Tetra Tech
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4:00 p.m. EST

OPERATOR: At this time, I would like to introduce Dana Warn (ph) at EPA Region 10. Dana (ph), you may begin.

DANA WARN (ph), EPA REGION 10: Welcome to the first West Coast Webinar of a three-part series on climate change, waste prevention, recovery and disposal organized by the Environmental Protection Agency Region nine and 10 offices. We are really happy to have you participating.

This Webinar will provide an introduction to climate change and materials management.

Before I introduce today's speakers, let me turn the line over to Tommie Jean (ph) from Tetra Tech to go over some of the call logistics.

TOMMIE JEAN (ph), TETRA TECH: Good afternoon. Thank you for joining today, everyone. This is a recorded session.

During the presentation, slides will be moved for you, and your lines will be muted. If you can't see the presentation or if you would just like to have it, you may download it and I am sending a note in the chat feature for downloading that at the EPA's Web site.

You'll notice on the right-hand side of your screen the chat box that has the note I just sent to you. That's also how we'll be asking questions today. If you have a question about the presentation or if you're having a technical issue, you may use that chat feature to send a note.

For asking questions, we'll set aside about 15 minutes at the end of the first two presentations, and the questions will be read aloud on the line so everyone can hear them, and they'll also be answered live on the line.

If we don't respond to a question online, we'll try to e-mail you a response later.

In addition, at the end of the entire session, we've set aside about 10 minutes for additional questions.

Please don't use the raise your hand feature because we cannot respond to those, but you may use the chat to send us a note.

If you have a slow connection, you may have about a 10 second delay in seeing the slides, but there should be no voice delay.

At the end of today, we'd really like to get some feedback from you on how you liked the content and the medium, so you'll get a popup box that asks you a few simple questions. We'd really appreciate it if you took the time right away to answer those questions so we can continue to improve this series.

In addition, we'll send you a second link to an e-mail survey where you can give us even more feedback instead of just multiple choice questions so that we can get as much information from you as possible.

Again, if you have any questions, technical or on the presentation, please don't hesitate to use the chat feature.

Dana (ph), I'll hand it back over to you.

DANA WARN (ph): Thanks, Tommie Jean (ph).

Today we have 11 impressive speakers lined up, and we're going to start out with David Allaway (ph) of the Oregon Department of Environmental Quality. He's a Senior Policy Analyst, and in 2004 he chaired the technical subcommittee on materials and waste for Governor Kulongoski's advisory group on global warming.

Then we'll hear from Debra Kaufman of stopwaste.org in Alameda County, California, where she is the Senior Program Manager. She has worked in the field of solid waste management and recycling for 20 years and has worked as both a consultant on recycling issues and in the private sector.

After we hear from both of them, there'll be a time for questions and answers, and then we'll move on to an overview from western states. The states will be speaking in alphabetical order by state, starting with Doug Butevn (ph) of the Alaska Department of Environmental Conservation, followed by Julie Bowles of the Arizona Department of Environmental Quality, then Richard Verenchik (ph) of the California Air Resources Board, then Clark Williams and Teri Wion of the California Integrated Waste Management Board, then Steven Chang of the Hawaii Department of Health, Joanna Pierce of the Idaho Department of Environmental Quality, Eric Noack of the Nevada Division of Environmental Protection, David Allaway of the Oregon Department of Environmental Quality, and Jay Shepard (ph) of the Washington State Department of Ecology. Their full bios are available on our Web site if you would like to read more about these speakers.

Thank you very much for participating, and let's get started.

DAVID ALLAWAY (ph), SENIOR POLICY ANALYST, OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY: OK. Good afternoon. I'm David Allaway (ph) with the Oregon Department of Environmental Quality, and I'd also like to welcome you to this first of three Webinars.

As the introductory speaker, my objective is to provide a high level overview of how waste prevention, recycling and composting can reduce greenhouse gas emissions.

This is a broad topic, and I have limited time, so I'll emphasize that my presentation is intended to be introductory in nature. Fortunately, some of the topics I'll introduce will be explored in greater detail by Debra today, and speakers in the Webinar scheduled for July and August.

I've also included my e-mail on these slides, which you can download if you want to follow up with me later.

I'm going to start by covering some of the basics and sharing a framework for understanding the greenhouse gas benefits of waste reduction. I'll then explore some implications for waste and waste reduction programs.

I put waste in quotes on slide four for a reason. We in the field of waste reduction use this word a lot. We talked about waste reduction and the waste sector and the waste management hierarchy of reduce, reuse, recycle, and the use of the term "waste" can be really misleading in the context of greenhouse gases.

From a greenhouse gas perspective, many of the benefits of waste prevention and recycling has very little, if anything, to do with avoiding landfill emissions, and while landfills are significant and offer real greenhouse gas reduction potential, it's my experience that it can be a strategic mistake to over emphasize the landfill emission reduction potential of waste diversion programs relative to the need to also address upstream production related benefits of recycling and prevention.

So, let's get started.

In its simplest form, the greenhouse effect is the build-up of heat trap and gases in the earth's atmosphere. These gases trap heat in that they allow solar radiation to pass through the atmosphere from the sun, but then they block heat in the infrared spectrum that would normally be radiated back out into space. As a consequence, the earth warms faster than it cools.

The gases that we're most concerned about for today's discussion are carbon dioxide, methane, and nitrous oxide. These gases don't have the same effect in the atmosphere.

Methane, for example, is much more effective than carbon dioxide at trapping infrared radiation. However, methane also has a much shorter life in the atmosphere than carbon dioxide, lasting on average only about 12 years.

So we expressed the relative warming impacts of different gases as global warming potentials. These act as multipliers that allow us to convert all gases to a common metric called carbon dioxide equivalents, or CO2E.

Over a hundred year time span, which is the time horizon most commonly used, one kilogram of methane has 21 times the global warming potential of one kilogram of carbon dioxide, so emitting one kilogram of methane into the atmosphere is equivalent of emitting 21 grams – sorry, 21 kilograms of carbon dioxide.

Now I have to emphasize that the use of 100-year global warming potential is fundamentally a values choice, or even a political choice. It's not mandated by the science, and this convention is increasingly being challenged.

As understanding of the impacts grows and the pace of change appears to be quickening, the need to immediately and sharply reduce emissions is becoming more apparent, and so rather than evaluating the impacts of gases over a 100-year time horizon, perhaps we should evaluate their impact over a 20-year time horizon, which is when dramatic action is needed to try and stabilize emissions and the climate and avoid the worst case scenario of runaway unstoppable climate change.

If we take that time horizon, 20 years, methane is even more potent, 72 times more damaging than carbon dioxide.

The URL at the bottom of slide six will take you to an interesting document from the non-profit group Eco-Cycle with more information on this topic, if you're interested in following up.

A few more nomenclature basics. Sometimes emissions are expressed in carbon dioxide equivalents and sometimes they're expressed as carbon equivalents, and there's a mathematical relationship between those, shown here.

In any case, when you talk in this field, you should never report emissions without also reporting the unit of measurement, so either talk about carbon dioxide or carbon dioxide equivalents or methane or nitrous oxide or some other form.

And finally we draw a distinction between biogenic and anthropogenic emissions. So for example, removing carbon from under the ground in the form of coal and putting it into the atmosphere via combustion is an anthropogenic or human-caused source of emissions.

So is cutting down a forest, converting that forest to a parking lot and burning the wood. The carbon that was in the trees is transferred from the biosphere to the atmosphere, and there's no place for it to come back down.

In contrast, cutting trees in a tree plantation and replanting them with more trees, if this can be conducted in perpetuity, and then burning the wood, is not considered a source of anthropogenic emissions. These

carbon dioxide emissions will be offset by a comparable removal of carbon dioxide from the atmosphere as the new replacement trees grow.

This is presumed, and I have to emphasize at this point, it is presumed to mirror natural cycles of growth and decay in a steady state natural system, and so these emissions are called biogenic and currently are counted separately from anthropogenic emissions.

Slide eight provides a useful framework for thinking about materials and wastes. This framework is provided by the U.S. EPA and underlies EPA's warm software for estimating the greenhouse gas benefits of prevention, recycling and composting. So let's take a quick look at this.

EPA uses a life cycle approach for some 30-some different materials to evaluate the greenhouse gas emissions, synchs and offsets associated with extracting raw materials, converting those materials into products via manufacturing, recycling, and then managing any discards via composting, combustion or land filling.

Raw materials extraction, up at the top here, results in carbon dioxide emissions primarily due to fossil fuel use. The extraction of wood from forests can also reduce in a reduced amount of carbon stored in forests, and this is referred to as reduced carbon sequestration, and it counts as a greenhouse gas emission.

Manufacturing is a major use of fossil fuels, and as such, a huge source of carbon dioxide emissions. There are also non-energy process emissions from manufacturing. An example of that would be carbon dioxide that is chemically released from limestone when limestone is cooked at high temperatures to produce lime. This is a component used to make aluminum, steel, and some grades of paper.

Recycling of many materials reduces fossil fuel use in manufacturing, and this translates into a reduction in greenhouse gas emissions.

EPA also holds that recycling and preventing the use of paper in the first place can lead indirectly to an increased amount of carbon stored in forests. This – the mechanism by which this happens is not the simple one kind of paper recycled saved 17 trees. Rather, it's a complex macro economic phenomena that occurs as increased quantities of paper recycled sends price signals through the markets that induce landowners to change the frequency at which they cut trees, and also the amount of land managed as forests.

This is a hypothesized benefit, and the estimation of the quantity is the result of a several-year long research collaboration between the EPA and the U.S. Forest Service.

Moving down the waste management hierarchy, composting can result in carbon dioxide emissions due to fuel use by composting equipment, but it has a larger counter veiling benefit as carbon rich compost is applied to soils. In the composting process, some of the carbon in yard and food waste is converted into complex and relatively stabile humic (ph) molecules. This carbon is then stored in soils that are treated with the finished compost. This carbon is typically biogenic in origin, and so its storage in soils represents a net removal of carbon from the atmosphere from a life cycle perspective, and thus it counts as an emissions offset.

Combustion releases nitrous oxide and carbon dioxide to the atmosphere, although conventionally we only count the carbon dioxide that is anthropogenic in origin.

For example, from the combustion of fossil drive waste such as plastics and not from wood or paper. Energy recovery has the potential to displace fossil fuel use elsewhere, representing an emissions offset.

And finally, EPA's framework treats land filling by acknowledging the potent methane emissions that escape gas collection and also escape oxidation at the landfill surface.

Stephanie Young (ph) of the State of California will explore these phenomena in greater detail next month.

Landfills also provide an opportunity to store biogenic carbon, just as composting does, and landfill gas energy recovery systems may displace fossil fuel use elsewhere, representing another emissions offset.

In the next slide I provided URLs for EPA's background document that explains all of this in much greater detail, as well as EPA's waste reduction model, WARM, that can be used to compare to greenhouse gas impacts of, say, recycling versus land filling, or composting versus incinerating, a wide variety of waste.

