waterways.

Procurement

Products that we use every day have environmental and social impacts around the globe. These impacts may occur at different points in a product's life cycle. The most universal impact is the accumulation of atmospheric carbon from greenhouse gas-producing processes used to grow or raise, extract, transport, manufacture, package, deliver, use, and dispose of every product. Some products, like automobiles, have the greatest negative environmental impact in their maintenance and use phase. A leather boot has little environmental impact during use but raising the cows from which the leather is produced is a very carbon-intense process as cows expel methane through their digestive processes. Life cycle considerations make it challenging to assess which products were sourced and manufactured more responsibly than others.

There are many resources and tools available to help navigate sustainable product attributes. Environmental product declarations (EPDs) outline the details of products' environmental effects, specifically their climate impacts. Health product declarations (HPD) articulate the chemical composition and potential health effects related to products. Responsible purchasing takes into account local sourcing is an important consideration in responsible purchasing, not only because it reduces transportation emissions, but also supports the regional economy which helps communities. There are a multitude of product testing standards and third-party certifications that provide assurances to consumers that manufacturers have followed applicable laws and best practices for environmental stewardship, and provided workers with adequate conditions, schedules, and a fair wage. B Lab's B Corp certification assures consumers that products and services were purchased from companies that demonstrate high social and environmental landscape. The International Living Future Institute's Just program is a voluntary disclosure tool to help companies optimize policies that improve social equity and employee engagement.

There are still many regions of the world where these protections are not guaranteed. In today's social climate, working with companies that do not maintain strong human rights and environmental standards may leave an organization exposed to the risk of incurring brand reputation damage. In 1948, the United Nations published the Universal Declaration on Human Rights in which Articles 4, 23 and 24 recognize workers' rights and related social protections. Many companies have adopted abbreviated statements within their procurement policies committing to support manufacturers, suppliers, and service providers that reject modern slavery in all forms and uphold worker rights. Zoo Atlanta encourages supplier diversity through its procurement mission which aims to provide equal access to procurement opportunities for minority and women owned business enterprises.

Products moving through the supply chain are responsible for indirect scope 3 greenhouse gas emissions. These are emissions produced outside an organization's boundary but from activities that support its operations, such as:

- **Employee commuting**
- **Professional travel**
- **Waste Processing**
- **Transportation of Goods**
- **Investments**

The Zoo as well as its concessions and gift shop partners have already made strides in working with suppliers on bulk purchasing of chemicals to reduce plastic use and sourcing produce from local vendors.

