Materials Management in Oregon
2020 Framework for Action

State of Oregon
DEQ Department of Environmental Quality

Painted Hills, Wheeler County

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Contents

Commonwealth Lake Park, Cedar Hills

1. Introduction

> **2050 Vision for Materials Management:**
> Oregonians in 2050 produce and use materials responsibly – conserving resources, protecting the environment and living well.

Materials play a significant role in our health and the health of the planet. We produce, use, consume and discard materials every day. These materials have environmental impacts on the air, water and land around us. They can also have health impacts on people who come into contact with the materials, including the workers employed to extract, manufacture and dispose of the materials.

In 2011, DEQ convened a workgroup to develop a materials management plan for Oregon that would address the significant environmental and health impacts of materials across their full life cycle—from product design to manufacturing, transportation, use and end-of-life management. The result, the *2050 Vision and Framework for Action*, envisioned an Oregon in 2050 where people produce and use materials responsibly—conserving resources, protecting the environment and living well. The plan included a *Framework for Action* that identified pathways, principles and actions for achieving the *2050 Vision*. This Framework is a flexible platform to guide progress toward the *2050 Vision*.

This *2020 Framework for Action* is an update of the original framework, which was published in December of 2012.

2. Purpose of this Document

The *2020 Framework* elaborates on our core values and priorities, including emerging work. Like the original Framework, it is intended to be flexible. The *2050 Vision* remains unchanged and will continue to be our guiding compass and embody the program's overarching objectives.

This *2020 Framework* serves four important functions; it

- Serves as a flexible platform to guide progress toward the *2050 Vision*
- Identifies Materials Management's primary priority areas
- Articulates core values and guiding principles
- Provides a Framework for others to apply the sustainable materials management approach

We intend this Framework for Action to be dynamic and responsive and plan to reevaluate it again in 10 years, or earlier if needed. We want to foster continuous improvement to ensure it effectively guides future actions toward achievement of the *2050 Vision.*

3. Call to Action

The *2050 Vision* is a vision for all of Oregon—one DEQ cannot achieve alone. Realizing the *Vision* will require engagement, insights and action from businesses, local governments, nonprofits, community groups, and people from both inside and outside Oregon. While we have developed and will continue to develop partnerships and collaboration on specific projects flowing from our priorities, we are inviting broader participation to engage in this important work.

> Materials and products—both made in Oregon and used in Oregon— support human health, well-being and healthy, resilient environments and communities. Sustainable use of materials allows all people to enjoy a prosperous, clean economy and fulfilling lives, now and in the future.

The stakes are high. Human-caused greenhouse gas emissions are the main driver of climate change, a process that is threatening the welfare of human and nonhuman species alike.[1] They are linked to rising sea levels, changes in the frequency of extreme weather events, the spread of human and agricultural disease vectors, and numerous other hazards to human health and quality of life.[2] In the Pacific Northwest, the impacts of climate change are already visible in changed patterns of precipitation and snowmelt, creating

[1] Intergovernmental Panel on Climate Change, "Climate Change 2014: Synthesis Report," 2014, https://www.ipcc.ch/pdf/assessment-report/ar5/syr/SYR_AR5_FINAL_full_wcover.pdf; Brett R. Scheffers et al., "The Broad Footprint of Climate Change from Genes to Biomes to People," *Science* 354, no. 6313 (November 11, 2016): aaf7671, doi:10.1126/science.aaf7671.

[2] Anthony J. McMichael, "Globalization, Climate Change, and Human Health," *New England Journal of Medicine* 368, no. 14 (April 4, 2013): 1335–43, doi:10.1056/NEJMra1109341; Intergovernmental Panel on Climate Change, "Climate Change 2014: Synthesis Report."

Mount Thielsen, Douglas County

significant risks to agricultural production. Meanwhile, rising sea levels threaten coastal communities.[3]

A significant amount of our greenhouse gas emissions comes from our consumption of materials. We estimate that Oregon's direct consumption of materials in 2015 contributed approximately 41 percent of all consumption-based emissions – more than emissions resulting from direct consumption of fuels (22 percent) and electricity (11 percent) combined.[4] Moreover, the bulk of a good or service's emissions occur before it is purchased, rather than from its disposal.[5] This research suggests that strategies related to promoting sustainable production and consumption can effectively reduce Oregon's contribution to greenhouse gas emissions.

Climate change is not the only environmental impact of material production, use and disposal. Air pollutants, discharges to water, smog formation, ozone depletion, soil degradation and erosion, toxicity, or land use change are some, but not all, of the other environmental impacts that arise across the life cycle of materials. There are also social impacts to materials, including hazardous working conditions, labor rights issues, health and safety concerns, environmental justice considerations and geopolitical conflicts. It is important to acknowledge and weigh these

[3] Jerry M. Melillo, Terese Richmond, and Gary W. Yohe, "Climate Change Impacts in the United States: The Third National Climate Assessment," 2014, http://s3.amazonaws.com/nca2014/low/NCA3_Climate_Change_Impacts_in_the_United%20States_LowRes.pdf?download=1.

[4] "Appendix A and B: Oregon's Greenhouse Gas Emissions through 2015: An assessment of Oregon's sector-based and consumption-based greenhouse gas emissions," May 2018, https://www.oregon.gov/deq/FilterDocs/OregonGHGreportAB.pdf..

[5] Less than one percent of emissions were associated in 2015 with the disposal of goods following their use by consumers, while more than 66 percent were associated with activities that happen in a product's life cycle before it is purchased and used by the consumer, such as resource extraction and product manufacturing. Oregon Department of Environmental Quality, "Appendix A and B: Oregon's Greenhouse Gas Emissions through 2015: An assessment of Oregon's sector-based and consumption-based greenhouse gas emissions," May 2018, https://www.oregon.gov/deq/FilterDocs/OregonGHGreportAB.pdf.

sometimes competing impacts—if we focus on addressing only one impact exclusively, we may simply trade one type of impact for another.