WARM uses emission factors that are derived by EPA using the framework that I just described. EPA's level of documentation is very good, and while WARM is far from perfect and has some elements that are controversial, it represents a very valuable tool for those of us interested in estimating and documenting the greenhouse gas benefits of waste reduction.

Now I want to mention a few issues specific to landfills, and you'll hear more about some of these in the July Webinar.

Many people assume that the primary benefits of landfill gas collection involves energy recovery. In fact, most of the benefit is in the act of burning the methane and converting it to carbon dioxide, which is much less potent than methane. This can be done in a flare. Energy recovery is not necessary, and it really represents frosting on the greenhouse gas remission – greenhouse gas emissions reduction cake.

Now, economics may mean that a landfill with energy recovery does a better job at collecting more gas and burning it off in the first place. That's a slightly different issue.

Economics may also mean that landfill operators with energy recovery systems in place have an incentive to maximize gas production, and thus direct feed stocks into the landfill and manage operations so as to produce more gas as opposed to less, and that can have reverse consequences as even a small amount of fugitive emissions can swamp any greenhouse gas benefits from energy recovery.

Similarly, in states such as Oregon with the renewable portfolio standard, it's debatable whether or not new gas recovery systems really displace fossil fuel use.

In Oregon and several other western states, electric utilities are required to meet a certain percentage of their supply from so-called renewable sources. As investment in landfill gas system – excuse me, uninvestment in landfill gas systems simply means that less money is invested in developing other renewables such as solar or wind.

So on the margin, fossil fuel displacement with landfill gas energy recovery systems might not occur.

My second bullet point here, and those of you in California know this topic very well, is that carbon storage in landfills has generated a lot of debate. I'm not going to explore that debate here in the interest of time, but I do want to say that any emissions inventory of the landfill should keep methane emissions and carbon storage separate, if you count carbon storage at all. If you combine them, you have the potential of showing that landfills are a net zero emission facility, even as they continue to put methane into the atmosphere. The potential that the credit negates the emissions from – the methane emissions from an accounting perspective.

So carbon storage credits should never be used to mask emissions from landfills.

And one last point of caution regarding landfill emissions is that the timing of emissions is highly variable, and that's shown on the next slide, which portrays hypothetical landfill gas generation from a fixed mass of waste in two different landfill environments, one wet, the other dry.

The theory holds that the overall amount of gas generation, the area under the curve, will be the same, but at a wet landfill, the emissions will peak much sooner and exhaust themselves much sooner, whereas the dry landfill will generate more of a long flow leak.

One important corollary of this of this is that the greenhouse gas benefits of landfill methane avoidance, when we don't put waste into landfills, are not necessarily immediate. It depends on the waste, its lignin content, the moisture content of the landfill and other operating conditions. Food, grass, brush, and different grades of paper all decompose and give off methane at different rates.

Now this is different from the energy conservation benefits of recycling, which tend to occur within weeks or months of the recyclables being collected.

So if we're looking for immediate emissions reductions, landfill diversion for the sake of avoiding emissions might not provide our biggest short-term potential. The benefit is at least partly, if not largely, delayed, and the extent of that delay in time will vary with the waste type and the landfill conditions.

A few caveats about EPA's WARM model. The energy benefits of recycling are based on averages from domestic mills. Results may vary widely between individual markets and will likely vary quite widely between different nations.

As I mentioned earlier, the forestry-related benefits of recycling and prevention are still somewhat speculative, and these benefits strongly drive the results for certain materials, especially corrugated and office paper.

Some of the benefits of composting might not be fully quantified in WARM, and in July you'll hear several presentations regarding some exciting new research in this area.

The quantity and timing of methane releases from landfills are highly variable depending on site conditions, as are the effectiveness of gas controls. Again, you'll hear more about these next month. And EPA's report lists several other important caveats.

So what has all of this taught us? Slide 13 shows the relative emissions over the life cycle of a ton of various materials produced and land filled.

For many materials, such as aluminum, glass, TET, carpet and tires, the emissions are almost entirely in production. Landfill emissions are limited to equipment operations. These wastes don't degrade.

Papers are different. For corrugated, for example, the production emissions, which are in blue, are – excuse me – the production emissions, in blue, are about twice the net landfill emissions for the average US landfill after subtracting out the carbon storage benefit – that's the reddish bar. OK? If the carbon storage isn't counted, or if it's applied to a different sector such as the forestry sector, then the landfill emissions are slightly higher than the production emissions, as shown in green.

For third class mail, newspaper and lumber, the net emissions under the WARM model are actually negative if one includes the carbon storage benefit. And I mentioned the dangers of this interpretation earlier in that they mask the real methane emissions from that portion of the waste that does undergo decomposition. Those emissions are shown green.

But the point I want to make here is that for many materials the greenhouse gas impacts for production dwarf the emissions for landfilling.

Now this conclusion was also drawn by a 2004 study in California by the Lawrence Berkeley National Labs. This study compared manufacturing use and end-of-life emissions for a wide variety of products. So, for example, the third product on the left, which is a car, about 13 percent of its lifecycle greenhouse gas emissions are involved in making the car and everything that goes into it, the rubber, the urethane, the

steel, et cetera. The other 87 percent of the emissions occur during the use of the car, those are the tail pipe emissions. End-of-life emissions are so small for a car that they don't even register for this and also many other products. And they certainly never dominate the equation.

Slide 15 shows an early attempt made, in order to get back in 2004, to estimate the full lifecycle emissions for the entire mix of products and materials, including yard waste, that count as municipal solid waster in Oregon. This estimation is a real time estimation. That is, landfill emissions are assigned to the year in which the emissions are believed to occur, not the year in which the waste is disposed of. We now know that this early attempt significantly undercounted emissions associated with production of the materials that end up in landfills. And yet despite this, the estimated production emissions still dominate for the entire mix of materials that make up waste generation in Oregon. You can see that recycling offers significant greenhouse gas reductions, and that the landfill gross emissions are significant but not overwhelming even without the inclusion of the energy recovery or carbon storage credit that would be included in EPA's WARM model.

The impact of production is especially important when you look at our data and at some other states as well about waste generation. Oregon defines generation as the sum of recovery and disposal, and we've been tracking it since 1992.

Slide 16 shows pounds of waste disposed, recovered and generated on the basis of pounds per person per day over a 15-year period. Despite the more than doubling in per capita waste recovery, per capita disposal – show as blue trashcans – continues to climb. But we don't view that anymore as the compelling environmental problem. Rather, it's that much of the increase in per capita generation is the result of increasing consumption. Increasing consumption only occurs if production increases along with it. And since pound-for-pound production is so much more impactful than disposal, on average, it's the increase in consumption that's suggested by this trend that is deeply troubling from a climate perspective and fundamentally not sustainable.

So now let's go on a quick tour of prevention and recycling viewed through the lens of greenhouse gases.

Ton-for-ton waste prevention and reuse are almost always preferable to recycling. I've included on this slide a link to a report on the environmental benefits of prevention, as well as a few examples of the benefits of reuse, looking at a personal computer and a corrugated box, comparing reuse to recycling.

Slide 18 introduces the lifecycle analysis that DEQ recently commissioned of e-commerce packaging. It lists 26 different packaging options for shipping non-breakable items through the mail by a catalog or e-commerce order fulfillment center. The options include a highly recyclable corrugated box with a wide variety of void fills, as well as a variety of shipping bags, many of them difficult to recycle. And asterisk indicates that we evaluated both lower and higher levels of post-consumer content.

Fossil derived carbon dioxide emissions over the entire lifecycle of these options are summarized in the next slide. The range of results for the low post-consumer box and void fills are represented by this first bar up on the top. The high post-consumer content box with void fills is shown below. On the left are the five low post-consumer content shipping bags and the five high post-consumer content shipping bags.

You'll note that while recycling and recycle content provide greenhouse gas benefits, they don't necessarily make for very good criteria when comparing dissimilar materials. In contract, the reason that all the bags have such lower emissions is because they weigh so much less and allow the products to be shipped more compactly, so that's a powerful example of waster prevention.

While many states of statutory recovery goals, Oregon might be unique in having both statutory recovery and prevention goals. Slide 20 shows our early modeling of greenhouse gas emissions over the lifecycle of materials that contribute to the municipal waste in Oregon. In pink are the emissions under a business-as-usual scenario where per capita waste generation continues to rise and recovery remains stalled at 47 percent. The blue line shows a small incremental reduction in emissions if we can bump recovery up to

our statutory goal of 50 percent. The red line shows a much larger reduction in emissions if we can achieve our statutory waster prevention goals. That won't necessarily be easy, but it's imperative from a greenhouse gas perspective.

DEQ recently adopted a waste prevention strategy. The URL is provided on this next slide. It's only four pages in length, so you might want to check it out after the presentation.

And I am going to turn next to recover. Oregon defines recovery as the sum of recycling, composting and certain forms of combustion. Using EPA emissions factors, we now estimate, as part of our annual material recovery survey, the greenhouse gas benefits of recovery and the energy benefits of recycling, and they're really quite large and very empowering to folks who are in the recycling and composting community.

Recovery in Oregon in 2006 reduced greenhouse gas emissions by three and a half million metric tons of carbon dioxide equivalent. That's the equivalent of taking almost three quarters of a million cars off the road. And given that our state's population is less than four million people and many of us don't drive, that's a really big reduction.

The energy conservation benefit of recycling is equivalent to 214 million gallons of gasoline, or just over one gallon of gas saved for every Oregonian every week of the year. Of course, many of these energy benefits aren't in the form of gasoline or liquid fossil fuels. They're in the form of coal, hydro and wood, but people like to talk about energy savings in the form of gallons of gas, so that's the dimension we've adopted there.

We've conducted a rough evaluation of the greenhouse gas impact of curbside recycling. Some of our collection companies, faced with rising diesel prices and concern about tailpipe emissions from their collection fleet, are interested in reducing the frequency of curbside collection, for example, going from weekly collection on the same day as garbage to every other week collection of recyclables.

We estimate that collecting 100 tons of mixed recyclables from households results in about – and this is a very rough estimate – about four metric tons of carbon dioxide emissions from the collections fleet and the upstream production and transportation of the diesel fuel. Reducing the frequency of collections from weekly to every other week for recyclables might cut those emissions by something less than half, resulting in about a two metric ton reduction in emissions for every 100 tons of recyclables collected.

But that same 100 tons of recyclables, when delivered to markets who use them in lieu of virgin feed stocks, results in a decrease in emissions from a global systems perspective of approximately 235 metric tons of carbon dioxide equivalents. So curbside recycling represents a fantastic investment in carbon emissions reductions. You reduce emissions by about 60 times greater than the collection fleet emits. And that's largely a consequence of the energy conservation and induced forest carbon sequestration benefits of recycling. Further, with a switch to less frequent collection of recyclables, the resulting inconvenience, confusion and lack of parody with garbage collection, it's believed to translate into a loss of recyclables collected, all other things being equal. If the tonnage recycled falls by more than one percent or so, this ends up leading to a net increase in greenhouse gas emissions from a global perspective. So it really is all about the tons.