DEVELOP MARKETS FOR RECYCLED MATERIALS

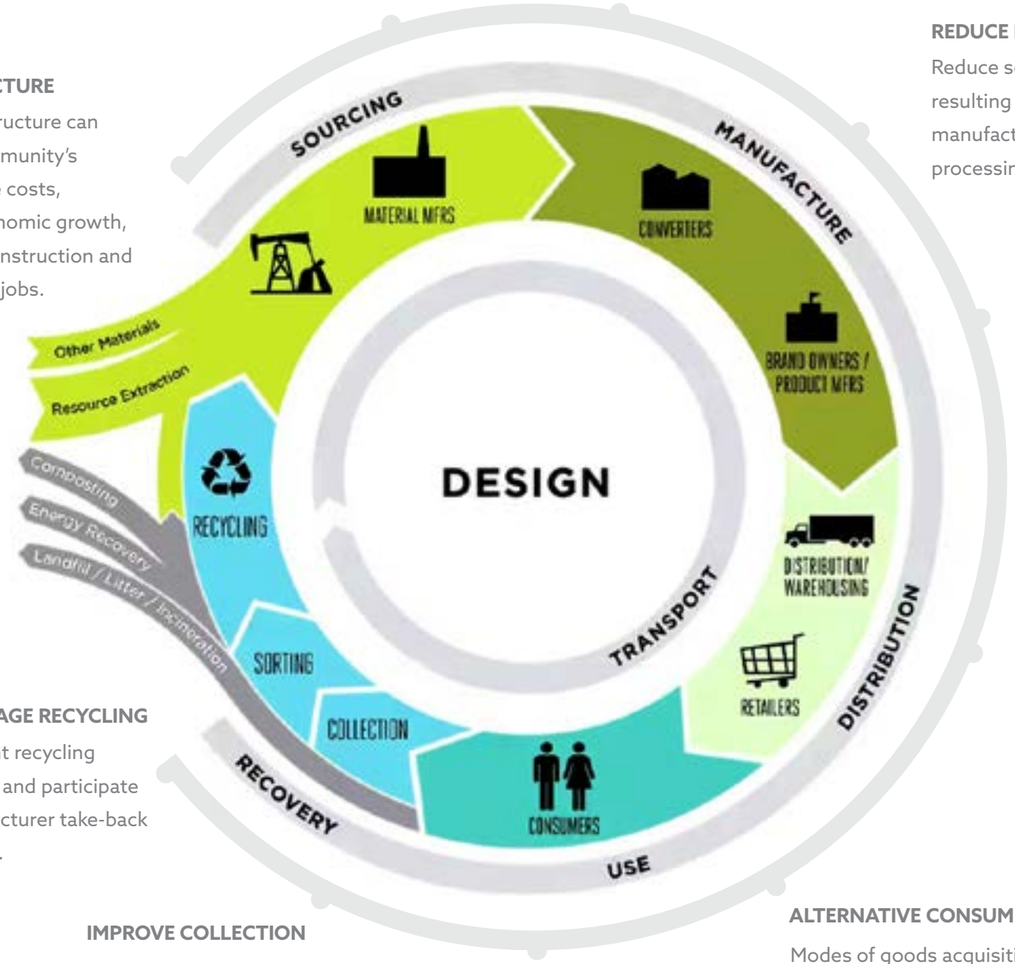
Design products and processes that require recyclable materials.

DESIGN BETTER PRODUCTS

Products that last longer as a result of using quality materials and fabrication methods.

INVEST IN INFRASTRUCTURE

Green infrastructure can reduce a community's infrastructure costs, promote economic growth, and create construction and maintenance jobs.



REDUCE PROCESS WASTE

Reduce solid waste resulting from an industrial/ manufacturing and/or processing operation.

BETTER DESIGN

Although product packaging is only used during the distribution phase, it contributes significantly to the life cycle environment cost of goods and should be minimized.

ENCOURAGE RECYCLING

Implement recycling programs and participate in manufacturer take-back initiatives.

IMPROVE COLLECTION

Make recycling collection easier for businesses and the general public.

PROMOTE REUSE

Create and implement reuse programs, participate in bring-your-own programs, reuse of already owned goods, incentives for return and reuse.

ALTERNATIVE CONSUMPTIONS

Modes of goods acquisition that do not involve acquiring new goods from formal retail and wholesale outlets, mail order/internet companies, hire purchase/rental agreements with formal businesses and social services.

Goals & Strategies • Procurement

Staff harvests a portion of animal produce from the Zoo garden.

GOAL: Commit to responsible purchasing.

Strategy: Develop a procurement policy that includes a statement on the Zoo's position on environmental performance and basic human rights protections as they relate to Zoo procurement.

Strategy: Purchase products from manufacturers that maintain transparency about product life cycle impacts.

Strategy: Communicate responsible procurement standards to vendors.

Strategy: Budget for cost premiums for sustainable, responsibility sourced products.

Strategy: Establish product standards for recycled content and other product attributes.

Strategy: Establish reuse and salvage clearinghouse on the Zoo intranet.

GOAL: Reduce negative impacts of Zoo event materials.

Strategy: Identify trusted vendors from whom to source, responsibly-sourced, plastic-free products at reasonable prices for Zoo events.

Strategy: Explore the opportunity for regional purchasing alliances to reduce cost premium for sustainable products.

Strategy: Include language on Zoo standards and instructions in vendor contracts and event materials to reduce material waste from partners' marketing collateral.