The *2050 Vision* leaves room for DEQ and others to evaluate how to balance actions to address these different impacts – in other words, leaving flexibility as we learn and grow.

We invite everyone who is passionate about a future where people in Oregon live well to join us in striving towards, shaping and realizing the *2050 Vision*.

4. Implementation of Framework

To achieve the desired outcomes in the *2050 Vision*, the *2020 Framework* includes, **core values** to support *wh*y we do our work, **pathways** for *how* we do our work, and **priorities** to determine *what* work we do.

Core Values

Why core values?

> DEQ's mission is to be a leader in restoring, maintaining and enhancing the quality of Oregon's air, land and water.

Since the *2050 Vision* was adopted in 2012, we have learned a great deal about the larger systems in which we operate, and what it means to advance a sustainable materials management agenda in today's world. We are now more aware of the connections between our work and the social, behavioral, economic and myriad other factors that influence our consumption patterns and use of materials. Traditional environmental work has sometimes forgotten the "people" part of the equation and, in turn, ignored our humanness, community connections and values. We created these core values in order to clarify and strengthen that interdependence between people, planet and the economy. Our work is not just about materials, but about people and all living things that use and consume those materials and that are impacted by their use.

We will use these core values to build support for our initiatives, both internally and externally. They will also serve as a foundation on which to build and strengthen partnerships. These values will guide development of strategic plans, as well as project plans for our work. Our core values will also enable us to identify and make the case for addressing important issues that emerge in the future.

These values complement and build on DEQ's agency-wide values, just as the *2050 Vision* complements DEQ's mission. DEQ's values are: environmental results; public service; partnerships; excellence and integrity; teamwork; employee growth; diversity; health; safety and wellness; and economic growth through quality environment. The guiding principles from the original *Framework for Action* align with these values and we view the guiding principles as more specific direction for achieving the *2050 Vision* and DEQ's mission.

Materials Management Core Values:

- **Healthy environment for all.**
  Everyone has a right to live in a healthy environment free of toxics and other environmental threats – now and in the future. We work to protect ecosystems and ensure access to ecosystem services, including clean air, water and land, for all living things.

- **Dignity for all human beings.**
  Everyone is worthy of dignity and respect. A healthy environment is important for preserving human dignity and wellbeing.

- **Social equity is an environmental issue.**
  Improving outcomes for historically marginalized communities is an environmental imperative. When the environmental benefits and burdens of materials are more equitably distributed, only then can every material choice be a sustainable one.

- **Collaboration makes us stronger.**
  We benefit from the experience, knowledge and perspective of others. It is essential for us to cooperatively engage and share power with community members and partners across disciplines.

- **Research and measurement are valuable tools.**
  We use scientific and meaningful measurement to understand where our opportunities are, to guide policy and program decisions, and to be accountable for our decision-making.

- **We can move beyond business as usual.**
  We need significant change in order to produce and use materials responsibly and that means challenging the status quo. It is important that we continuously pursue better outcomes from our economy, environment and other systems.

- **We must be adaptable to succeed in the face of change.**
  The path to realizing the 2050 Vision will contain unforeseen challenges, roadblocks and new opportunities. In order to achieve our goals, we must be prepared to adjust and adapt our approach to the unexpected.

- **The needs of all communities inform our work.**
  We respect the diversity of perspectives across Oregon. We strive to understand the variety of lived experiences and make our work relevant to each community across the state.

Guiding Principles

DEQ's Guiding Principles for Materials Management

When prioritizing, planning and implementing actions, DEQ will consider the following guiding principles:

- Develop and implement policies and programs based on robust research.
- Lead when appropriate.
- Coordinate and collaborate with partners.
- Ensure that actions complement one another.
- Build on what's already working, such as using existing infrastructure when possible.
- Focus on high-impact materials and processes.
- Be flexible and adaptable.
- Continuously use the Framework for Action and update as necessary.
- Consider environmental and other impacts of policy options, including:
    - Social equity
    - Quality of life
    - Economic viability
    - Potential unintended consequences

Pathways

To move from our current reality to the desired outcomes for 2050, we have organized how we do our work into four pathways.

- **Foundations.** Establish and achieve new goals and measurements to lead to highest environmental outcomes. Implement rules that protect and enhance environmental and human health. Scientific research and innovation will inform program decisions and policy.

- **Policies and regulations.** Develop and implement policies and regulations that focus on managing materials through all stages of their life cycle. DEQ will lead when appropriate and support other regulating agencies to develop and implement policies that support the *2050 Vision.*

- **Collaboration and partnerships.** DEQ will engage and collaborate with a range of stakeholders and community members to explore and develop solutions to environmental challenges. We will work through established partnerships and build new partnerships with businesses, community groups, governmental and nongovernmental organizations. . Implementation will be done by building on existing work and infrastructure when possible and ensuring actions complement others efforts.

- **Education and information.** DEQ will continue to develop and share information such as research, studies, plans and educational materials that have been developed by DEQ and by other partners.

Crater Lake, Klamath County

5. Priorities

The following priorities reflect our program's intended priorities for the next 10 years as we advance toward the *2050 Vision*. Using the core tenets of sustainable materials management and applying life cycle thinking, we have identified these priorities as critical to achieving the *2050 Vision*. These priorities include materials that have significant environmental and health impacts (for instance, air pollutants, toxics and major contributors to greenhouse gas emissions.); our engagement with existing and new partners and stakeholders; and areas that will be crucial to achieving the *2050 Vision*. As environmental impacts of materials continue to alter our natural landscape in permanent and sometimes catastrophic ways, we may add priorities to respond to unexpected situations or new opportunities for meaningful action. We invite our staff, partners and public to engage with us on these priorities—or to help us identify new priorities that deserve attention.