While collecting large quantities of recyclables in a large truck might make good sense from a carbon perspective, self-haul – self-haul of small quantities of personal vehicles is a bit more sketchy, as slide 25 shows. It can still be justified, without a doubt, especially if the additional distance required to travel is small and/or the quantity of recyclables delivered by each vehicle is large. So this argues for self-haul recycling programs that are as or more convenient than garbage and for collecting multiple materials at consolidated locations, as opposed to asking people to drive recyclables to a variety of different collection points.

Many of our recyclables are transported long distances to markets. Can that make sense from a greenhouse gas perspective? Americans intuitively overestimate the greenhouse gas impacts of freight relative to production. Slide 26 shows a very crude analysis of the breakeven point of transportation from a carbon perspective. Recycling aluminum, for example, reduced greenhouse gas emissions by about 3.4 metric tons of carbon equivalent. That's the equivalent of shipping aluminum 524,000 miles in an ocean freighter, all the way to the moon, ignoring the effects of gravity. Even glass bottles, which have the lowest per ton benefit shown here, can be shipped by rail 9,000 miles before the carbon emissions of transport exceed the carbon reductions from displacing virgin feed stock. So don't sweat the freight impacts of shipping recyclables to market, at least from a greenhouse gas perspective.

For many of these materials, the benefits are a consequence of virgin production displacement and have next to nothing to do with avoided landfill emissions. The next slide illustrates this using the example of glass collected in a small community at the border of Oregon and Idaho. After subtracting out the energy use of transportation, the net energy savings for driving glass to a bottle plant all the way across the state in Portland are estimated to be about 10 times higher, in blue, than the net energy benefits of keeping the glass local and using it in lieu of aggregates, that's in black. And the net energy benefits of driving glass to Portland and then shipping it via rail to California to be made into fiberglass are even higher. That's in pink. The greenhouse gas benefits of recycling are driving by end markets not transportation businesses. Local is not necessarily better, and the choice of end markets can have a very significant impact in the relative greenhouse gas benefits of recycling program.

Finally, slide 28 shows the recycling one ton of different materials generates very different greenhouse gas reductions. Negative numbers on this chart represent a reduction in greenhouse gas emissions. You'll also note that the location or type of emission reduction varies by material. For aluminum, steel, glass and PET (ph), it's all about reduced energy and process emissions. Those are in blue. For newsprints, the energy benefits are meaningful, but they're smaller than the EPA's hypothesized, induced forest carbon sequestration benefit, in maroon. For corrugated and office paper, there are no fossil fuel energy savings on average, and the results are dominated by forestry, in maroon, and avoided landfill emissions, in orange.

And this has important ramifications when we think about how to incent greenhouse gas reductions through different policy options, such as cap and trade. And I'm hoping that we'll have this explored in more topic in the Webinar in August.

So, in conclusion, I wish I could have summarized this in two takeaway messages, but I'm going to – I'm going to give you about 10. Upstream emissions dominates for most materials and waste. The impacts of goods is much higher than conventionally recognized by most greenhouse gas inventories. And Debra Kaufman (ph) from Alameda County is going to be talking about that momentarily. We'll also have a presentation by Joshua Stilleroff (ph) of the EPA in August presenting some very exciting research they're doing demonstrating the greenhouse gas emissions associated with materials.

Waste prevention is hugely important and tragically overlooked by many programs. Recycling does provide very significant benefits. Collection and long haul transportation emissions are surprisingly insignificant. The benefits tend to be driven by virgin feed stock displacement and, in some cases, avoid landfilling. Benefits can also vary widely by end use.

Recycle content does not consistently correlate with reduced greenhouse gas emissions. If you have a material you've decided to use, like office paper, you can typically reduce greenhouse gas emissions by increasing the post-consumer content of that office paper. However, if you're comparing two dissimilar materials such as corrugated boxes and polyethylene shipping bags, the option with the higher level of post-consumer content is not necessarily the one that's going to lead to lower greenhouse gas emissions over the lifecycle.

I've spoken very little about composting in part because we're going to hear a lot about that in the Webinar in July, but I do want to emphasize that composting can lead to greenhouse gas reduction benefits, especially for food waste which is highly methanogenic (ph). Recycling paper likely has much higher

greenhouse gas benefits than composting. And sometimes we talked about, "Shall we recycle our waste paper or shall we compost it?" And some paper can't be recycled. The only virgin (ph) option really is composting. But, if given a choice, recycling is probably going to led to higher greenhouse gas benefits than composting.

Among engineering controls in landfill, converting methane to carbon dioxide provides a much greater benefit than energy recovery, although energy recovery can add to benefits. Public perception, to the contrary, degradability in a landfill is not necessarily a good thing. Now I know we have a lot of people who believe that we want our waste to degrade, in part because they believe that we're running out of landfill space. And in some areas, in some regions, landfills – there is an acute shortage of landfill space. But the problem with degradability is that when waste and landfill degrade they release methane. And methane is such a potent greenhouse gas, especially when you consider it over the 20 year time horizon, that even small leaks of fugitive emissions from a highly efficient gas collection system will swamp, will overwhelm any of the greenhouse gas benefits of energy recovery at the landfill. So we really don't want to be putting waste into landfills for the purpose of generating methane.

The final point I want to make is that thanks in large part to EPA and the research that they've conducted in the last several years and are continuing to research, the greenhouse gas benefits of recycling, waste prevention and composting are becoming much easier to estimate. They're certainly filled with controversy within the WARM model, but we've all come a long ways in large part through the research of EPA I believe. We have found the use of the WARM model and the emissions factors that underlie the WARM model to be very useful in our program. And if you've not checked out WARM yet, I would encourage you to do so. Again, I provided the link to the WARM model earlier in this presentation.

So that is the end of my presentation. I have put my phone number and e-mail address here in case you want to follow up with me and are unable to do so during the Q&A session that will follow the next presentation, which is by Debra Kaufman (ph) of stopwaste.org. So thank you very much.

UNIDENTIFIED PARTICIPANT: Thank you, David (ph). Debra (ph), I am handing the presentation over to you.

DEBRA KAUFMAN (ph): OK. Thank you. It's a pleasure to join you. I'm Debra Kaufman (ph) with the Alameda County Waste Management Authority, commonly now known as stopwaste.org. We're a joint powers authority representing our 14 cities, two sanitary districts and the country itself on recycling and waste issues. Our agency and work is funded from a landfill tipsy (ph) of $7.57 per ton. And our mission is to reduce the waste drain by 75 percent and hopefully go higher than that.

I'm going to talk about how Alameda County is proceeding with connecting climate change and recycling and using the available tools. So Alameda County is in northern California, and we're a population of 1.4 million people. We're a diverse county with both urban and suburban communities. And we started our efforts in the area of climate protection in 2006.

All waste diversion efforts help reduce greenhouse gases, and David (ph) outlined it – outlined some of those ways. Traditionally, however, energy conservation and transportation measures have garnered most of the climate change attention with solid waste reduction being more of an afterthought. Our goal with these climate change efforts has been to illustrate the role waste diversion activities play in helping our cities reduce greenhouse gas emissions. And while that may be a smaller role than transportation measures, it is comparable to many traditional energy conservation measures and can contribute significantly to reducing global climate change impacts.

We have found that hitching the waste reduction wagon, so to speak, to the climate change one has helped leverage our message and get broader buy in and appeal. Recycling and composting waste prevention has never been more popular, and part of that is due to concern over climate change. And recycling really is first and foremost an energy and materials conservation measure.

So to help our cities make the connections between recycling and climate change, we decided to help fund some of the early climate change activities needed to get our cities going down that path.

To that end, we funded emission inventories for all our member agencies, as well as a template climate action plan. And that template plan includes emission reductions associated with a variety of waste diversion programs, and it's available on our Web site. And we did this via a master contract with ekly (ph) on behalf of all of our jurisdictions in the county. And that's a model that others are replicating now. Doing it that way allowed ekly (ph) enough efficiency to charge a lower cost than if each city had contracted separately for their inventory. And we were able to justify the expenditure from landfill tip (ph) fees (ph), and I think other jurisdictions could do the same thing from franchise fees because waste is one of the three emissions included in the inventory.

The inventory process that ekly (ph) recommends includes a reduction target, a climate action plan as well as an inventory, as shown in this slide, slide number 37. We help the cities with milestone one, the emissions inventory, and milestone three, the local action plan. And we also help with implementing the plan, milestone four.

So I want to spend a lot of the time that I have today talking about the two tools available and this process available to local governments. And those are ekly's (ph) greenhouse gas inventory tool and EPA's WARM.

I think it's important for recycling professionals to distinguish between these tools and understand what they're intended for and what they do and don't do because they are two of the most important tools in the arsenal of connecting waste diversion and climate change.

So the greenhouse gas inventory shows a city their total emissions for both local government operations and for community activities for a baseline year. Our cities use 2005 as that baseline year.

I want to emphasize that the inventory does only one thing, it counts up greenhouse gas emissions for a base year. It does not address emission reduction strategies such as recycling or carpooling or energy conservation measures, and it's really not intended to.

The EPA's waster reduction model, WARM, on the other hand, is a tool for doing that, for estimating the emission reduction potential of recycling and other alternatives to landfilling. There are different tools to do this for energy conservation measures and transportation measures, but WARM is specifically about quantifying emission savings from waste diversion.

I'm going to – I'm – I want to talk a little bit about the – what the inventory includes and doesn't include, and then I'd like to talk about how WARM can be used to compliment it. So first, on the inventory side, the inventory – the ekly (ph) methodology, which really is the methodology that most local governments are using, calculates emissions for both government operations and community activities in the categories of transportation, energy consumed and waste. Government operations generally represent less than five percent of overall emissions, so the community inventory piece is really critical. And I want to emphasize that the waste category includes landfill methane emissions only.

The inventory does not calculate the emission reduction potential from recycling. Ekly (ph) has some tools to help with that, but they're unrelated to the inventory itself. I think that's an important distinction to make because I've heard a lot of folks say that the inventory should include recycling. It's really not intended to. It's simply an accounting of emissions from three – from these three activities only.

So I want to show you what an inventory for one of our cities showed, and it's comparable to most of the inventories conducted. These are the sources of emissions. And, as you can see, waste – or more specifically methane emissions – are a small portion of the overall emissions. The emissions here are shown from the commercial and residential sectors are all energy related.

So going back to the inventory, I want to discuss what's missing related to waste. The inventory does not include emissions from energy used elsewhere in producing products that are consumed locally or wasted locally. Those are reflected in the energy emissions reported for the communities that host those manufacturing or recycling facilities. And they're included in those communities' inventories if those are conducted. This methodology, the methodology that ekly (ph) uses was designed to address legitimate concerns about double counting the emissions in both the place that it was originally emitted, the place where the product was manufactured and the place where it was purchased and consumed.