Strategy: Avoid excessive purchasing of event-branded merchandise and giveaways.

GOAL: Reduce transportation impacts from product purchasing.

Strategy: Seek opportunities for regional purchasing partnerships.

Strategy: Expand sourcing products locally.

Strategy: Enhance on-site food production.

GOAL: Reduce operational natural resource use and carbon impacts from purchased equipment and appliances.

Strategy: Establish equipment and appliance standards for:

- Energy efficiency – Energy Star®
- Water efficiency - WaterSense®
- Emissions and contributions to air quality loss.
- Prohibit water-cooled equipment on site in favor of closed loop or air-cooled systems.

GOAL: Reduce harmful health effects for users and contributions to air quality depletion from purchased equipment and appliances.

Strategy: Update operational protocols to decrease the use of energy-intense fuel-using equipment.

Strategy: Specify electric equipment over fuel-powered equipment wherever possible.

GOAL: Reduce replacement costs and carbon impacts from equipment purchase and use.

Strategy: Develop a detailed equipment inventory.

Strategy: Implement a preventative maintenance program to extend equipment life.

Strategy: Train staff in efficient equipment operation.

Strategy: Engage in long-term equipment and appliance rental or service contracts rather than purchasing equipment with shorter usable life and rapid technological innovation to avoid products becoming obsolete or incompatible with other systems before their end of their usable life.

GOAL: Reduce resource depletion from product purchasing.

Strategy: Establish reuse and salvage clearinghouse on the Zoo intranet.

Strategy: Establish product standards for recycled content.

Strategy: Expand education about the effects of purchasing decisions on the environment.

GOAL: Ensure vendor compliance with the Zoo's sustainability and procurement programs.

Strategy: Include language in RFPs and contracts to address vendor compliance with the Zoo's procurement policy and environmental standards.

Strategy: Include overview of the Zoo's sustainability program and related expectations and standards of behavior in contract documents and introductory materials for on-site vendors and contractors.

Strategy: Maintain a vendor inventory and prioritize suppliers with sustainable and responsible business practices.

Strategy: Continue to work with SSA on concessions and gift shop alignment with procurement standards.

TRANSPORTATION & FLEET MANAGEMENT

According to the US Environmental Protection Agency (EPA), transportation is responsible for 30% of the annual total greenhouse gas emissions on average. The typical gasoline-powered passenger vehicle emits 4,600 metric tons of carbon dioxide into the air annually.

There are several methods for reducing emissions from an organization's transportation operations, such as purchasing electric fleet vehicles and incentivizing the purchase of electric vehicles, by expanding charging infrastructure or creating preferred parking spaces. Promoting alternative transportation for Zoo visitors and commuting employees can help lessen the Zoo's transportation carbon footprint.

In 2021, the Zoo replaced the diesel trams that convey guests around the Zoo with electric models. The Zoo is purchasing a new, electric engine for the Jones Falls Zephyr train ride.

Goals & Strategies • Transportation

GOAL: Benchmark approximate miles driven, annual fuel use, and greenhouse gas emissions contributions from the Zoo's vehicle fleet for 2022.

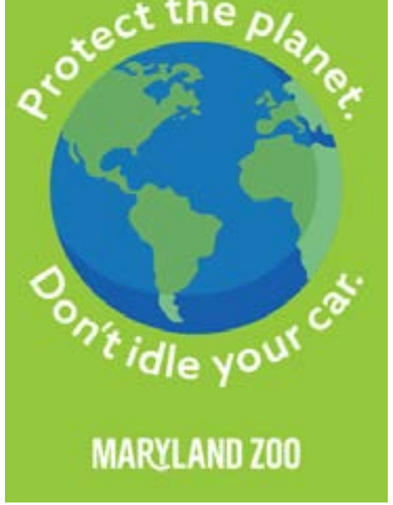
Strategy: Complete and maintain the "Maryland Zoo Fleet Vehicle Inventory Spreadsheet".

GOAL: Electrify 90% of vehicle fleet by 2035.

