A New Way of Thinking about Materials Management

The Oregon Story

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National governments are finally working to address the astronomic growth of the volume and damaging impacts of plastic waste. In March 2022, the United Nations Environment Assembly passed a resolution to negotiate the world's first legally binding instrument to end plastic pollution.

In the U.S., the state of Oregon has strived for years to address pollution caused by plastics and other materials. Oregon's history of proactive policy on environmental matters reflects its residents' deep appreciation for their state's bountiful nature. The research and planning efforts of the Oregon Department of Environmental Quality (DEQ) have helped to modernize the state's approach to effective management of materials, which is essential not only to clean up waste but also to combat climate change. Washington CORE spoke to David Allaway, Senior Policy Analyst at DEQ's Materials Management Program, about his organization's efforts and success in driving revolutionary policy change.

Holistic Approach to Assessing Environmental Impacts of Materials

In 2012, DEQ introduced its 2050 Vision for Materials Management,[1] a policy framework for reducing the environmental impacts of products used by consumers and industry in Oregon. This holistic approach, as seen in Figure 1, considers the impacts of products at all stages in their life cycles, not only consumption and disposal by consumers, but also upstream processes such as extraction, manufacturing, packaging, and transport.

Figure 1: Life cycle of materials and products

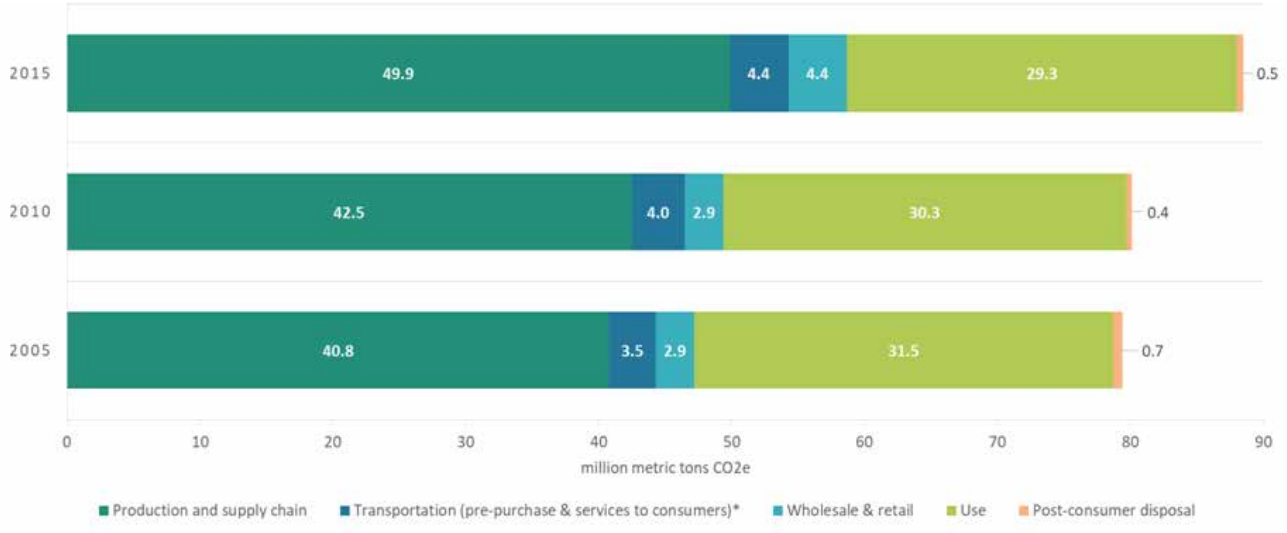
Source: DEQ[3]

Capturing "Upstream" Impacts

Traditionally, governments have focused on the impacts of products at the end of their life cycles, meaning their disposal and/or recycling. In the past, Life Cycle Assessments (LCAs) have been considered impractical because they are expensive to produce, complex, and challenging to translate into policy. However, the narrow focus on end of life fails to capture some of the significant root causes of greenhouse gas (GHG) emissions and other environmental impacts.