This slide reiterates some of the concerns that I mentioned. Energy and transportation emissions associated with extracting, producing, transporting products and packages are reported elsewhere, if at all. Reporting local emissions only, which is really what the inventory was designed to do, can yield a somewhat parochial approach wherein only actions that reduce local emissions are prioritized. So some cities have concluded that because the inventory shows few emissions related to waste, waster reduction activities are not a priority. And while recycling does produce emissions elsewhere, local action, obviously, is critical to reducing those emissions. So that's where the local inventory does a bit of disservice to the issue of waste related emissions. It makes them look smaller than they really are.

And there's still a lot of controversy related to what is the accurate methane recovery rate to use. The – there really is no completely accepted methodology for estimating fugitive emissions, although research is underway on this issue. Some – one of the main concerns I've heard related to this is that methane recovery generally takes place after a sale has closed, which often isn't for a year after waste goes in.

Sally Brown (ph), the professor at University of Washington states that research shows that food releases most of its methane in the first four months, which is generally before methane recovery systems are activated.

So what I want to say is despite the weaknesses noted in the inventory, it is a very useful tool. Cities need a baseline of emissions to develop a reduction target, and the ekly (ph) inventory provides that. And also the methodology that ekly (ph) uses is based on international protocol.

So we've discussed the fact that total landfill emissions appear to be a small part of overall emissions released of (ph) creating waste if you consider the energy and transportation emissions of extracting, manufacturing, transporting goods and packaging. I want to note that even if we had perfect landfill gas collection efficiency, the best we can say about landfilling is that we're wasting the energy contained in 40 million tons of resources, which is what California buries. And every ton that we deposit in the landfill represents a missed opportunity to reduce multiple tons of emissions that come from recycling the material instead.

OK. So the inventory measures landfill emissions and not greenhouse gas reductions associated with recycling, composting, and these are summarized on this next slide. The state of California is conducting a lifecycle analysis on the benefits of composting with respect to reducing greenhouse gases, and some of composting's benefits may be better quantified in that study.

So what the local inventory can't do is help us connect the dots between local consumption and wasting and the upstream impacts of that consumption. EPA's WARM tool, however, does just that. And WARM, as David (ph) mentioned, is the best tool that we have to quantify the upstream benefits of recycling and composting. And I want to talk a little bit about how we've used that tool and how others can use that tool.

WARM helps cities project the CO2 equivalent reductions from increased diversion, and it's a great tool to illustrate the benefits of recycling and composting compared to landfilling.

So the next two slides I want to show you how we've used the WARM model to compare the impact of waste diversion activities on climate change with more traditional emission reduction activities.

Here's an analysis that we did looking at various green building measures for a typical home. What we found was that construction and demolition debris recycling from new homes saves as much CO2 in the first year as traditional energy and water conservation measures such as using energy star appliances and energy efficient insulation and water efficient irrigation systems. The C&D (ph) recycling savings accrue in the first year only as opposed to the other savings, which are ongoing, but they're still impressive.

Let's look at another example for our schools. This shows a school district with 800 students at each grade level. And it shows that recycling compares favorably with other greenhouse gas measures that a school might consider, including converting their bus fleet to bio-diesel and installing solar on their roofs. Not only does recycling offer comparable greenhouse gas savings, it's also the cheapest alternative. And we're not talking about eliminating waste here. We're looking at an achievable modest increase from 30 to 35 percent recycling.

The next slide summarizes the emission reductions associated with various waste diversion activities, and I put this in as a reference slide. Our goal has been to disseminate this information to our cities so that they can include these activities in their climate action plans.

The next slide gives you an alternative representation of how much impact recycling and waste prevention could have on reducing climate change. The pie chart is not to scale, but it shows the potential from recycling in achieving emission reductions. And, when I say recycling, I'm including all waste diversion activities. Well, we don't know exactly what these numbers are as of yet. If you consider the upstream energy and transportation emissions associated with waste, this would be a better representation of the emission reduction potential of waste diversion activities than the currently accepted one to three percent that California and the US say that waste contributes to overall emissions.

David (ph) mentioned a new report called trashing the climate. And that report asserts that when we minimize waste, we reduce greenhouse gas and energy use, transportation and deforestation, which together represent 36 percent of total emissions. They assert that it's this 36 percent that more accurately reflects the impact of the whole system of material extraction to disposal on climate change.

So I want to switch focuses here and talk briefly about what's remaining in the waste stream. Recoverable organics make up 50 percent of what's being discarded in the states' landfills. And your waste composition is probably not that different. And food produces more methane per wet ton than any other type of organic material. And that's why we've prioritized getting food waste and other organics out of the landfill.

I like this quote from the EPA that says, "There are no plausible scenarios in which landfilling minimizes greenhouse gas emissions from waste management."

I want to share with you some of the ads that we're using in Alameda County to help keep residential food waste out of the waste stream. We have a program where residents co-mingle their food waste with yard waste. Our food scrap recycling media campaign is targeted to reach residents using billboards, buses, bus shelters, shopping carts and in home media. Bill inserts have been one of our most popular and least expensive methods and have been widely distributed.

Here's an example of one of those bill inserts.

This is one of our billboards posted outside a major sporting arena.

Here are a couple more examples of this year's ads placed in our public transportation train stations.

We're trying to encourage people to make food scrap recycling a habit in their lives, like cleaning out the refrigerator is.

Here's another billboard.

We're also working on promoting food soiled paper. Our consumer survey indicated that residents are still not putting food soiled paper in the green bins.

I want to end with a summary of activities we consider important with respect to waste and climate change.

Getting organics out of landfills is critical so that they don't generate methane in the first place. Showing our cities and state that recycling, composting and waste prevention activities are very cost effective greenhouse gas reduction measures and need to be included in local and state climate action plans. Advocating through recycling reporting protocols that include upstream emissions, and examining how WARM or another model could be used to accurately account for the impact of local activities on total global emissions. It's important to pursue the issue of what the appropriate methane recovery rate is.

Current research should give us a better handle on fugitive emissions. Its relevance consider and suggest improvements both to the WARM model and the ekly (ph) inventory methodology.

And, finally, here are some resources that I have found very useful on this. WARM has been an invaluable tool, and despite some noted inventory weaknesses, ekly (ph) is a great organization that has done a lot to help our county move climate change issues forward. They're a great resource and generally – genuinely interested in helping local governments with climate change issues, as is Californians Against Waste.

And here's a reference for the report that I referenced today and that David (ph) discussed. And here's my contact information. Thank you very much for participating today. Thank you.

UNIDENTIFIED PARTICIPANT: Thank you, David (ph) and Debra (ph). We have received a few questions. I'll read some aloud, and if you participants have more questions, please use the chat feature on the right hand side to send those.

One of the questions, the WARM model assumes only 75 percent methane capture destruction at landfills. Waste management believes it's possible to implement GG-GCCS (ph) and maybe someone can define that for us. But Waste management believes it's possible to implement GCCS (ph) efficiency at landfills over the life of a landfill that approaches or even exceeds 90 percent. This would result in a 60 percent reduction of CH4 from landfills projected by WARM.

David (ph) or Debra (ph), could either of you address that?

DEBRA KAUFMAN (ph): Well, this is Debra (ph). I just think there is still a lot of debate about this issue. You know I know a lot of – you know several landfill operators have said that they can achieve 95 percent, but there is not at this point an accepted methodology for determining how much fugitive emissions occur.

UNIDENTIFIED PARTICIPANT: OK. We have another question. I'm wondering if food waste is highly methanogenic (ph) and produces most of its methane during the first four months, would that mean that food waste composting generates a lot of GSGHG (ph)?

DEBRA KAUFMAN (ph): Well generally the food waste is generating the methane in landfills under anaerobic or without oxygen conditions. The composting process is usually aerobic and is not generating much methane at all.

UNIDENTIFIED PARTICIPANT: OK.

DAVID ALLAWAY (ph): This is David (ph). The one alternative approach would be if you were doing anaerobic digestion. And, if you were, you would be producing methane from the food waste, but the digestion would be occurring in a sealed tank where you'd be able to capture a very high percentage of the methane that was being produced.

I guess I might also mention that in the presentations next month, in the next Webinar, there will be two presentations about research around composting, including one by Dr. Sally Brown (ph) who is a compost and climate scientist at the University of Washington. And hopefully she should be able to answer this question with even more detail.

UNIDENTIFIED PARTICIPANT: Oh great. OK, thank you. Another question, have you quantified the CO2 benefits of using landfill methane for an energy source in terms of avoided carbon from a conventional energy power plant?

DAVID ALLAWAY (ph): We haven't done that calculation in Oregon, but that is the calculation which is embodied in the WARM model. The WARM model assumes that energy recovery, both from combustion and – sorry, combustion of waste and also combustion of landfill gases is displacing electricity that would be produced using conventional needs. And so that is embodied – or embedded, sorry – in the background document that I provided the link to earlier.

UNIDENTIFIED PARTICIPANT: OK. Another question about – David (ph), you were mentioning the Webinar in July. I believe that's on July 16th. Will in vessel composting and anaerobic digestion be discussed on that Webinar? Do you know?

DAVID ALLAWAY (ph): I actually don't know if it will be or not, but we should certainly ask the next round of speakers to do so.

UNIDENTIFIED PARTICIPANT: OK, great. Let's see. We're getting a lot of questions come in here. We have a couple more minutes of questions. Another one, "What distinguishes organic compost from non-organic compost? Why aren't biodegradable plastics allowed in organic compost?"

DEBRA KAUFMAN (ph): Biodegradable plastics is you know a different issue for every operator. Some compost operators take them and some don't. I don't know about specific. I can't answer the organic compost versus non-organic compost question.

UNIDENTIFIED PARTICIPANT: OK. Methane's 23 times potency is based on a 100-year window, but methane degrades within 16 years. Shouldn't WARM and decision makers consider the greater early benefits of methane avoidance?

DEBRA KAUFMAN (ph): I think that's an excellent point. And that new report, "Trashing the Climate" like lays out a very good case for translating methane's global warming potential into a 20-year timeframe. And that would make – if all emission sources were converted to a 20-year timeframe, methane would go from being two percent of total US emissions to five percent.

UNIDENTIFIED PARTICIPANT: OK. Have you seen any existing or planned waste reduction incentive programs similar to like carbon path or trade programs, which track GHG (ph) emissions and carbon footprints related to waste management activities?

DAVID ALLAWAY (ph): On the upstream side, involving production of materials, there's a lot of activity happening at the corporate level, including organizations such as Wal-Marts, involving carbon footprinting of products. Europe is ahead of the United States on this, in this area, in terms of trying to put like a carbon – something comparable to a nutrition label on a product so that when you go to a store and are confronted with three different product choices, you can choose the one with the lower carbon footprint.

But on the prevention side, there is a lot of activity happening in terms of trying to understand, at least, the carbon impact of products, although it hasn't made it to the level of retail promotions in the United States yet.