Strategy: In conjunction with annual budget preparation, use data collected in the Fleet Vehicle Inventory to prioritize vehicle replacement and establish a replacement schedule that considers efficiency and emissions factors and environmental impact of fleet vehicles alongside other criteria.

GOAL: Eliminate excess emissions from vehicles and conserve fuel.

Strategy: Implement a preventative maintenance program for all fleet vehicles to enhance fuel economy and avoid excess emissions.
Strategy: Conduct training on the best driving practices for vehicle fuel economy, emissions, and durability.
Strategy: Implement and enforce a policy that prohibits vehicle operators from idling engines when not actively traveling.



Caption: The Maryland Zoo Sustainability Committee developed a policy and campaign to prohibit vehicle idling around the Zoo campus.

Upper Right: The Jones Falls Zephyr will soon have an electric locomotive.

Lower Right: The purchase of electric Zoo trams cuts emissions and fuel use and improves air quality.

SITE & FACILITIES

The Maryland Zoo is home to several historic buildings and exhibits that represent the evolution of the zoological conservation industry. The restoration and adaptive reuse of these facilities not only helps to preserve elements of the Zoo's history, but also reduces the Zoo's building material inputs and carbon emissions relative to new building construction. Buildings are responsible for nearly 40% of carbon emissions in the United States.

97% *of Zoo staff responded that sustainable building design and construction is an important or very important goal.*

The Zoo's materiality assessment revealed that, as expected, most of the negative environmental impacts result from the operation of campus facilities and maintenance of site features and public spaces. Over the past two decades, the Zoo has addressed deferred maintenance issues and closed antiquated exhibits that previously resulted in discharge from leaks. The sources of environmental concerns that persist include on-campus combustion from fuel for building heating, cooking, rides, transportation, and maintenance equipment. The presence of refrigerant leaks was not examined at this time. Most of the Zoo's environmental impacts are the result of indirect emissions from building energy consumption and the life cycle impacts of goods through the supply chain.

In March of 2022, the State of Maryland published its revised High Performance Building Program that sets minimum sustainable design requirements for state-funded buildings. It requires that buildings comply with the 2018 International Green Construction Code (IgCC) or as an alternative compliance path, achieve third-party certification under the U.S. Green Building Council's (USGBC) Leadership in Energy & Environmental Design (LEED)[R] or the Green Building Institute's Green Globes program. Baltimore City is updating its own mandatory standard, but currently references the 2012 IgCC with LEED Silver Certification as an alternative compliance path.

While the Maryland Zoo has not historically pursued formal green building certifications, meeting those design and construction requirements and performance thresholds will help achieve the Zoo's sustainability goals. Lorax Partnerships will work with Zoo leadership to develop sustainable design and construction guidance that results in efficient, healthy, and comfortable facilities.

Goals & Strategies • Sites & Facilities

GOAL: Reduce the use of chemicals and other products that may have harmful effects on human, animal, and ecosystems health by 2024.

Strategy: Enhance existing chemical inventory and evaluation process by adding reference to:

- South Coast Air Quality Management District (SCAQMD) 1113 for paints and coatings and 1168 for adhesives and sealants.
- California Department of Public Health Standard Method 01350 for Testing & Evaluation of VOC Emissions and/or California Air Resources Board (CARB) compliance for other applicable building construction and products.
- Request Health Product Declarations (HPDs) and Environmental Product Declarations (EPDs) for all chemical and building construction and maintenance products.

Strategy: Review and revise protocols for the use of de-icing chemicals in response to winter weather to minimize environmental harm from contaminated effluent on campus and through the storm sewer system to local waterways.

Strategy: Review and revise protocols and criteria for the use of pesticides and herbicides to minimize unintended impacts to valuable species.

Strategy: Review and revise protocols for fertilizer use to prevent eutrophication and acidification of waterways.

GOAL: Increase resilience of facilities and site elements against threats.

Strategy: Address facility and operational resilience strategies in emergency response to protocols.

Strategy: Ensure resilience is a standard discussion item in design meetings for new capital development and renovation projects.