To address this shortcoming, DEQ established a new accounting system for GHG emissions that provides a more complete understanding of where and why materials-related emissions occur and proposes effective options to reduce them. DEQ's consumption-based inventory system quantifies how demand from Oregon consumers causes emissions across the globe at all stages of the life cycle. DEQ determined that the greatest share of emissions is generated by "upstream" production facilities such as paper mills, aluminum smelters, and plastics manufacturers. The most recent consumption-based inventory assessment, conducted in 2015, found that nearly 50 million metric tons of Oregon's GHG emissions, a full 56%, stemmed from the production of materials.[2]

Figure 2: 2005-2015 Oregon consumption-based GHG emissions by life cycle stage



Source: DEQ[4]

Reducing Emissions by Changing Consumption Habits

It is hoped that manufacturers will take steps to reduce emissions from their production processes by utilizing methods such as green technology, fuel switching, and energy efficiency; but since many of the products consumed in Oregon are produced elsewhere, Oregon state regulators have limited control over those sources of emissions. Therefore, the state has supplemented its own regulation of in-state emissions sources with programs that aim to reduce emissions from the demand-side, such as by encouraging the purchase of more environmentally friendly products.

For example, like many other products, most GHG emissions generated in the life cycle of concrete occur during its production. On the demand side, concrete purchasers in Oregon - large institutional buyers, municipal governments, and general contractors - can specify and purchase concrete mixes that contain cement alternatives with lower carbon footprints. The state works with these large purchasers and concrete producers to encourage the production and purchase of these alternatives such as steel slag, fly ash, and ground-up glass, which can reduce the carbon footprint of concrete purchases by between 20% and 50%.

Recyclability Does Not Tell the Whole Story

To inform the 2050 Vision, DEQ conducted LCAs on the environmental impacts of different attributes of packaging materials, including e-commerce packaging and water bottles. Instead of using LCAs to determine the total carbon footprints of products, most policymakers currently rely on the popular but often misguided belief that materials with attributes that sound environmentally friendly (e.g., biobased, recyclable, compostable), are by default better for the environment than fossil fuel-based and/or nonrecyclable materials. Positive attributes such as recyclability are easy for the public to understand, and therefore perpetuated by industry in marketing.

Unfortunately, such attributes do not always tell the whole story. For example, DEQ examined total GHG emissions and material used over the life cycle of three types of coffee bean packaging (steel can, plastic tub, and multi-material plastic laminate bags). Although the cans and tubs are recyclable and the bags are not, the bags require far less material to package the beans and had the lowest fossil fuel consumption and GHG emissions comparatively over the product life cycle.

Separately, DEQ research in 2017 also found that in some cases, biobased materials can use more fossil fuel and cause more environmental damage than fossil fuel-based materials. Biobased packaging is typically made from materials grown on farms or in forests, which can produce harmful agricultural runoff from fertilizer use. Harvesting and processing these materials in factories uses fossil fuel and emits pollution – sometimes more than "fossil derived" alternatives.

So, it is important to distinguish between high-impact and low-impact materials based on holistic analyses, drive supply for low-impact materials, and determine if it is possible to make production of high-impact materials greener.

Plastic Pollution and Recycling Modernization Act

Acting on DEQ's research, in 2021 Oregon took a major step toward realizing the goals of the 2050 Vision by enacting the Plastic Pollution and Recycling Modernization Act (Recycling Modernization Act). The need for policy action had become critically important since China implemented its National Sword policy in 2017, closing off what had been the primary destination for recycling U.S. plastic waste, and leaving Oregon and other states struggling to find economically viable and sustainable ways to deal with this waste.

In the U.S., waste collection is usually conducted via a single stream approach in which all hypothetically recyclable materials are collected together. Most local governments favor this approach due to its convenience for residents, but it can cause contamination. Oregon's recycling collection and processing system suffers from a high rate of nonrecyclable contaminants, due in part to consumer confusion over product recycling labels and to varying waste collection standards in different locations.