UNIDENTIFIED PARTICIPANT: OK. Could one of you explain some more on the different timeframes for CO2 reporting? You propose a 20-year timeframe and why?

DEBRA KAUFMAN (ph): You want me to try that one, David (ph)?

DAVID ALLAWAY (ph): Well, why don't you go first, and I'll …

DEBRA KAUFMAN (ph): OK. You can mop up.

You know the issue is that there are different timeframes that the IPCC (ph) looks at, different gases global warming potentials. And they do consider a 20-year timeframe and a 100-year timeframe. A hundred year is used more traditionally, but if you take methane and you – since methane only lasts in the environment 12 years, it has a much stronger impact if you look at a 20-year timeframe than that 100-year timeframe. It makes more sense to look at methane over – the impact of 20 years because that's where the impact is going to be. And, if you do that, then you see that methane is actually 72 times more potent than the equivalent CO2. Does that – I don't know – does that make – does that cover it, David (ph)?

DAVID ALLAWAY (ph): That works for me. I might add just a little bit more. The use of these different time horizons is intended to help policy makers weight the short-term versus the long-term cost and benefits of different strategies. The decision to use 100-year planning horizon versus a 20-year planning horizon versus a 10 or a 1,000-year planning horizon is really a policy decision. And I actually want to share a quote from the – one of the reports of the inter-governal (ph) panel on climate change on this issue. They say, quote, "If the policy emphasis is to help guard against the possible occurrence of potentially abrupt, non-linear climate responses in the relatively new future, then the choice of a 20-year time horizon would yield an index that is relevant to making such decisions regarding appropriate greenhouse gas abatement strategies," which is sort of science speak for saying, "If we're concerned about reducing emissions and the impact of the emissions in the short-term, then we need to take – we need to weigh – give more weight to the short-term planning horizon, which would be the 20-year global warming potential as opposed to the 100-year global warming potential.

The 100-year global warming potential is the standard that's used in Kyoto (ph). And that was negotiated you know – I don't know – the mid-'90s I believe – early '90 – '92? You know, at that time, global warming was still kind of theoretical. I mean it was understood, but no one was really seeing hard and fast evidence of it. And what we have happening today is a situation where the forecasts are constantly under predicting the current rate of change. Global warming is happening faster than the models are predicting, which suggests that we need a faster response and a faster reduction in emissions if we want to avoid reaching a tipping point where global warming becomes unstoppable. And if you take that frame of reference, then using a shorter time period, such a 20-year planning or 20-year horizon, is much – is much more important.

UNIDENTIFIED PARTICIPANT: OK, great. Thank you both. We have some more questions coming in. All of the comparisons that you were talking about during your presentations use landfill gas emissions. How do incinerator emissions compare?

DEBRA KAUFMAN (ph): (INAUDIBLE) …

DAVID ALLAWAY (ph): There is …

DEBRA KAUFMAN (ph): Go ahead, David (ph).

DAVID ALLAWAY (ph): Yes. The EPA report in the WARM model includes some information on incinerators. I have to admit I haven't spent that much time looking at the incinerator emissions in part because it appears that the incineration infrastructure, at least in – at least in the state that I work in is relatively fixed. We don't expect it to be expanding or contracting any time soon. So from a policy perspective the incineration issues are not as relevant for us as they may be for other states. However, if I

recall correctly, EPA's report holds that incineration of MSW (ph) I believe has slightly slower – slightly lower greenhouse gas emissions or a higher greenhouse gas benefit than landfilling. It's a relatively small differential, if I remember correctly. And that, in both cases, recycling still compares very favorably against either incineration or landfilling.

UNIDENTIFIED PARTICIPANT: OK. Have you broken out the impacts of building materials versus traditional municipal recyclables?

DAVID ALLAWAY (ph): The – again, EPA – because we haven't done much of this original research ourselves here in Oregon. So EPA, in the WARM model, includes a wide variety of building materials, concrete, I believe asphalt, copper, steel, wood, other materials where they have attempted an estimate of the greenhouse gas impact of different end of life management options.

UNIDENTIFIED PARTICIPANT: OK.

DAVID ALLAWAY (ph): So I'd encourage you – or the person who asked that question – to dig into the WARM model and the back (ph) documentation and see just what materials they've evaluated.

UNIDENTIFIED PARTICIPANT: Great. We have time for a few more questions. Here's another one. Due to the density of organic – of organics, how far can organics be transported using fossil fuels for composting or AD (ph) and still lower lifecycle GHG (ph) emissions versus putting them in a local landfill?

DEBRA KAUFMAN (ph): David (ph), do you have an answer to that?

DAVID ALLAWAY (ph): Well, Sally Brown (ph) will speak to this next month. I don't want to steal her punch line. But her estimate is that you can transport food waste in a diesel truck to Patagonia before the emissions exceed the emissions reductions benefits of composting. The city of Portland did an analysis a couple of years ago looking at the greenhouse gas impacts of driving food waste from the Portland area to a – to a proposed compost facility that was located about 150 miles from Portland. And it was still – even after including in the additional diesel emissions – the composting activity was still highly favorable from a greenhouse gas perspective.

UNIDENTIFIED PARTICIPANT: OK.

KAUFMAN (ph): Also the WARM model allows you to input different miles to the compost facility versus landfills, so the model allows you to look at that.

UNIDENTIFIED PARTICIPANT: OK, great. Another question. David (ph), I believe you were talking about measuring global warming. And someone asks, "What criteria is being used to measure global warming? How can we say it's happening faster than what's predicated?"

DAVID ALLAWAY (ph): Oh yes, that's a really good question. And perhaps I should clarify that what we're seeing is that the effects of global warming and the effects of climate change are happening faster than predicted. The ice sheets, the glaciers, the ice sheet in Antarctica are all melting faster than most of the models were predicting even just a few years ago. So that would be one example.

UNIDENTIFIED PARTICIPANT: Another question, "Has anyone analyzed or quantified the benefits of C&D (ph) recycling from an emphasis – or from an emissions global warming perspective? Obviously much of the benefit is in avoided production. But, if so, who may have analyzed or quantified those benefits?"

DEBRA KAUFMAN (ph): We've taken the WARM – what WARM has done and converted that into a – translated that into C&D (ph) recycling savings equivalent CO2 savings per home and per commercial building. And I cannot share – and that information is on our Web site.

UNIDENTIFIED PARTICIPANT: And your Web site is listed on your slides …

KAUFMAN (ph): Stopwaste.org.

UNIDENTIFIED PARTICIPANT: OK, great. So here's a note from someone and that – regarding incinerator emissions, the "Stop Trashing the Planet" reports – it's called a "Stop Trashing the Planet" report, and it states that per kilowatt hour incineration produces more GHG (ph) emissions than coal, oil or natural gas fired power plants. Can one of you address that?

DAVID ALLAWAY (ph): This is David (ph). I haven't reviewed that report. So I can't really offer my opinion about the relative greenhouse gas emissions of different combustion activities. The question that was asked previously was asking about incineration of waste versus landfilling of waste, and so I'll clarify that that's the answer I was – sorry, that's the question I was answering. Not the question here, which is, "Is it better to burn …" or the implied question, "Is it better to burn oil, coal, natural gas or garbage to generate electricity?"

UNIDENTIFIED PARTICIPANT: OK, great. Thank you. Well, I think it's time for us to go ahead and move on to the next phase of our presentation. As Dana (ph) from the EPA mentioned at the beginning, we have nine different presenters from different states. We've also set aside some time at the very end of the presentation for more questions. So if you think of something else for David (ph) or Debra (ph), please go ahead and type it in. We'll do that at the end.

Now we are moving to Our State (ph) presentations, and we are beginning with Doug BUTEYN (ph), the Alaska Department of Environmental Conservation. Doug (ph), are you on the line?

DOUG BUTEYN (ph), ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION: Yes I am.

UNIDENTIFIED PARTICIPANT: All right, Doug (ph), the floor is yours. And I'll be moving the slides for you.

DOUG BUTEYN (ph): OK, thank you.

Well, to begin, I wanted to clarify that my presentation is going to focus exclusively on what's happening at the state level in Alaska. And just wanted to recognize up front that there are also other efforts being made in the state at the local level by local government and non-governmental entities. So keep that in mind.

With that, let me begin. Climate change planning in Alaska is being coordinated for the state by the governor's climate change sub-cabinet, which was instituted in September of 2007 by an administrative order. The sub-cabinet began its work by giving immediate attention to the problems faced by communities that are most at risk from coastal erosion and flooding, much like the community of Newtok shown in the photo. But it's also developing recommendations for assisting other Alaskan communities that will be impacted by climate change.

On slide number four here, you can see the organization of the sub-cabinet, which was created – or which began or took this form in May of 2008, when it created two advisory groups comprised over 100 people in Alaska, and their task was creating or crafting a climate change strategy for the state that will ultimately go to the governor for her review. The mitigation advisory group is focused on developing and prioritizing strategies for reducing Alaska's contribution to climate change, and the adaptation advisory group is tasked with devising strategies for responding to the already-present impact of climate change, including things like increased coastal erosion and the thawing of permafrost. Within each of these advisory groups, there are various technical work groups working at taking a closer look at the options available for specific industries and economic sectors, and the planning being done specific to the solid waste industry is

occurring under the mitigation advisory group within what's called the forestry, agriculture and waste technical work group. Next slide, please.

The potential strategies that we are going to consider for the solid waste industry in Alaska are shown here on this slide, and please note that the list shown is a set of group headings rather than individual strategy options. So there are multiple options available within the broad scope of the items on this list, and all of the available options are likely to be implemented, or could be implemented, somewhere in this state, but the issue for us is whether any one option can be implemented statewide, and the next slide will show you why that's such an issue. But to help put that next slide in perspective, I just wanted to point out that, after listening to the previous talks, the population in the State of Alaska is approximately one-half of what it is currently in Alameda County.

So that's what makes the issue here in Alaska kind of interesting. First of all, we have to deal with the overall size and the geographic diversity of the state, and – for instance, if you implement a strategy that works well in the Southeastern Panhandle, down where Ketchikan and Juneau are, it's not likely to be as well suited for the North Slope region, up towards Barro (ph).

And another reality we have to deal with is that there isn't a developed road system within the state. In fact, on the map here, the only communities shown that are actually accessible by road are Fairbanks and Anchorage, and so everywhere else we have to transport waste either by air, which is expensive, or by barges, which in most of the state can only run in the summertime. Therefore, implementing a statewide strategy will require a coordinated effort among all of the interested and affected persons and organizations.

But on the positive side, because of the way our population is distributed, about 90 percent of the solid waste in Alaska is generated in about 10 percent of our community, and as such, initiating a selective strategy within the most populated portion of the state means that we can realize the majority benefit of the strategy, even while we're still trying to figure out how to extend it into the rest of the state.

And I think that's the last slide and the end of my talk.

UNIDENTIFIED PARTICIPANT: Thank you. Now we'll hear from Julie BOWLES (ph) with Arizona.

Julie (ph), are you on the line?