Strategy: Consult District of Columbia Resilience Design Guide during project planning.

GOAL: Achieve compliance with the Maryland High Performance Building Program for new construction or major renovation projects.

Strategy: Formally certify under one of the accepted third-party certification Leadership in Energy and Environmental Design (LEED), a program of the U.S. Green Building Council; International Green Construction Code; or The Green Globes protocol of the Green Building Initiative.

Strategy: Design and construct projects to comply with one of the above third-party certifications but engage in independent review of documentation to confirm compliance rather than formal certification.

Strategy: Establish tailored minimum standards for the sustainable development of capital facility renovations and new buildings including:

- Target maximum energy and water use intensity for each project.
- Verify intended Energy Use Intensity with an energy model.
- Implement a holistic, iterative integrated design process that includes input from all stakeholders.
- Adopt preliminary modeling and analysis of design factors that impact building efficiency.

Strategy: Include references to sustainable design and construction requirements in all design and construction documents and requests for proposals.

GOAL: Eliminate the need for supplementary heating and cooling to maintain occupant comfort in smaller spaces (e.g., admissions booths).

Strategy: The facilities team should evaluate these types of spaces and discuss thermal comfort issues with staff.

Strategy: Develop solutions like insulating these spaces or providing a more efficient thermal control system.

Goals & Strategies • Sites & Facilities

GOAL: Reduce the use of fuel-powered tools and equipment by 80% from 2023 baseline by 2030.

Strategy: Review standard protocols for tasks completed using fuel-powered equipment to determine alternative, cleaner, more efficient approaches.

GOAL: Eliminate resource consumption resulting from insufficient equipment and processes by 95% by 2027.

Strategy: Survey facilities and identify issues that staff report to create a prioritized master list of facility and process insufficiencies to be addressed (e.g., Bear 2 flow through process in place of a functional filtration mechanism).

Strategy: Survey front line staff for the top equipment function issues in each area and create an inventory and strategy to address issues.

Strategy: Eliminate water waste from water-cooled concession equipment by December 2024.

GOAL: Maximize technology system equipment use efficiency.

Strategy: Use power strips to habituate a convenient technology shutdown outside hours of operation.

Strategy: Introduce Energy Star efficiency requirements into the procurement of eligible computers and IT equipment.

GOAL: Maintain a healthy tree canopy on the campus.

Strategy: Survey the campus tree canopy.

Strategy: Provide labels for specimen and heritage trees for visitors.

KEYS TO SUCCESSFUL PLAN IMPLEMENTATION

The successful implementation of this plan is dependent upon the development of systems that support responsible environmental, social, and governance standards, the rethinking of established protocols, and the adoption of staff habits that contribute to sustainable operational performance. While this plan outlines several system improvements to advance sustainable performance at the Zoo, developing the habits necessary to work in a more sustainable, resource-efficient manner can be challenging. Experts report that it takes, on average, 2 months for a new behavior to be reinforced enough that it becomes an automatic habit.

> *"Success is the product of daily habits – not once-in-a-lifetime transformations."*
>
> *-James Clear, Atomic Habits*

Glossary

Acidification – Ocean acidification refers to a reduction in the pH of the ocean over an extended period, caused primarily by uptake of carbon dioxide (CO_2) from the atmosphere. Acidification reduces the amount of carbonate, a key building block in seawater. This makes it more difficult for marine organisms, such as coral and some plankton, to form their shells and skeletons, and existing shells may begin to dissolve.

Anthropogenic –Anthropogenic means something originated from human activity.

Benchmark – A benchmark is a standard or point of reference against which things may be compared or assessed.

Carbon Neutral – Carbon neutral refers to a state of balance between the carbon emitted and the carbon sequestered (absorbed).

Carbon Sink – A carbon sink is anything that absorbs more carbon than it releases.

Carbon Sequestration – Carbon sequestration is the process of absorbing carbon from the atmosphere.

Cohort – A cohort is a group of people with a shared characteristic.

