Presentation Script:
Materials Management and Climate Change - An Introduction
www.epa.gov/region10/westcoastclimate.html

SLIDE 1
Title slide. The presenter should introduce themselves.

SLIDE 2
I'd like to give you an overview of what we'll be discussing today. We'll start by understanding patterns of materials consumption in the United States and then connect the environmental impacts of that consumption to greenhouse gas production, which causes climate change impacts. We'll define "materials management" and then discuss a whole variety of ways materials management can help reduce greenhouse gas production. Strategies discussed will include recycling, extended producer responsibility, the limits of recycling, product stewardship, environmentally preferable purchasing, reuse, consuming less, and actions state and local governments can take. Finally, this presentation is not meant to be an exhaustive list of all material-related greenhouse gas strategies, so I'll leave you with some resources that provide practical advice and examples for state and local governments.

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For this presentation the term *materials* includes everything from raw materials to products consumed by individuals and governments. Materials could include, for example, sand used for roadways, concrete, cell phones, food, office supplies and packaging.

SLIDE 4
Over time, we have dramatically increased our consumption of materials in the US. Mining and producing materials for consumption takes energy. The energy primarily comes from fossil fuels. Since we know that burning fossil fuels produces greenhouses gases and contributes to climate change it seems like burning fossil fuels to produce materials would also contribute to climate change. But how do the impacts of our material consumption patterns compare to let's say- our transportation fuel consumption patterns? Let's take a look.

SLIDE 5
Here is the 2006 US inventory of greenhouse gases, which was compiled by the Environmental Protection Agency. You can see that the generation of electrical power, transportation, and industry sectors contribute the vast majority of the nation's GHG emissions. But where are materials in this chart? We can see that once our materials (or products) become "waste" they comprise 2% of the nations greenhouse gas emissions. But this 2% doesn't account for the impact of producing products. Where is the impact of producing furniture, electronics, or food?

SLIDE 6
Well, it turns out that full greenhouse gas impact of materials are spread throughout every category of this chart. This makes it very difficult to understand the environmental implications of our material consumption patterns. So, EPA decided to take another look at how they categorize these emissions and found some

surprising conclusions. This next slide will show the same exact emissions as this slide but categorized differently.

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You'll notice in this chart that the provision of goods and food contributes to 42% of the nation's GHG emissions. Finally, we found the materials! You'll see that the transportation of people and energy use in our buildings still contributes about half of the nation's emissions, but the significance of our material consumption dramatically changes from one chart to another. Let's break down this pie chart a little further to understand how material consumption impacts climate change.

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Here is the same chart but the provision of goods and food (the materials) are broken down into the stages of a materials' lifecycle when the emissions occur. We see that about 32% of the nation's emissions are a direct result of producing the materials we all consume, 7.1% is from shipping them to the consumer, and only 2.2% is a result of disposing materials in landfills. So, it's pretty clear that the production of materials is where the vast majority of impacts occur over a materials lifecycle. So, if we want to reduce the impacts of material consumption, this is the chart we should use as a guide for prioritizing our actions. This begs the question: "where are we focusing our efforts today?" Let's take a look.

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This is a simple chart that shows the lifecycle of a product: resource extraction, processing, manufacturing, distribution, use, and finally recovery or disposal. All materials follow this lifecycle. Traditionally, programs focused on "waste management" at the end of a material's lifecycle, which is represented by the small circle in this graphic. Waste management could include recycling, burning for energy recovery, composting, and landfill disposal.

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All materials follow a similar lifecycle. Here we can see each stage of steel's lifecycle. As we learned, the impacts of producing materials was the largest contributor over the lifecycle. So, materials management is an effort to shift the focus to the entire lifecycle of materials in order to achieve the largest environmental benefits. For steel, this could mean using less steel in construction, designing for disassembly and reuse, and purchasing steel with high recycled content.

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Here is a working definition of materials management. [READ definition] "*Materials management is an approach to using and reusing resources most efficiently and sustainably throughout their lifecycles. It seeks to minimize materials used and all associated environmental impacts."* So, now that we're all on the same page about the lifecycle impacts of materials, the question still remains: "how do we reduce these impacts?"

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Well, let's go back to gradeschool where you may have learned about REDUCE, REUSE, RECYCLE. Believe it or not – this logic still holds true! Let's start from the top. Reducing our consumption has the biggest benefits because we're completely avoiding the production of new materials, which if you remember from the pie

chart, has the biggest impact over the lifecycle of materials. If you reuse materials, you also avoid the production of new materials, which has significant benefits. Finally, if you recycle a material you certainly avoid the landfill, which is good, but the bigger benefit, from a greenhouse gas perspective, is reducing the demand for virgin materials in the production of new products.

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So, recycling reduces the energy demand for making new materials by conserving virgin resources, which is why it's so beneficial. This chart show that making a product from recycled material uses significantly less energy than using new "virgin" resources. Let's remember that there's an order to reduce, reuse, recycle for a reason- reduction and reuse have larger environmental benefits than recycling. Nevertheless, recycling is an important materials management strategy and governments have control over recycling and composting programs, so let's discuss some of the national trends and benefits associated with recycling first.