Lifecycle Programs

Built Environment

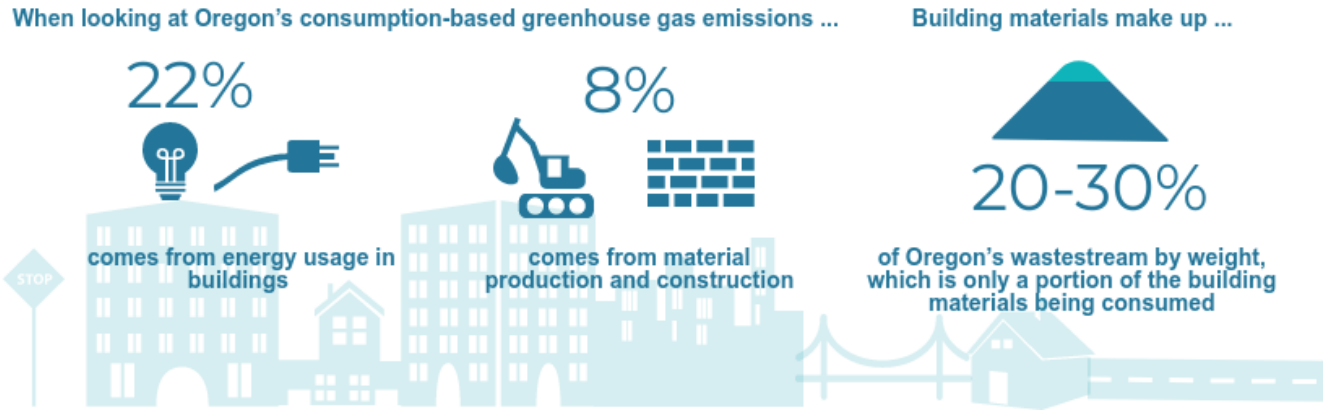
Our work in the built environment examines the environmental impacts of human-made structures and spaces that provide the setting in which we live, move and interact. This includes buildings, roads, bridges, parks and utilities.

Why it matters

The construction materials sector accounts for eight percent of Oregon's 2016 consumption-based greenhouse gas inventory, and the use of energy in buildings accounts for an additional 22 percent of the state's emissions – making the built environment responsible for approximately 30 percent of Oregon's 2016 consumption based greenhouse gas emissions. In Oregon, building materials account for 20-30 percent of waste generation in the municipal solid waste steam, the waste stream represents just a portion of the materials being consumed and used in our building and infrastructure stock. In addition, many people living in Oregon spend a

significant portion of their time inside buildings, which makes the design, aesthetics and health of materials choices important contributors to our wellbeing.

Our work
We have a long history of working in the built environment – strengthening the state's small housing movement, supporting material reuse and deconstruction through research and grants, and collaborating with the Oregon Concrete and Aggregate Producers Association to reduce the impacts of concrete mixes. We are developing a strategic plan that will guide our work over the next few years. The plan will call for the reductions in embodied carbon of materials, which are important in reducing short-term climate impacts of buildings and infrastructure. We're also exploring pathways to reduce toxics in building products, to enhance measurement and disclosure of impacts through third-party certifications, and to use building and zoning code to accelerate large scale change. We will also consider strategies to better utilize, maintain and repair existing building stock, because reducing demand on new material production yields the largest environmental benefit.



Business Initiatives

We work with the business community to voluntarily implement options that reduce environmental impacts.

Why it matters
Businesses contribute to our economy but also add burdens on the environment. They are often in a unique position to change how materials are used in product design, manufacture and transport, use and discards of products. Where specific materials have a demonstrable impact reduction potential, such as on climate change or human toxicity, businesses can leverage their position to take meaningful action. In short, helping Oregon businesses become more environmentally responsible can benefit individual businesses and the communities they operate in. It can also affect the supply chain as many items are purchased from outside the state and country.

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Our work
Our work in business initiatives is not necessarily limited to a single programmatic area or a specific business or sector, but spans industries, product categories and focus areas. For instance, initiatives involving the built environment often encompass many business-facing activities, products, and services. We offer sustainability audits and technical support for businesses; sponsor internships at businesses to help identify sustainability opportunities; share relevant scientific research; and provide businesses with learning opportunities, technical assistance and some financial incentives in order to inspire meaningful actions to reduce environmental impacts. Projects can involve foundational research, stakeholder engagement, training, knowledge-sharing, and collaboration. Future projects may focus on developing guidance and best practices, and fostering industry-wide collaboration.

Food – Prevention and Recovery

Food is one of the most significant materials in terms of environmental impacts. Our program views food holistically—from production, distribution, refrigeration and preparation through final disposition.

Why it matters
A significant amount of greenhouse gas impacts associated with food comes from its production, and an estimated 25 to 40 percent of all food produced or imported for consumption in the United States is never eaten. Both the *2050 Vision* and the Oregon Global Warming Commission's *Interim Roadmap to 2020* identify preventing food waste as a priority for Oregon because of the environmental burdens associated with food and its disposal when wasted. The EPA estimates that potential greenhouse gas savings associated with preventing the wasting of one ton of food are approximately 6-7 times larger than the savings associated with recycling that food through composting or anaerobic digestion.