Decarbonization – reduction or elimination of carbon dioxide emissions from a process such as manufacturing or the production of energy.

Effluent – Effluent refers to liquid waste discharge to a water body.

Emission – Emission refers to a gaseous discharge to air.

Energy Use Intensity (EUI) – The EUI is the amount of energy used per square foot per year expressed in thousands of British thermal units/ square foot/year = kBtu/ft2/yr.

Environmental Aspects – An environmental aspect is anything that happens within an organization that interacts with the environment.

Environmental Impacts – An environmental impact is any change to the environment, whether adverse or beneficial, resulting from a facility's activities, products, or services.

Eutrophication – Eutrophication describes excessive richness of nutrients in a lake or other body of water, frequently due to runoff from the land, which causes a dense growth of plant life and death of animal life from lack of oxygen.

Fluorinated Gases – Fluorinated gases include hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride and are synthetic, powerful greenhouse gases that are emitted from a variety of household, commercial, and industrial applications and processes.

Greenhouse Gas Emissions – gases in the Earth's atmosphere that trap heat.

Greenhouse Gas Scope 1 Emissions - Emissions are direct emissions from company-owned and controlled resources often from on-site combustion of fuels.

Greenhouse Gas Scope 2 Emissions - Emissions are indirect emissions from the generation of purchased energy from a utility provider. In other words, all GHG emissions released in the atmosphere, from the consumption of purchased electricity, steam, heat and cooling.

Greenhouse Gas Scope 3 Emissions - Emissions are all indirect emissions that are not included in scope 2 - that occur in the value chain of the reporting organization, including both upstream and downstream emissions. In other words, emissions are linked to the organization's operations.

Global Warming Potential – Global Warming Potential (GWP) was developed to allow comparisons of the global warming impacts of different gases. Specifically, it is a measure of how much energy the emissions of 1 ton of a gas will absorb over a given period of time, relative to the emissions of 1 ton of carbon dioxide (CO_2).

Half-life – A substance's half-life is the time required for one half of the atoms of a given amount of a radioactive substance to disintegrate.

Life Cycle Assessment (LCA) – LCA is a method used to evaluate the environmental impact of a product through its life cycle encompassing extraction and processing of the raw materials, manufacturing, distribution, use, recycling, and final disposal.

Life Cycle Cost Assessment (LCCA) – LCCA estimates the pure financial impact over the life of the investment. This process is often used to compare building systems and equipment and typically considers the product's first-cost, installation cost, maintenance cost over its operational cost, and sometimes the disposal or decommissioning cost at the end of the product's usable life.

Materiality Assessment – Materiality assessment is a process by which the examination of a variety of factors and their potential impact on the organization and importance to stakeholders to determine what operational issues to prioritize in an ESG sustainability plan.

Morbidity – Morbidity describes the state of suffering from an illness or the rate of disease in a population over time.

Mortality – Mortality describes the state of being subject to death or the rate of death in a population over time.

Net Zero Energy – Net Zero Energy describes a building, organization, or process that meets all its energy consumption needs through efficient operation and renewable energy generation.

Non-Point Source Pollution – Non-point source pollution describes pollution for which either the source cannot be identified or results from many sources.

Point Source Pollution -Point source pollution describes pollution for which a source can be identified, such as a spill or discharge.

Power Purchase Agreement (PPA)– A power purchase agreement is an arrangement in which a third-party developer installs, owns, and operates an energy system on a customer's property. The customer then purchases the system's electric output for a predetermined period.

Resilience – Resilience is the capacity of an organization or community to withstand or to quickly recover from environmental pressures and disruptive climate events.

Water Use Intensity (WUI) – WUI refers to the amount of energy used per square foot per year expressed in thousands of gallons/square foot/year = kGal/ft2/yr.

Zero Waste – Zero Waste means designing and managing products and processes to systematically avoid and eliminate the volume and toxicity of waste and materials, conserve and recover all resources, and not burn or bury them. Most certifications require a minimum of 90% of waste to be eliminated or diverted into the circular economy.