The Recycling Modernization Act tries to improve this situation by requiring producers to separately collect

certain materials that are recyclable, but not compatible with the commingled collection system, such as plastic film. Additionally, to avoid environmental damage to other - usually developing - countries that purchase waste bale shipments from Oregon, the Act requires Oregon's materials processing facilities to sort waste to a higher standard in order to decrease contaminants in bales. It also requires facilities to send bales only to countries that are capable of managing the materials in an environmentally responsible way.

Mandating Producer Responsibility

Additionally, as outlined in Figure 3 below, the Recycling Modernization Act creates a system of incentives and mandates for producers to evaluate and disclose the life cycle impacts of their products. This requirement applies to the 25 largest producers by Oregon market share for the three covered product types: packaging, printing and writing paper, and food serviceware. The law also requires producers to contribute to a state fund that will implement waste prevention projects around the state, such as bringing durable dishware and dishwashers into school cafeterias. Once fully funded, this may be the largest fund for waste prevention in the history of the U.S., at about $8 million per year.

Figure 3: Plastic Pollution and Recycling Modernization Act system framework

Source: DEQ[5]

Perhaps most significant for reducing plastic waste, the law puts in place an extended producer responsibility model – in which the producers who sell "covered products" in Oregon must share financial responsibility for the recycling system along with local governments, the consumer households and businesses that they represent, the collection and processing companies, and the state. Since waste generators already pay for almost all of the cost of the waste collection system, and local governments are unwilling to raise rates on them further, producers will fund any necessary improvements to processing facilities or other infrastructure.

In this context, the "producer" with compliance obligations for a packaged product is the manufacturer of that product, not the manufacturer of the packaging. If the manufacturer is not located in the U.S., the importer becomes responsible for compliance obligations. For items sold via e-commerce or remote sales, the company that fulfills orders is legally responsible.

Producers will be required to join a producer responsibility organization and make payments based on the annual quantity of covered products manufactured. More sustainable materials will incur lower fees, while materials that create higher economic costs and environmental impacts will incur higher fees. These requirements are meant to encourage consumers to recycle properly and producers to use more easily recycled and/or less-harmful materials in production.

Increased Awareness of Climate Impacts of Materials

Efforts like Oregon's Plastic Pollution and Recycling Modernization Act have helped people in the state and around the world to become more aware of the climate impacts of materials in terms of GHG emissions. This issue emerged in the EPA's 2021 National Recycling Plan and has been raised in ongoing discussions for the potential UN plastic waste treaty, as well as among the food and built-environment industries. There is growing momentum to bring materials into the fold of climate change solutions.

David Allaway is a Senior Policy Analyst at the Oregon Department of Environmental Quality's (DEQ) Materials Management Program. At DEQ, David leads projects related to sustainable consumption and production of materials including waste management, life cycle analysis, and greenhouse gases. He contributed to Oregon's 2050 Vision for Materials Management and served as an invited science advisor to Walmart's Packaging Sustainable Value Network and the New York Times bestseller *Drawdown: The Most Comprehensive Plan Ever Proposed to Reverse Global Warming.* He also led efforts to develop and update Oregon's consumption-based greenhouse gas emissions inventory and contributed to U.S. greenhouse gas accounting protocols for communities and recycling with the International Council for Local Environmental Initiatives.

Endnotes

[1] https://www.oregon.gov/deq/FilterDocs/MManagementOR.pdf
[2] https://www.oregon.gov/deq/FilterDocs/OregonGHGreport.pdf pg. 4
[3] https://www.oregon.gov/deq/FilterDocs/MManagementOR.pdf pg. 5
[4] https://www.oregon.gov/deq/FilterDocs/OregonGHGreport.pdf pg. 36
[5] Recycling Modernization Act Overview https://www.youtube.com/watch?v=4Z2JIPrwtm8

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