Our work
In 2017, DEQ created a *Strategic Plan for Preventing the Wasting of Food* that identified nine projects to pursue over the next five years. Several projects, such as a study on wasted food generation and a deep dive into the environmental impacts of food rescue, have been completed and are informing our ongoing work. DEQ's "Wasted Food Wasted Money" campaign (produced in English, Spanish, Vietnamese and Russian) continues to evolve as a resource for grocery stores, restaurants, and other food service businesses. Outside of the commercial sector, we are conducting market research to support the development of a multi-year,

statewide campaign to encourage Oregon community members to reduce food waste at home. This campaign will serve as a model for other agencies and be easily adaptable for others to use and refresh over the course of several years.

Forging and maintaining new partnerships is a core component of our food work. For example, our partnership with Metro regional government and the Oregon Restaurant and Lodging Association has led to a series of workshops held across the state for commercial food service businesses. This relationship is ongoing, and we're actively looking for ways to build on workshop success and find other ways to engage with ORLA members. We also play a lead role in convening a regional coalition of interested states and cities to advance food waste reduction among food retailers and their suppliers. We are doing this work through the Pacific Coast Collaborative, an intergovernmental partnership aimed at fostering climate change collaboration among its members. A key component of the PCC work is the development of a public-private partnership with food retailers on the west coast. Under this partnership, we will work together with retailers and businesses in their supply chains to identify ways the food retail sector can reduce its food waste. Four retailers have already agreed to join the partnership, and work on the technical program for the partnership will begin in 2020.

On March 10, 2020, Governor Kate Brown issued an executive order that directs several state agencies, including DEQ, to take action to reduce greenhouse gas emissions and avoid the worst effects of climate change. Among the specific directives in the executive order is one that calls on the Environmental Quality Commission and DEQ to "take actions necessary to prevent and recover food waste, with the goal of reducing food waste by 50 percent by 2030." This new directive will help further focus and drive our work for the next 10 years, and should bring us new resources to expand our existing activity.

Procurement

Procurement is the practice of selecting and purchasing goods and services. DEQ is currently focused on the buying practices of state and local governments. The goal of sustainable procurement is to leverage the activities of these larger institutional purchasers to drive changes in product design, formulation and production for better environmental performance and improved labor conditions.

Why it matters

State agency procurement of goods and services from 2013-2018 averaged about $3 billion in annual spending. Procured goods and services have significant social and environmental impacts over their life cycle with the purchasing activities of public agencies contributing over 50 percent of total GHG emissions from operations. State and local governments in Oregon have a unique opportunity to create and sustain the demand for better product choices. Large purchasing contracts serve as a platform for working with vendors to secure higher-performing, lower-impact products and making these options more readily available in the market. Through leadership in its own procurement, the state can also engage with and support changes in the even larger space of business procurement.

Our work
DEQ collaborates with state and local agencies—both in and outside Oregon—and professional organizations to promote sustainable procurement. Sustainable purchasing guidelines and strategies are developed with the objective of reducing environmental, health and social impacts of products and services. In some cases, Oregon has strong sustainable procurement policies that would benefit from improved implementation and training of procurement staff and vendors. We are supporting the efforts of Oregon's Department of Administrative Services to develop a formal sustainable procurement program, as well as assisting other agencies and organizations. Future opportunities within DEQ include the development of sustainable criteria for DEQs loan programs, cleanup actions, and grants.

Product Stewardship

Product stewardship is an environmental management strategy in which all parties involved in the design, production, sale and use of a product take responsibility for minimizing the product's environmental impact throughout the stages of its life. The greatest responsibility lies with whomever has the most ability to affect the life cycle environmental impacts of the product—typically, the producer.

Why it matters
For products that don't require energy for their use, the large majority of environmental impacts typically occur before a consumer purchases them. In these cases, producers are often in the best position to reduce such impacts.

In the traditional model of environmental regulation, if one jurisdiction (for example, Oregon) acts to regulate industry sources of pollution more aggressively than other states or nations, businesses in that jurisdiction may be disadvantaged. However, product stewardship can offer ways to regulate and reduce the environmental impacts of products regardless of where the producer is located. By regulating the impacts of products sold into Oregon (as opposed to production inside Oregon) it treats all businesses equally regardless of geographic location.

Product stewardship can also help ensure that environmental and health impacts across the full life cycle of a product are reduced and that outstanding impacts are reflected in product prices. Such pricing gives consumers the power to choose more sustainable options and can create further signals that result in the reduction of these impacts.

Our work
Product stewardship can use both voluntary and regulatory approaches. Opportunities for action include: advancing EPR and other forms of product stewardship (including elements that extend beyond end-of-life management), using both voluntary and regulatory approaches consistent with DEQ's *Recommendations for Product Stewardship in Oregon* (2010); supporting voluntary product stewardship through focused research, technical assistance and financial incentives for high-impact demonstration or pilot projects; and coordinating with partners, such as other states or the federal government, to advance understanding and implementation of both voluntary and regulatory product stewardship. We will also consider increasing awareness of the potential benefits that product stewardship programs can play in reducing the environmental and health impacts of products. Additionally, we may consider promoting producer disclosure requirements that give consumers more information about the environmental, health, and social impacts of

products. This would allow all partners to make more conscientious decisions about purchasing, while motivating producers to improve processes to reduce these impacts.

Reuse, Repair, Product Life Extension

Making goods and materials last longer reduces the demand for new products and slows the flow of materials through the economy. Maintenance, repair and reuse gives items like cars, electronics, clothing and furniture a longer useful life so they don't have to be replaced as frequently.

Why it matters
Extending the lifetime of products typically offers significant environmental benefits by preventing the production of new replacement goods and the associated impacts from material extraction, processing and disposal. Many everyday products can have a longer useful life with proper maintenance and repair and still have value once discarded. Capturing this value through expanded opportunities for repair, refurbishment, resale and reuse reduces a broad variety of environmental impacts and offers greater access and affordability to many who can benefit from low-cost alternatives. Repair and reuse industries contribute significantly to employment and economic prosperity in Oregon and help to rebuild the skills and practices we need to be more resourceful.