JULIE BOWLES (ph), ARIZONA: Yes, I am.

UNIDENTIFIED PARTICIPANT: OK, Julie (ph). The floor is yours.

JULIE BOWLES (ph): OK, well, first, I want to say thank you for letting me speak. If you'll all just bear with me, Kurt Maurer (ph) was going to be presenting, and I've seen this material just a short time ago. So I'll go ahead and start.

I want to give just a brief overview of what we're doing here in Arizona. The Arizona climate change process began in February of 2005 with the first of two climate change executive orders issued by the governor. This established a 35-member climate change advisory group, or CCAG (ph), with the mission to complete an inventory and forecast a greenhouse gas emissions and also to submit an action plan of recommendation for mitigating greenhouse gas emissions.

The group completed the inventory and forecast in June of 2005, and among the key findings were that Arizona has the fastest GHG emissions rate of growth in the U.S., and they are projected to increase to roughly 148 percent over 1990 levels by 2020 and 200 percent by 2040. Nearly 80 percent of emissions are from two sectors, and that is electricity use and on-road transportation, and it was found that only 2 percent of the state's total GHG emissions are from the waste sector.

The CCAG (ph) process was a year-long iterative process in which there were six meetings held and 40 technical work group meetings between July 2005 and June of 2006, and the group considered more than 200 different policy options. The mission of the group was to find meaningful solutions that fit Arizona's unique needs and circumstances. Options moved forward on the basis of greenhouse gas emissions reduction potential, cost savings and co-benefits.

So we'll go ahead and start with some of the information that you see here on slide one. The governor released a climate change action change in September of 2006. This plan include a comprehensive set of 49 recommendations. Some of that information you'll see there on the slide. The plan included one recommendation that addressed all the waste management because it was only 2 percent of the emissions. That plan was primarily addressed through increased recycling and reduced waste generation with reliance on continued efforts of our state recycling program. It was determined that the state should aim to expand curbside recycling programs to all communities of 50,000 or more in population, increase penetration of recycling in multi-family housing, to increase participation in the existing recycling programs and create a new recycling program for the commercial sector, provide incentives in developed markets for recycled materials. And now we'll move on to slide two.

The governor issued the second executive order, number 2006-13, and this executive order established a climate change executive committee to develop strategies to implement the action plan recommendations. It also contained specific directives, including to set the state's GHGG (ph) emissions reduction goal to 2000 levels by 2020 and 50 percent below 2000 levels by 2040; also, to develop a greenhouse gas emissions reporting mechanism and establish a multi-state registry via the climate registry; to adopt a clean car program through the administrative rule approved on May 6, 2008, and also to convert 12,000 vehicles state fleets to low GHC emission vehicles by 2010.

The Western Climate Initiative, along with other Western states and Canadian provinces set out to establish a regional multi-sector cap and trade program, and this process has been very involved and is ongoing. The WCI partners are on schedule to submit two governors and premiers a sub-program to sign recommendations in late August or early September. In addition, ADQ (ph) is working this legislative session to adopt an Omnibus Energy Conservation Bill, and this is a series of mandatory and (ph) voluntary provisions addressing energy efficiency in schools, public building construction, appliance standards, anti-idling requirements for commercial diesel vehicles and renewable energy standards for public power suppliers not under the jurisdiction of our state's Public Utilities Commission.

If you want to go ahead and go to slide number three, this will provide you with Kurt Mauer's (ph) contact information should you have any additional questions relating to Arizona's programs. And that's pretty much all I have.

UNIDENTIFIED PARTICIPANT: Great. Thank you very much.

JULIE BOWLES (ph): Thank you.

UNIDENTIFIED PARTICIPANT: Next, we have Richard (ph) with the California Air Resources Board.

Richard (ph), are you on the line?

RICHARD VERENCHIK (ph), CALIFORNIA AIR RESOURCES BOARD: I certainly am.

UNIDENTIFIED PARTICIPANT: Great, Richard (ph). The floor is yours.

RICHARD VERENCHIK (ph): Why don't we move on to the second slide, just move right past this first one, and here you see a kind of basic overview and the pie chart of where California's greenhouse gas emissions come from – obviously, transportation being the largest one, and then electricity and industrial sources. So these are some of the big actors, so to speak, that we have to deal with in trying to reduce our emissions.

Let's take a look at the next slide. What is AB32 (ph)? AB32 (ph) is the legislation that the State Legislature adopted in late 2006 that basically outlines broadly a plan for California to reduce its greenhouse gas emissions, and what we're shooting for right now is to try by 2020 to cut our emissions back to a level that they were at in 1990, and that would be a reduction of around 30 percent. Then beyond that, we want to move out and continue making reductions, and we'll take a look at that in a minute. The legislation basically says that the Air Resources Board is going to monitor and regulate the various greenhouse gas sources and be the lead agency, but we're certainly working with a lot of other state agencies and other governmental entities, actually, from around the world in doing this. One of the points that is made in AB32 (ph) is that while we want to reduce greenhouse gases, we certainly do not want to do anything that would detract from the ARB's other health-based programs dealing with air emissions.

And the next slide will kind of give us a bar graph look at what the challenge is. That black line along the top is the 1990 emission levels, and if you can see off to the second from the far right, 2020 is talking about the reductions that we need to make, about 173 million metric tons, or as I said earlier, about a 30-percent reduction, and then looking out to 2050, an 80-percent reduction is what we're going to be shooting for.

The next slide, please. It shows us the timeline that AB32 (ph) has set out for us, and you see a number of milestones here until we get out to 2020, when hopefully we've reached that goal of reducing greenhouse gases down to the levels that they were in 1990. And the next slide, we can go into a little more detail about the scoping plan itself. The – if we could go to the next slide? There we go.

The scoping plan is really the 500-pound gorilla, so to speak, of how ARB and the other state agencies are going to work to reduce our emissions back to those 1990 levels, and really, we're looking at virtually every sector of the economy in California, and as I said before, once we hit those 2020 goals, we want to be looking forward toward 2050. Some of the ideas that we have in mind in putting together the scoping plan and that are required by AB32 (ph) is that we maximize the benefits to California in that we do not do anything to increase criteria and toxic air pollutants, and in fact, the work that we've done even just to this point tells us that by reducing climate emissions, we're going to see reductions in criteria and toxic pollutants. The whole protocol that we're going through promises to be something that is going to bring about new technology and the potential for what we call green tect (ph) or economic development based on some of the protocols that will be developed to reduce climate emissions, and the scoping plan requires us to assess the economic environmental public health and societal impacts of any plan that we end up with.

Let's go on to the next slide. And this is what we're looking for in kind of structuring out how the scoping the plan should work. We've done some preliminary recommendations that will get us about 60 percent of those tons that we need to reduce to 1990 levels by 2020 – the automobile standards, low carbon fuels, taking a look at land use and how we develop land and provide housing. Energy efficiency is going to be a cornerstone of this whole plan, renewable energy sources, and then beyond that – well, what do we do then to get the remaining 40 percent of the tons and reductions that we need? We're looking at a variety of different things: direct regulations, cap and trade programs, possible fees on carbon. We expect that there's going to be an overall, as I said before, beneficial impact on coal pollutants that. Just by virtue of things like efficiency and reduced fuel use, you're going to get fewer of those other pollutants that I talked about before, the criteria pollutants, PM (ph), things like that. Next slide.

I'm going to kind of jump out of order in what I would normally do in a presentation like that because I know that the group is interested in waste and recycling and things like that. So one of the protocols that we're developing in AB32 (ph) and the scoping plan is what we call one of the early action items that have to be in place by January of 2010, and the idea is that we want to continue reducing methane emissions from landfills by requiring, you know, gas collection and control systems on landfills where they don't currently exist. Many of them in the state already have them, but we're looking now at establishing statewide standards to maximize the efficiency of methane capture. In working with the Integrated Waste Management Board here in California, we're also going to explore opportunities to increase energy recovery from the methane gas and landfills. I know that there are some places in California already where

they're running electric generators off of the methane gas from the landfills. Let's go to the next slide, and we can talk about this a little more.

We expect – actually, that was prepared – this slide was prepared a couple of days ago by me to show you how rapidly things change in our work on the scoping plan. That first bullet, the number has been reduced to probably about something in the range of one million metric tons reduction. As you can see there, there's a draft regulatory language that's already been posted on our Web site, and there's, in October of 2008, there'll be a staff report out available for people to comment on. The – again, this next bullet, it says that it would go to the board in November of 2008. We're looking now at January of 2009, and then in effect by late 2009, or 2010 at the latest. There's links there, for those of you who would like more information on this. The Climate Change page will take you to Early Action Items and then Landfill Methane, and that next bullet is a direct link right to the methane protocols that we're working on. And the last is Rinaldo (ph), our staffer, who is one of the leads working on this, if you wanted to call somebody and have further questions about it.

Let's try the next slide. We also have set up, along with the Integrated Waste Management Board, a commercial composting work group. We have nearly 200 permitted commercial composting facilities in California, and they contribute both VOCs that are smog forming emissions, and again, methane in the form – greenhouse gases in the form of methane. So the work group is taking a look at these things and doing some studies on them, and there's some more contact information down there at the bottom of that slide, those of you who would like more information. Next slide, please.

We're going to go back to the scoping plan, and if you weren't aware of it, the draft scoping plan is scheduled and has been released today. It was brought up at our board meeting, and there was a lot of discussion on it. But the draft plan is now out and should be posted by sometime late today or tomorrow that you could actually go to the ARB Web site, then go to Climate Change, and you'll be able to look at the draft. We strived mightily to keep it under 100 pages, and it came in at either 96 or 98. I don't remember which. But it'll give you a very good overview of what we're looking at and thinking about. Then there'll be a series of public work shops, as you can see here in July and August, a number of community meetings. And then the final scoping proposal would be released in October and go to the board for consideration probably November 20, but sometime in late November. AB32 (ph) says that we must have it adopted by December 31 of 2008, and so it will be done by then.

And the last slide, please. This is basically other contact information, the climate Web site. There are list serves that you can sign up for if you're interested. There's the climate change portal, which has a number of governmental agencies that are working on this, and last, but I hope not least, my name, my email and my phone number. If you have questions, send me an email. I respond, or call me. I'm usually in my office if I'm not out doing presentations similar to the one that I just did for you. So call or email if you have any questions or anything you can help me with. If you're lost trying to find something on our Web site, I'm happy to assist you.

And that wraps up my presentation.

UNIDENTIFIED PARTICIPANT: Great. Thank you. Our next speaker is also from California, but we're having a little bit of trouble getting him on the line. Richard (ph), would it be all right if we go ahead and ask you some questions right now?

RICHARD VERENCHIK (ph): Certainly.

UNIDENTIFIED PARTICIPANT: OK, great. We have a few: One, are emissions from solid waste late collection vehicles counted on the first slide pie chart as transportation or as waste?