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This EPA chart shows the percent of municipal solid waste recycled over time. The good news is that recycling has increased. Infrastructure has improved and governments improved capacity to recycle through curbside recycling collection, pay as you throw programs that charge customers on a scale proportionate to how much they waste, and programs like bottle bills which put a small deposit on bottles and cans to maximize their recovery.

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This next EPA chart shows that in 2008, as a nation, we were pretty good at recycling paper and yard debris but have significant room for improvement in all other material categories, including paper and yard trimmings.

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Our national recycling rate is 33% and here's an idea of what the benefits equate to.

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Our national recycling rate is equivalent to taking 39 million cars off the road for one year, heating 22 million homes for one year, avoiding 50 new power plants, or avoiding the use of 400 million barrels of oil.

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Another benefit of recycling is that it's a very cost effective way of reducing greenhouse gases. This chart shows how much money it costs to reduce 1 ton of greenhouse gases with each of these strategies. You can see that curbside recycling and pay as you throw programs, which charge you proportionally to how much waste you generate, are inexpensive ways to achieve greenhouse gas reductions compared to other strategies such as upgrading residential energy efficiency or producing wind power.

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Recycling can also save money since it generally costs less to recycle than landfill materials. Here's an example of 2 companies who took recycling to its upper limit and achieved significant cost savings. HP eliminated about 90% of its waste and is now saving $870,000 per year. Epson eliminated all the waste they were sending to

landfill and are saving over $300,000 per year. Reusing or recycling all of your waste is sometimes referred to zero waste. Businesses have proven how zero waste is cost effective. Governments can also achieve cost savings by implementing zero waste strategies.

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Another trend in increasing the recycling of materials is Extended Producer Responsibility laws. These laws say that the material producer has a responsibility for the entire lifecycle of their products, including the management of the product as a waste at the end of its life. Some materials covered by EPR laws include batteries, electronics, cell phones, carpet, auto switches, fluorescent lighting, mercury thermostats, paint, and pesticide containers. This chart highlights the states with EPR laws in 2006.

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EPR is a growing trend among state governments as this graphic suggests. As of 2010, many more states have adopted EPR laws. In addition to state laws, local governments can adopt EPR resolutions. These resolutions support transfer of responsibility of managing discarded products and materials to the producer or manufacturer.

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Last but not least are JOBS. More recycling can mean more jobs for collecting, processing and transporting the materials. Diverting a ton of recyclable or compostable material has approximately twice the economic impact of sending it to a landfill. According to research by California's recycling agency, diverting one additional ton of waste would pay $101 more in salaries and wages, produce $275 more in goods and services, and generate $135 more in sales than disposing of it in a landfill.

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So, if the nation's recycling rate is 33% today, what are the benefits of increasing the recycling of municipal solid waste? If we recycled and composted everything, we would reduce annual GHG emissions by about 450 million tons per year. Is this good? Sure it's good, but let's put these numbers in perspective.

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If we recycled and composted everything, this chart shows that we'd reduce the nation's GHG emissions by about 6%. Again, this is good, but it doesn't get us very far. How else can we start reducing the impact of the remaining 36% of the nation's GHG emissions associated with our material consumption? Let's look at some options together.

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Product stewardship is a policy that can help reduce greenhouse gas emissions by ensuring that all those involved in the lifecycle of a product share responsibility for reducing its health and environmental impacts, with producers bearing primary financial responsibility. One example of a producer taking action is when Tropicana orange juice performed a lifecycle analysis of their product to understand how they could reduce the GHG emissions associated with their product. They found that about 60% of the emissions from a half gallon of OJ were in growing the oranges and 35% of the total emissions were from producing and applying fertilizers. So, as a product stewardship effort, Tropicana is now looking how to use fewer and less carbon

intensive fertilizers. Governments – and individuals - can use information and product disclosure provided by companies to select the best products to purchase.

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Specifying goods based on their environmental performance is often called Environmentally Preferable Purchasing - another strategy to reduce GHG emissions. After all, at the end of the day we do have to consume certain things to do our work and meet our basic needs. So, when you have the luxury of choice, what products can be specified to reduce GHG emissions? For example, governments can purchase EPEAT registered computers and Energy Star electronics. Over their lifetime, compared to the purchase of products that do not meet EPEAT's criteria, EPEAT registered notebooks, desktops, and monitors purchased worldwide in 2009 will reduce of over 2 million metric tons of greenhouse gas emissions — equivalent to taking nearly 1.4 million US passenger cars off the road for a year. Additionally, specifying the purchase of materials with recycled content also avoids greenhouse gas emissions. EPA's RECON tool, which link is on the slide, can help you calculate the greenhouse gas benefit from choosing materials with recycled content.