Our work
DEQ has an existing *Strategic Plan for Reuse, Repair and Extending the Lifespan of Products in Oregon* that covers the period of 2016-2021. The plan identifies three priority materials: building materials, textiles, and manufactured goods that have remanufacturing potential. The plan also identifies a number of specific strategic actions, including foundational research, expanding infrastructure, increasing demand, and providing policy support where needed. Examples include grants to support workforce development and industry expansion, new infrastructure and reuse opportunities. Additional actions include partnerships with businesses to advance "circular" models that prioritize reuse, repair and remanufacturing; and support for state and local incentives like deconstruction and adaptive reuse of buildings, Right to Repair legislation, and single-use product restrictions.

DEQ reuse and repair grant recipients (left to right): Renewal Workshop, JD's Shoe Repair and ToolBox Project

Sustainable Consumption

The concept of Sustainable Consumption points to the balance of material goods and lifestyle choices that allows humanity to thrive while preserving the quality of natural systems on which all life depends.

Why it matters
Global economic output today is almost 10 times larger than it was in 1950, and as production and consumption have increased, so too has the flow of materials and energy through the economy. Climate change, pollution, resource depletion, habitat loss and eco-system degradation are the result of placing increasing pressure on the planet's natural resources. Achieving a sustainable level of consumption requires scaling economic activity and supporting consumer lifestyles to stay within the limits of natural ecosystems, while meeting basic needs for a healthy and meaningful life for all.

Our work
We are taking a comprehensive approach to address the underlying forces driving consumption habits and lifestyles. Economic policy, business practices, media and popular culture encourage increased consumption. This complex set of forces also offers a broad suite of possible interventions for influencing lifestyles and consumption patterns. Many of the potential solutions extend beyond DEQ's sphere of influence and control, so partnerships and collaboration will be key to broader engagement and action. Initial priorities include: building productive partnerships with academic, non-profit and community partners; and fostering engagement with state and local governments, businesses and the public. The goal is to spark new conversations, engage new partners and audiences, test new ideas, and facilitate new ways of meeting everyone's needs.

Toxic and Hazardous Materials

People may be exposed to dangerous substances through everyday items we use and consume. These substances have the potential to accumulate in the environment, and in our food and bodies.

Why it matters
Addressing the toxicity of materials in our economy is central to the long term well-being of Oregon, and it is central to the concept of "living well" in the *2050 Vision*. Many of DEQ's existing regulatory programs in air, water and land allocate substantial resources to limit toxics pollution. Eliminating toxic and hazardous substances from products today will have the added benefit of avoiding costly cleanup and regulatory programs for these chemicals in the future.

Our work
The *2050 Vision* acknowledges and sets a high priority on the reduction and elimination of toxics. We explore opportunities to reduce hazards and exposure through cross-programmatic activities guided by our *Toxics Reduction Strategy.* The strategy includes a broad suite of actions that complements and supports ongoing efforts in Materials Management and other DEQ programs. The strategy has actions that focus on built environment, government

procurement and business initiatives that have a strong connection to our program. Additionally, the strategy focuses on eliminating toxic chemicals on DEQ's Toxic Focus List.

Addressing hazardous products and waste has been an ongoing program effort for DEQ. Household Hazardous Waste (HHW) collections were conducted and promoted to collect unwanted hazardous and toxic materials from households, and later small quantity waste generators such as small businesses and institutions. The program has also actively removed hazardous wastes from school laboratories to safeguard Oregon's children.

Measurement

Goals and Measures

Measurement is the use of metrics to evaluate the state's success or failure at achieving its environmental goals. The state has many existing environmental goals and may set new goals towards achieving the *2050 Vision*. Goals and measures can happen at the project or program scale.

Why it matters

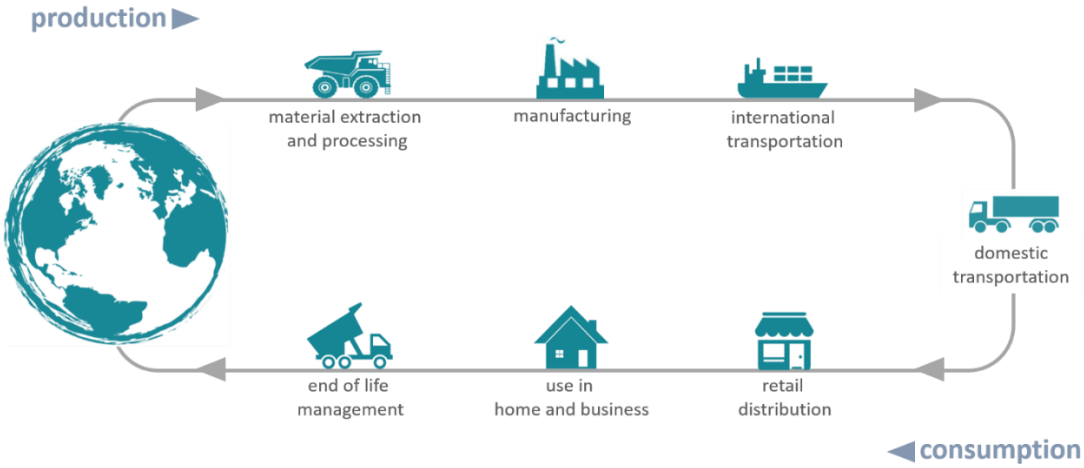
Traditionally, evaluation of the environmental impacts of materials has relied on statistics involving the disposal, recovery and generation of garbage by different sectors, including homes, businesses, institutions and governments. These waste-based indicators provided a rough estimation of the flow of materials in the Oregon economy. But they fail to adequately address the impacts of materials on compelling issues such as climate change, resource depletion, and emissions to land, waste and air. These pressures require a reorganization of the traditional perspective of materials consumption. DEQ works with goals and measures to create a more holistic metrics that direct us toward material stewardship, and enhancing the well-being of all.