RICHARD VERENCHIK (ph): They would – they would be counted as transportation. Strangely enough, before I came into the climate change group in late 2006, I worked on the Air Board's regulation to reduce

diesel smoke or PM (ph) emissions from waste collection vehicles, so I'm fairly familiar with that, and certainly, they would be counted – they would be counted in transportation emissions, I'm pretty sure.

UNIDENTIFIED PARTICIPANT: OK. Another question: is California going to adopt the ICLEI (ph) protocol and EPA's WARM model?

RICHARD VERENCHIK (ph): I couldn't tell you that. At this point, I just don't know the answer. One of – one of my disabilities, so to speak, is that I work in the Air Board's Southern California office, and all of the other staff who are working on climate change are in the Sacramento office. So sometimes, I'm a little behind the curve in picking up on information that, you know, might be talked about over lunch or when you run into somebody in the hall. So I just cannot answer that question. I don't know the answer, but if the person who asked the question would send me an email so I'd know who to respond to, I'll get the answer and get back to you.

UNIDENTIFIED PARTICIPANT: OK, great. And just a reminder, the slide that's up now has Richard's (ph) email right there. Richard (ph), one more question for you; are the CO2 emissions reductions for the State of California proposed to be calculated on a state basis, and has population growth and economic growth been taken into account in the overall percent reduction?

RICHARD VERENCHIK (ph): The first part of the question is yes. I mean what we calculated was we calculated what we have here in California from various things like electricity generation or use, even if the electricity is generated outside of the state, cement manufacturing, automobiles, trucks and things like that. What were the other two parts of that question?

UNIDENTIFIED PARTICIPANT: Has population growth and economic growth been taken into account in the overall percent reduction?

RICHARD VERENCHIK (ph): It probably has. I know that one of the things that we try to stress to people is that this is not – you know, once it's adopted, it's not a dead document. We can continue to upgrade, tune-up, change as we move along in time, which we have done over the – over the last couple of decades with our standard automobile regulations to cut down on smog-forming emissions. As things change, the last time we did this was in 1998, when we realized that sport utility vehicles were becoming very popular as passenger cars in California, yet we regulating them at the time as trucks, work trucks, and so we made changes to, you know, to change that, to bring the sport utility vehicles into the area of passenger cars. The same would happen with the work that we're doing on climate emissions, that adjustments that need to be made can be made down the road.

UNIDENTIFIED PARTICIPANT: OK, good. We will ask you one more question, and we're still trying to connect with our next California speaker. Steven Chang (ph) from Hawaii, we might move to you next. I want to give you a heads up. So Richard (ph), with the California Air Resources Board, one more question; are you considering a ban on organics from the landfills? This is currently under way in Europe and would be far more effective than improving fugitive methane capture. For example, you do not have to capture fugitive emissions if you anaerobically digest organics capturing all emissions.

RICHARD VERENCHIK (ph): You know, the answer to that is that I don't know. You know, we're so early in the process of getting these protocols in place. Again, if that individual would send me an email, I can check with the folks in our office, or they could send an email directly to the staffer whose name I mentioned on the methane emissions and ask that question. If they don't get a satisfactory answer, they can contact me.

UNIDENTIFIED PARTICIPANT: OK, great. Thank you very much. We do have our next California speaker, Clark Williams (ph).

Clark (ph), are you on the line?

CLARK WILLIAMS (ph), CALIFORNIA: Yes, I am on the line. Thank you …

UNIDENTIFIED PARTICIPANT: Great. The floor is yours.

CLARK WILLIAMS (ph): Wonderful. I'd just like to say, Richard (ph), you created a nice foundation there for us to work through, and fortunately, I do have the benefit of working here in the Cali (INAUDIBLE) Headquarters Building, and I share a floor with the ARB's Office of Climate Change. And in response to one of the questions that was asked, I would mention that ARB has been working with ICLE (ph) and the California Climate Action Industry (ph) on local government operations protocol, and a draft of that protocol was released this week, and I believe the cutoff date for comments on that is July 18. So that is something that is out there.

The Waste Management Board has been working in the context of what's called a Climate Action Team was formed in response of governor's executive order judging California to reduce its emissions and preceded AB32 (ph) legislation being signed, and it's continued working once AB32 (ph) was signed. The Waste Management Board has participated in five of these climate action team subgroups, an economic subgroup, an agricultural subgroup, a green building group, a land use subgroup, and we also the recycling and waste management subgroup. And what I was going to do today is talk about some of the ideas, and we refer to these as measures we've come up with through the recycling and waste management subgroup work and recommended the ARB, it's potential measures to help achieve the emission reductions by the 2020 date, gets back to our 1990 levels.

So I'm going to touch briefly on what we're doing in regards to the landfill methane, and also we're doing on the recycling side, doing commercial recycling, increasing production markets for compost, anaerobic digestion, extend producer responsibility and also environment (ph) purchasing, and one of the items that we've developed through the – our (INAUDIBLE) subgroup, which is on the watershed friendly landscape guidelines.

The first thing we've done is largely in support to the early action measure Richard (ph) mentioned, which is on reducing landfill methane fugitive emissions, and we've developed a guidance document to assist landfill owners and operators by providing information on different technologies and management practices they can use at their sites to reduce greenhouse gas emissions.

At this time, there's no overall practical and cost-effective guide for landfill owners and operators to reduce greenhouse gas emissions from landfills tailored to the specific needs in California. The best management practices document we developed can be used on a voluntary basis by landfill operators to reduce their greenhouse gas emissions and may be used by agencies such as the California Area Resources Board as technical support information for regulations and market-based registry approaches to further reduce landfill methane emissions.

Let's move on to the next slide. One of the other things we're working on with regard to landfill gas is we've developed a measure where we convert landfill gas into liquid natural gas. We've funded some demonstration projects on a commercial scale from converting landfill gas to LNG (ph) for use as vehicle fuel. Recovery of landfill methane that is otherwise flared as a biomass renewable energy source reduces climate change emissions by avoiding emissions associated with fossil fuel energy sources. Increasing energy recovered from landfill methane is a primary component of the Climate Action Team landfill methane capture strategy. In addition, the governor's executive, or S0606 (ph), directs state agencies participating in the bioenergy interagency working group to enhance sustainable management and development of biomass resources for electricity generation and production of alternative fuels or biofuels. Production of alternative fuels recovered from the methane and landfill gas is one means of achieving these goals.

Next slide, please. All on the whole, the commercial sector generates over half the solid waste in California. Reductions in greenhouse gas emissions can be realized from solid waste management by recovering traditional recyclables from the waste stream to remanufacture these materials. Traditional

recyclable materials have significant intrinsic energy value that displaces fossil fuel energy requirements when introduced back into the manufacturing cycle. I've mentioned that the Air Resources Board has actually put together a work group to look at reducing greenhouse gas emissions from the glass manufacturing center in California. That's something we're looking forward to participating with Air Resources Board on. Obviously increasing the use of recycled color in the glass manufacturing plants can be one method of reducing their greenhouse gas emissions.

We're also working with a group called the Institute for Local Government and their California Climate Action Network. The ILG will assist local jurisdictions to conduct inventories of greenhouse gas emissions, develop action plans and implement policies to reduce greenhouse gas emissions and working with them to incorporate solid waste management and recycling strategies into the network.

Next slide. As David (ph) and Debra (ph) both touched on, diversion of organic materials from landfills can provide a significant reduction of greenhouse gases through landfill methane avoidance, and also beneficial offsets, and they both did mention a lifecycle assessment the project we're working on. For organic diversion of alternatives we were hoping to better quantify some of those beneficial offsets, especially for the composting.

The board is also – the Waste Management Board has also set a goal, strategic directive for itself to reduce the amount of organics disposed in the landfills by 50 percent in the year 2020, and this will require a major increase in composting (INAUDIBLE) infrastructure. To help support this, we're conducting demonstration and field workshops on compost-based best management practices. We're developing compost specifications for agricultural uses, studying the effectiveness of either compost to recover and mitigate methane emissions in landfills, and also working on tackling site and capacity issues to increase the ability to site and expand compost in (INAUDIBLE) infrastructure.

Next slide. Through the work of the recycling and waste management subgroup, we've also developed a measure to increase the use of anaerobic digestion technology to organic materials to utilize or convert to fuel our energy and offset fossil fuel energy sources.

Next slide. Extended producer responsibility is a strategy to place shared responsibility for end-of-life product management on producers and all entities involved in the product chain, so the general public. For producers and other stakeholders are responsible for the end-of-life costs creates an economic incentive to reduce those costs through better product design. We also feel this has an opportunity to realize greenhouse gas reductions.

Environmentally preferable purchasing is another element of this measured and developed to increase demand for products in kind of a variety of environment benefits, including reduction and greenhouse gas emissions. I will say that the State of California, all the state agencies have been directed to really help lead by example in reducing their greenhouse gas emissions, and environmentally preferable purchasing is one of the key strategies was taken in implementing the purchasing power to help reduce our greenhouse gas emissions.

Next slide. Through our work with the Land Use Climate Action Team subgroup, we really built upon some excellent work done in Alameda County in Stopwaste.org, which is quantifying the greenhouse gas benefits of watershed friendly landscaping guidelines. What we did is we took some of the work done in Alameda County and put forward a measure for consideration by the Area Resources Board that would expand that work to 50 percent of the landscaped area within California. There's really seven basic principles here: landscape locally, landscape with less waste going to landfills, nurture the soil, conserve water, conserve energy, protect water and air quality and create and protect wildlife habitats, which is a strategy that could offer significant greenhouse gas benefits, including offsetting electricity use to transport water (INAUDIBLE).

Next slide. For more information, you can either contact myself of Terry Wine (ph), and also you can visit the Waste Management Board's climate change Web site that was just posted live this morning and find

more information on all these measures we've been developing in collaboration with the Air Resources Board.

UNIDENTIFIED PARTICIPANT: OK, Clark (ph). Thank you very much. Next up, we have Steven Chang (ph) with the Hawaii Department of Health. Steven (ph), are you on the line?

STEVEN CHANG (ph): Hi. Can you hear me?

UNIDENTIFIED PARTICIPANT: Absolutely. Yes. All right, you have the floor. The floor is yours, and I'll be moving the slide to view.

STEVEN CHANG (ph): On June 30, 2007, (INAUDIBLE) governor of Linl (ph) signed into law Act 234, the Global Warming Solutions Act, which mandates that statewide greenhouse emissions be reduced to 1990 levels by the year 2020. The recent greenhouse emission inventories became apparent in 2005. Over 92 percent of our – the greenhouse gas emissions were generated from Hawaii's energy sector. On January 20, 2008, a memorandum of understanding between state government and the U.S. Department of Energy Office of Energy Efficiency and Renewable Energy created the Hawaii Clean Energy Initiative. The agreement seeks to transform Hawaii's energy portfolio into a predominantly renewable energy mix, moving away from reliance on fossil fuels.