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Speaking of choice, we sure seem to have an increasing number of ways we can consume water these days. The Oregon Dept of Environmental Quality commissioned a study investigating the most environmentally responsible way to consume drinking water. They found that if you drink bottled water, and recycle the bottle, you'll reduce GHG by 16% compared to disposing of the bottle. Drinking water from the tap, however, reduced GHG by 79-98% compared to disposal. This is the kind of information that can be helpful to consumers trying to make the right choice. This can also inform local governments about ways to minimize their environmental impact such as eliminating bottled water from city procurement.

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Packaging. Everyone hates it! It's the one thing you bring home from the store that no one wants! A study by the Oregon DEQ and others found that plastic shipping bags – even if made from virgin resources and not recycled – have lower environmental burdens in most categories than cardboard boxes – even if the boxes contain high levels of recycled content. So, despite the fact that recyclability is a desirable attribute of a product, like packaging, something that is recyclable doesn't necessarily mean that its environmental burden is less than non-recyclable alternatives. Again, materials management allows us to look at the full picture and not just waste management to inform procurement decisions.

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Another study Commissioned by Oregon DEQ looked at the best ways to reduce the impacts of building material consumption over the lifecycle of residential homes. The study found that building a smaller home reduces both material and energy use over time and it the most significant leverage point for creating greener buildings. After all, as this chart shows, the average home size in the United States has almost tripled over the last 60 years and at the same time, we're putting fewer people into our homes. These kinds of results make us think more about HOW were consuming materials instead of just focusing on how to MANAGE the waste.

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In addition to building smaller, we can also conserve resources and energy by preserving the materials we do use. Since most homes remodeled and demolished are not due to the materials failing, there can be considerable life and value left in durable building materials, like siding. This slide shows just one simple technique to install siding in a way to maximize eventual material reuse and recycling. This is called Design for Deconstruction and is a small but promising movement in construction techniques. Local and state governments can make deconstruction a mainstream practice by setting construction material diversion goals and adopting ordinances requiring 50 or 75% material recovery. Additionally, deconstruction can be incentivized through fastracked permits in combination with hold times on demolition permits.

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The strategies I've mentioned are all helpful in reducing our materials related emissions, but if we are going to be successful in significantly reducing emissions, we simply need to consume less.

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Let's talk briefly about the concept of collaborative consumption. This concept goes even further back than gradeschool - this takes us back to pre-school! That's right - we're talking about SHARING! Let's face it – sharing is just as hard for some adults as it is for 3 year olds. Sharing, however, is good for the planet. In fact, it's really good. We can share, trade or sell used goods ranging from clothing, cars, houses, and food. There is a rise in collaborative consumption that recognizes the social, economic and environmental benefits of sharing and reuse.

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There are hundreds of websites dedicated to sharing and resale of used goods. The advent of social media the web are creating platforms where "sharing" can seem normal again. These sites make it easy to give away or use goods from your neighbor or your virtual neighbor. Instead of buying a popcorn maker for a party you can borrow or rent anything. The same goes for a car, baby toys, and even the unused plot of land in your backyard.

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Governments also provide libraries – including tool libraries – where people can share and reuse many types of goods. These platforms are proving that access is better than ownership.

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Today we've learned about a lot of approaches to materials management and I'd like to summarize some of the actions local governments can take to better manage materials. First, you can conduct GHG inventory and set reduction goals for materials management. Portland's Climate Action Plan outlined actions to reduce their 46% of greenhouse gases that comes from materials. Their Action Plan includes reducing waste generation by 25% through reuse and procurement decisions and recovering 90% of waste generated. San Francisco instituted mandatory composting and recycling for all residences and commercial facilities.

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Local governments can also adopt an Environmentally Preferable Purchasing resolution and set disposal bans to drive products into environmentally preferable purchasing and recycling. Massachusetts banned from landfill and incinerator: aluminum, metal, glass, plastic, recyclable paper, wood, wallboard, and many other materials. Local governments can also support reuse centers for building materials, clothes, and household items to ensure these goods have a second or third life.

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Because of their enormous procurement power, governments can also make a significant difference through procurement. Many cities have eliminated bottled water from city procurement and require 100% post-consumer recycled paper. Governments can specify low-carbon materials or require carbon footprinting or labeling of products. These sorts of efforts are just coming underway.

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I'd like to leave you with a great resource for more information, tools, and examples of what others are doing for Materials Management and Climate Mitigation. On this website you can finds links to the examples we've mentioned and sample language to incorporate into your materials and climate planning.

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In summary, the main concepts we discussed today are the connections between consuming products and greenhouse gas emissions. We found that over the lifecycle of most products, the production phase of that product causes the most greenhouse gas emissions. We learned how "materials management" strategies can reduce greenhouse gases more effectively than just focusing on "waste management". We discussed the benefits and limitations of recycling, examples of extended producer responsibility laws, and the benefits of product stewardship for producers. We provided some links to tools that can aid in environmentally preferable purchasing, briefly discussed reuse strategies, and challenged ourselves to consume less and share more! Finally, I provided a small list of potential government actions and provided a website resource for more detailed information, examples, and strategies for state and local governments to reduce material-related greenhouse gas emissions. Thanks so much for your attention.