Our work

The goals and measures work is intended to devise the methods, data collection and forecasting tools that needed to chart a meaningful path forward for reducing and tracking environmental impacts of materials. Current work includes a consumption based greenhouse gas emissions inventory (CBEI), a supplement to Oregon's sector based emissions inventory that has helped identify consumption-related greenhouse gas hotspots. CBEI has been a useful tool for both state and local climate action planning. Another current project that takes a lifecycle approach is the development and use of the Waste Impact Calculator. This calculator will allow DEQ and others to look at the environmental impacts of producing, disposing, and recovering materials tracked through Oregon's disposal and recovery systems. This project will help waste reduction and recovery programs target materials with the largest environmental impacts. Future work will combine existing ways of measuring progress with emerging thinking and tools including life cycle assessment (LCA), planetary boundaries, and social impact accounting projects. This work may be manifested in a statewide "dashboard" of indicators that represent impacts to land, water and air and help gauge progress towards achieving the *2050 Vision.*

Life Cycle Assessment

Life cycle assessment is the prevailing methodology to quantify environmental impacts associated with all the stages of a product's life − from raw material extraction through materials processing, manufacture, distribution, use, repair, maintenance, and disposal or recycling.



Why it matters

In many cases, the majority of damaging environmental impacts of a product or material take place before it ever reaches the consumer. The way a product or material is designed, produced and used can contribute to resource depletion, pollution and greenhouse gas emissions. By offering a systematic way of estimating environmental impacts along all stages in the "life" of a product or material, LCA produces comparative metrics to help answer questions such as, "Which has less environmental impact: water sold in plastic bottles or in aluminum cans?" LCA can also identify opportunities for reducing environmental impacts long before a product or material reaches the landfill or recycling center.

Our work

Our program uses this technique, and relies on others who employ it, to identify where impacts occur, to measure the magnitude of these impacts, and to evaluate alternatives. Life cycle thinking is foundational to sustainable materials management. No stand-alone strategic plan exists for LCA. Instead, we apply life cycle thinking as an approach, and LCA as a tool, to many of our other prioritized work areas. Examples include using LCA to assess the highest and best use for specific materials, such as glass and wood waste, at their end-of-life and to evaluate the upfront impacts of building materials, such as concrete, for our built environment work. We also advance the use of LCA by partners and stakeholders by offering training, workshops, webinars, and software tools. We also help partners and local businesses conduct and share LCA studies on the environmental impacts of different foods and packaging.

LCA still has broad, untapped potential. In the future, we will explore novel applications of LCA to quantify social and economic impacts and to help predict the consequential impacts of a materials management decision. Other projects we may undertake include: sponsoring the development of new, Oregon-based LCA databases and tools; developing regionally specific impact methodologies; using LCA-derived product labelling schemes; and examining how LCA, paired with other tools such as Alternatives Assessment, can offer even more insights into the impacts of materials.

Solid Waste and Recovery

Extended Producer Responsibility

Extended producer responsibility (EPR) is a waste management strategy that requires producers to share in the responsibility for the end-of-life management of their products and materials.

Why it matters
Materials like paint, electronics and some types of packaging are difficult or expensive to recycle and improper disposal of these materials can harm the environment. Typically, producers aren't involved in the end-of-life management of their products. Instead, the cost of end-of-life management falls to governments and individuals. By shifting the responsibility of management back to producers, EPR ensures that producers are covering more of their "fair share" of the burden at end of life. This also creates a potential incentive for producers to make product changes that could result in less waste and use of less toxic substances and non-renewable resources. EPR can also reduce the incidence of illegal dumping for covered materials.

Our work
DEQ launched some of the nation's first EPR programs, and has administered Oregon's PaintCare and E-Cycles programs for a decade. In 2019, Oregon passed a law to create a Drug Take-Back Program, joining California, Washington and New York in offering a statewide product stewardship program for the safe disposal of unused medications. We are also coordinating with other states and the federal government to advance EPR programs for other materials. We will continue to manage EPR programs for paint, electronics, and drugs while exploring opportunities to expand producer responsibility to other products and lifecycle phases.

Opportunity to Recycle

We work with local governments to ensure that people have the opportunity to recycle in accordance with Oregon's recycling laws.

Why it matters
Through proper recycling, we are able to reduce the amount of resources required to make new products. Recycling can also create jobs and reduces pollution. The Oregon legislature passed

the Opportunity to Recycle Act in 1983. The Act established solid waste management policies that recognized the environmental benefits of waste prevention, reuse and recycling. Today, these laws offer local governments flexibility in implementing materials management programs and meeting voluntary material recovery goals, with additional requirements for local governments with larger populations and cities closer to Portland. DEQ provides technical assistance to help local governments navigate these requirements and ensure that the recycling programs they offer—and, in some jurisdictions, waste prevention and reuse programs—comply with these laws.

Our work

To assist with compliance, DEQ surveys wastesheds and local governments on their recycling programs through annual Opportunity to Recycle reports. DEQ staff also work directly with wastesheds and local governments on finding solutions to implementation issues. More broadly, we collaborate with stakeholders to address challenges to recycling, including contamination and outdated infrastructure.

Recovery

Materials recovery is the process of collecting, processing and utilizing scrap materials for their physical or chemical properties. In Oregon, recovery includes recycling, composting, and incineration with energy recovery for certain waste materials. Many Oregon residents participate in recovery activities at home and work. Businesses across Oregon and the globe use recovered materials to manufacture steel rebar, glass beer and wine bottles, cardboard boxes, soil amendments, airplanes, clothing, plastic packaging, and many other products.

Why it matters

Oregon was the first state to institute a Bottle Bill in 1971 and has been recycling for more than 40 years. Material recovery conserves resources and reduces environmental impacts by reducing the need to extract virgin resources for the creation of new products and packaging. Recycling, for example, provides feedstock for the manufacturing of new products, which can reduce the environmental impacts of that manufacturing. In 2018, Oregon recovered 2.3 million tons of materials, which prevented 3.3 million metric tons of carbon dioxide equivalent from being released into the atmosphere — reducing the state's greenhouse gas emissions by about 4 percent compared to a scenario where all waste was disposed.

Materials recovery is also a valued part of the state economy. Oregon's recycling and reuse system is the nation's 14th largest in terms of employment, being responsible for 12,567 jobs statewide. Among states it is the 15th largest in terms of economic activity, generating over $2.5 billion annually.

Our work

We study recovery in Oregon and work to improve it in many ways. We calculate the annual amount that Oregon recovers from its waste stream with our *Material Recovery and Waste Generation Rates* report. To better understand the types of materials that are discarded – and might in the future be recovered -- we periodically conduct a Waste Composition Study. We generate reports and information on our websites and oversee a *Recycle Right!* campaign to help residents navigate the often confusing rules of what can and cannot go in a recycling bin.

We also calculate the environmental benefits linked to recovery, and place them in the perspective of total environmental impacts for the state. Though there is a common perception that the key benefit of recycling is landfill avoidance, models like DEQ's Waste Impact Calculator show that recovery can reduce environmental impacts such as water use and greenhouse gas emissions as well. These models demonstrate that not all recovery is created equal: some materials promise greater impact reductions than others. Accordingly, these models help us focus our work on the most strategic materials. Finally, such models demonstrate that even the savviest application of recovery has its limits. If recovery were increased from current levels to its maximum feasible value, the state's total greenhouse gas emissions (based on the total in the Consumption-Based Emissions Inventory) would decline only about 3 percent.

Finally, we are working to modernize recycling in Oregon. We've brought together stakeholders responsible for Oregon's recycling system—including local and state governments, businesses, and other organizations—through a Recycling Steering Committee. This Steering Committee is working together to develop recommendations to modernize Oregon's recycling system so that it may better optimize the benefits of recycling using a life-cycle perspective, be stronger and more resilient to changes in market supply and demand, and restore and maintain public trust in the system. Implementation of those recommendations – including the potential for legislation – will likely be a focus area for the next several years

Solid Waste Compliance

Oregon law prohibits the disposal of solid waste except at a permitted disposal site, and also prohibits the mishandling of solid waste. Our program responds to complaints about the mishandling and illegal disposal of solid waste, as well as associated issues involving odors, dust, asbestos or other environmental concerns.

Why it matters
By investigating solid waste complaints and illegal dumpsites, DEQ is helping keep Oregon's environment clean and safe. Illegal disposal of solid waste can harm the environment and be hazardous to human health. The impacts can be particularly harmful when illegal disposal happens in local communities lacking the resources to conduct cleanup.

Our work
DEQ's public complaint process helps communities lacking resources to address illegal dumping. Our Solid Waste Orphan Site Account program offers funding and low-interest loans for investigation and cleanup of contamination at solid waste disposal sites. SWOSA funds can be used to clean up hazardous substances at properties owned or operated by a local government, and at privately-owned or operated sites that have received domestic solid waste when the responsible party is unknown, unwilling or unable to undertake the cleanup.

Solid Waste Permitting

Oregon law states that no person may establish, operate or maintain a disposal site without first obtaining a solid waste disposal site permit. Our program issues the following types of facility permits: conversion technology, energy recovery, material recovery, composting, anaerobic digestion, solid waste treatment, transfer stations, incineration units, waste tire handling, and landfills. DEQ also issues permits that regulate short term disposal or pilot projects called solid waste letter authorizations.

Why it matters
Permitting ensures that disposal site operators are committed to safely managing materials and protecting Oregon's environment, and that disposal sites do not create hazards or environmental risks for the communities around them. We regularly inspect permitted facilities to confirm compliance with state requirements. We also monitor and check performance standards and environmental conditions at facilities to ensure that environmental protections are in place and working properly.

Our work
There are over 300 permitted solid waste sites around the state. Different types of facilities—from composting facilities to landfills—can raise different environmental concerns and require different protections. Our work with permitted sites includes site inspections, technical assistance and complaint response.

We also issue solid waste letter authorization permits for short term disposal of material that can be safely managed without additional regulatory requirements of other permits and for short term pilot projects that manage solid waste. These include one-time or short-term disposal permits for slightly contaminated soil or sediment at locations where environmental impacts will be minimal.

Additionally, we make determinations whether a waste can be used or disposed without a permit. Clean fill, such as rock, dirt, bricks and concrete, can be used as construction fill, road base or other uses without a permit. Wastes that receive a DEQ beneficial use determination are used for constructive purposes. Waste asphalt shingles can be used in new asphalt paving. Wood ash can be used as a soil amendment to help crop growth.

Community Involvement

Communications

Communications is how we connect our work to the community. It's about finding the right messenger and pairing it with the right message; crafting the right outreach tools and finding the best methods to deliver them. It's about making our work accessible.

Why it matters
Some of the work of DEQ's Materials Management Program is not commonly—or easily—understood. Our research is dense, our reports acronym-rich, and some of our most significant findings are often counterintuitive. To achieve the *2050 Vision*, we need to communicate our work in ways that are accessible and memorable.

Our work
DEQ develops information that can be used to help businesses and consumers understand the relative impacts of actions and choices, and partner with others to disseminate the information. We work with partners such as businesses, nonprofits, local governments and libraries to deliver messages related to sustainable materials management. We do this by developing consistent statewide messaging, and finding the right mix of tools to reach the right people. We also lead a series of statewide public awareness campaigns that include *Make Every Thread Count*, *Wasted Food Wasted Money* and *Recycle Right!* A multi-year food waste prevention and Oregon E-Cycles campaigns are also underway, as is the development of a *Strategic Communications Plan* that will look for novel ways to engage with new audiences.

Grants

Our grants program helps recipients reduce the environmental impacts of materials at all stages of their lifecycle. The recipients help reduce waste, build capacity for reuse and repair, support responsible recycling, or otherwise advance the *2050 Vision*. Since 1991, DEQ has awarded over $9 million in materials management grants.

Why it matters
Grants matter because people and organizations need money to do this work, and our grant funding is often the one of the few sources of available for this type of work in Oregon. We cannot achieve the *2050 Vision* without the contributions and creativity of local communities. Grants expand our reach by connecting with local governments, nonprofits, schools and Tribal governments. Examples of funding projects include those that reduce food waste in school cafeterias, support recycling infrastructure in rural communities and encourage reuse and repair of household items.

Materials Management Grant recipients (clockwise) Oregon Green Schools, Salvage Works, Marion Polk Food Share, Corvallis Sustainability Coalition, Port of Portland, Community Warehouse and Free Geek

DEQ continues to seek new ways to reach diverse audiences and help applicants understand the reach of this opportunity. Each year, DEQ awards focus points to highlight important issues, such as encouraging food waste prevention to projects that foster community-based partnerships. This approach allows us to be flexible and adapt to current needs. As our program grows, we plan to explore more focused grant programs, expand our community partnerships, sponsor activities and support other innovative community-based initiatives.

Outreach and Partnerships

Progress towards the *2050 Vision* will require collaboration with our traditional partners, as well as with new partners. Effective outreach and strong partnerships will enable us to foster and maintain such relationships that advance all our work.

Partnerships also allow us to break down barriers to participating in the policymaking process and get more meaningful input from underrepresented communities on solutions and strategy.

Why it matters

To achieve the *2050 Vision*, we need the expertise, influence and commitment of other state and local agencies, businesses, nonprofit organizations, community groups, researchers, federal agencies, other states and the public. Outreach increases awareness and builds community buy-in around the environmental and social challenges we're facing. Partnerships can uncover new ways to address these problems, provide valuable feedback on policy proposals and spur action in communities. Partnerships also allow us to break down barriers to participating in the policymaking process and get more meaningful input from underrepresented communities on solutions and strategy.

Our work

Building and maintaining partnerships takes time and investment. Staff have historically worked to develop and maintain strong relationships with community stakeholders in their projects. We now recognize the need for dedicated and focused efforts on partnerships. At the same time, we will work across DEQ to help increase social equity and improve representation in our collaborations. We pledge to seek out and listen to community voices for ongoing projects. We look forward to further developing this work area with dedicated financial and staff resources so that opportunities for partnerships are consistently identified and pursued.

Social Equity

Social equity is achieved when all people have access to the opportunities necessary to satisfy their essential needs, advance their wellbeing, and achieve their full potential.[6]

By advancing equity and increasing opportunities for historically marginalized communities, we can better serve the people of Oregon.

Why it matters

Research shows there are major disparities across most systems and institutions between communities of color and white communities in

[6] City of Portland, Charter, Code and Policies, https://www.portlandoregon.gov/citycode/article/539950

Oregon.[7] By working towards a more equitable society, we help to create a reality where our identifying characteristics – including race, gender identity, sexual orientation, disability, and other identities –no longer predict our success.

The advancement of social equity is integral to our work because the *2050 Vision* prioritizes human health, wellbeing, and healthy, resilient environments and communities. Identifying shared values and including underrepresented communities will enable us to do work that is more resonant and responsive, and therefore stronger and more sustainable. By advancing equity and increasing opportunities for historically marginalized communities, we can better serve the people of Oregon.

Our work

Social equity may be an emerging priority for us, but it is certainly not a new or unknown issue. Much of our work in the last six years has been foundational – focused on sourcing stable funding, expanding our expertise, and conducting important research that will inform future efforts. To complement and expand that foundation-building, we will educate ourselves on how equity issues and environmental issues are interconnected; collaborate with those who have a deeper understanding of social equity; and learn more about the values and priorities of communities around the state. Once we have learned from deep listening, we will identify meaningful ways to incorporate equity and community values into existing work and opportunities for new work.

Emerging Priorities

This space is reserved for emerging priorities that help guide progress towards achieving the 2050 Vision for Materials Management in Oregon. For example, one emerging topic at the time of publication is ocean impacts. Materials contribute to marine debris, micro plastics, and other impacts that affect the water quality of ocean water.

[7] https://inequality.org/our-inequality-work/reports/; https://www.ocpp.org/tag/income-inequality/; https://www.coalitioncommunitiescolor.org/leadingwithrace; https://facingraceoregondotorg.files.wordpress.com/2016/01/2015facingraceweb.pdf


Bandon Beach, Coos County

6. Conclusion

The *2050 Vision* is intended to be a vision for all of Oregon, and thus, we cannot achieve the Vision alone. We will continue to collaborate with others to create a more sustainable future – a future where producers make products sustainably, people in Oregon live within their sustainable share of the world's natural resources, and materials have the most useful life possible. The *2020 Framework for Action* shares our thinking on the core values, principles and priorities needed for us to help Oregon achieve the *2050 Vision*. We intend to reevaluate this Framework in 10 years or earlier in order to allow reflection and improvement on its ability to guide us toward the *2050 Vision*.

To connect with us or learn more about our work, visit us at https://www.oregon.gov/DEQ/mm.