Can I have the next slide? Under the MOU, Hawaii will become a testing ground for a portfolio of renewable energy technologies, including solar, ocean thermal, wave energy, geothermal and wind. The state will also pioneer financial policy and business models that we hope can be replicated throughout the United States. As you know, Hawaii currently depends on imported fossil fuels for almost 90 percent of our energy. Our environmental programs will be tasked to provide a great deal of technical assistance to industries developing these new technologies, and we want to insure …

UNIDENTIFIED PARTICIPANT: Pardon the interruption. Steven (ph), could you please speak up?

STEVEN CHANG (ph): OK.

UNIDENTIFIED PARTICIPANT: Thank you.

STEVEN CHANG (ph): Is that better now?

UNIDENTIFIED PARTICIPANT: Yes, that's great.

STEVEN CHANG (ph): OK, all right. We want to insure the proper waste management and protection of sensitive ecosystems. Can I have the next slide? Hawaii is unique in that it is the only state that's completely surrounded by the ocean. As I mentioned on the previous slide, our residents literally cling to the edge of volcanoes. This is a view of Waikiki Beach, which is really the centerpiece of Hawaii's largest industry, tourism, and in the background, you can see the edge of Diamond Head, and you can see the communities. They're all within three miles of our coastal waters.

Next slide, please. The effective climate change would have a dramatic impact on our state and all other island communities in the Pacific Ocean. This next photo is a projection of what Waikiki would look like with a one-meter increase in sea level. Beaches would disappear. Communities, our harbors, our airports, the entire ecosystem would be destroyed or unusable. Hawaii currently imports 80 percent of all food and merchandise by marine commerce, and you can see just a simple one-meter increase would have a devastating effect on our economy.

Next slide, please. Waste management activities represent the largest source of our non-energy greenhouse gas emissions. As fully you'll see in this photo, it tells in comparison to the 25 million tons of fuels to equivalent generated by the energy sector. Our waste – solid waste management activities represent about 1.7 million tons of carbon dioxide gases and this is about six percent of our overall footprint.

And it is an area of great controversy here in Hawaii today as communities are questioning the need for landfills and challenging identifying where landfills should be placed as landfills reach capacity. Next slide, please.

The (INAUDIBLE) of Honolulu that have about 90, I'm sorry, 70 percent of Hawaii's population is even currently considering proposals to shift about 100,000 tons of solid waste to the Pacific Northwest.

It's an interesting strategy to reduce our global – our carbon footprint but obviously would have an impact on our Pacific Northwest communities. Waste management is a huge challenge here in Hawaii.

We have a high waste generation. It's currently at about over nine pounds per person per day. There is limited curbside recycling. But in this morning's paper we're encourage that the (INAUIDLE) of Honolulu has decided to move forward with an Island wide curbside recycling program.

And we hope that that will have a significant impact on the reduction of waste going to our landfills. One of the other challenges we have is the material that we can take out of our waste stream there is a huge cost to send those materials through our recycling markets on the West Coast or into Asia.

A typical newspaper recycler may pay as much as four times the shipping cost to send newspaper to market to China as would a West Coast recycler. Another area that has been of challenge to us is the fact of (INAUIDBLE) product stewardship.

In the rest of the United States there are opportunities where manufacturers will take back products at the end of life. One example would be Acoustic Tiles in most of our buildings. But Alaska and Hawaii suffer from the fact that currently those programs exclude our two states, next slide.

We're very concerned being here in the middle of the Pacific Ocean on what the impacts of global warming will have on our community. Can you imagine Waikiki Island the year of 2100? You should start looking for new ocean front property behind Waikiki and you might consider having your own island in Waikiki.

All right that concludes my presentation. And my last slide is my contact information. Thank you.

UNIDENTIFIED PARTICIPANT: Great, thank you so much. Moving right along, next we have Joanna Pierce from the Idaho Department of Environmental Quality. Joanna, are you on the line?

JOANNA PIERCE: Yes, I'm on the line.

UNIDENTIFIED PARTICIPANT: Great, the floor is yours.

JOANNA PIERCE: OK, thanks. In Idaho the state effort to reduce greenhouse gas emissions was really formally initiated in 2007 by Idaho's governor through an Executive order that appointed DEQ to take a leadership in completing a statewide emission inventory which we're currently completing right now which will include waste related emissions from sources such as residential burning, from yard waste, and also from municipal landfills.

He also appointed DEQ to work with state government to implement greenhouse gas reductions within each agency, provide recommendations to them on actions that can taken to reduce greenhouse gas emissions on a statewide level.

And to serve as a central point for coordinating greenhouse gas reduction related efforts and information for the state. In regards to DEQ's directive to work directly with other state agencies DEQ has formed what we call the Greenhouse Gas Working Group which consists of DEQ and 14 other state agencies.

And really the goal of this group has been to encourage state agencies to take the first step in reducing greenhouse gas emissions before we ask or require industry to do the same. And so in 2007 each Greenhouse Gas Working Group member developed an agency specific greenhouse gas emission inventory and an action plan.

The action plan of each agency included goals specific to reducing waste through source reduction and recycling efforts and this working group is an ongoing effort by the state. Agencies are continuing to implement their plans, track their emissions on an annual basis, and identify new opportunities for reduction.

In addition to emissions on waste Idaho also recognizes that emissions from vehicles are a major source of greenhouse gases, as well as, a major source of pollution in Idaho especially in our more urban areas.

And so Idaho's governor has established a policy directing all state agencies to decrease the amount of gas and diesel used in state vehicles through various ways including increasing vehicle fuel efficiency, increasing operating efficiency, reducing vehicle miles traveled, and giving priority to hybrid or electric or other fuel efficient or low emission vehicles.

And the state is also beginning to track the use of alternative transportation by state employees and always looking for ways to incentivize employees to increase their alternative transportation (INAUIDBLE). Idaho is also currently a member of the Climate Registry and a member of the Western Climate Initiative. And recently DEQ, the state agency, signed up to become a reporting member of the Climate Registry and is currently working to recruit additional reporting members by hosting a meeting with interested industries, universities, cities, environmental groups, and really any interested parties.

Additionally the Center for Climate Strategies recently prepared a report for DEQ which contained an inventory and a forecast of the state's greenhouse gas emissions from 1990 to about 2020. And the goal of this report was to provide Idaho with initial understanding of its current and possible future greenhouse gas emissions.

And the last thing I am going to talk about is that – the last thing I am going to mention today is that Idaho's Carbon Sequestration Advisory Committee which was formed in 2002 to address growing concerns related to carbon emissions and greenhouse gases.

Currently the committee is working to partner with several carbon sequestration entities in an effort to develop a viable carbon market for Idaho's agriculture and for its land owners. So, what that I think I'll – my contact information is on the slide that you're seeing. And with that I'll turn that back over.

UNIDENTIFIED PARTICIPANT: Thank you so much, Joanna. Next up we have Eric NOAK with the Nevada Division of Environment Protection. Eric, are you on the line?

ERIC NOAK: Yes. Thank you.

UNIDENTIFIED PARTICIPANT: The floor is yours.

ERIC NOAK: Thank you, first let me start by saying, I am sitting in for Colleen Crips (ph) and I have included Dr. Crop (ph) as the last slide. Nevada doesn't currently have any climate change legislation that is specific to solid waste, however, we do have several actions underway.
And one of which may actually result in some favorable legislation. Like many states the governor established a Climate Change Advisory Committee and we're an observer (ph) in the Western Climate Initiative.

And in addition to being a founder member and founding reporter in the Climate Registry we are implementing a Nevada Greenhouse Gas Registry. Next slide, the climate change, the governor's Climate

Change Advisory Committee is made up of members of academia, government, environmental advocates, and business leaders.

And they were asked to evaluate the implications of climate change on Nevada and make recommendations. And I understand they have completed their work and a report has been produced. And it should be up for public comment and posted on the Energy office's Web site which is listed there at the bottom of this slide, the Web site is.

And so we should be able to see what those are. And I understand there is 26 or 28 recommendations and one of – I know that waste management recycling is included in this report. But they were also asked to prioritize the top six and I am not sure but I do not believe that it makes the top six.

So, we'll have to wait and see and then, of course, we'll be able to comment on that. Next slide, and Senate Bill 422 was passed in our last legislature and signed by the governor in June of 2007.

And it requires that electric generating units of five megawatts of greater to report their gas emissions and requires the development of a greenhouse gas emissions inventory that will be updated every four years. And it's being done in our division.

And again that will allow us to understand and quantify the emissions. And again while we don't have specific solid waste legislation we may be able to use the recommendations from the governor's Climate Change Advisory Committee to move forward with that.
And, again, next slide is the contact information for Colleen Crips (ph) who's our lead for climate change, and that's all I have.

UNIDENTIFIED PARTICIPANT: All right, thank you so much. We have two more presenters. The next is David ALLAWAY, we heard from David earlier today. He's with the Oregon's Department of Environmental Quality. David, are you on the line?

DAVID ALLAWAY: Yes, I am, thank you. I'm just going to provide a quick overview of some of the other activities occurring here in Oregon as it relates to materials and waste. If you could please go to the next slide.

Our work really began in 2004 when our governor convened a advisory group on global warming, and this advisory group was supported by seven technical subcommittees including a subcommittee on waste and DEQ was asked to staff the subcommittee.

We changed the name to Waste of Materials. Each subcommittee was charged with forecasting emissions to the year 2025 under a business as usual scenario and we chose to build a forecast of lifecycle emissions of the materials to become waste as opposed to limiting ourselves to the landfill and incinerator emissions.

We did this because our technical subcommittee was also charged with identifying policy and program options to reduce emissions and estimate the resulting greenhouse gas reductions.

Since most of the greenhouse gas reductions associated with prevention of recycling a corrupt stream in production and not rantal (ph) related, limiting our emissions analysis to landfills would have foreclosed much of the discussion around these powerful emissions reductions options.

So, we took this unprecedented step of trying to estimate the full emissions over the lifecycle of materials consumed and discarded in Oregon. We now know that we significantly underestimated the production related emissions, but in any case, you can see our early work by going to the URL shown here.

A few other activities that are shown on the next slide. We've been very active at referencing the greenhouse gas benefits of recovery in our outreach to the public and I have to say that our local

governments and recycling industries have told us that they really appreciate having their programs and the benefits of their recycling programs highlighted in this manner.

As I noted earlier, we completed a few years ago, a very interesting analysis of the environmental burdens of a wide variety of e-commerce shipping options and this has been widely used by the packaging industry in the United States as they try to make and figure out how to make their packaging more sustainable.

We've also provided some limited assistance to leading local governments here in Oregon who have worked to integrate climate into their own programs.

For example, we provided some limited assistance to the City of Portland a few years ago as they evaluated how far they could ship their food wastes to a compost facility before the transportation emissions would exceed the avoided landfill emissions. We mentioned that earlier.

We are now starting work to update our supplemental accounting effort. We're doing this to shine a spotlight on the very significant emissions related with materials consumption.

As Debra (ph) pointed out earlier, conventional greenhouse gas inventories, including that of our state, treat energy and materials consumption and by extension, energy and materials conservation inconsistently.

Most of the other states we've heard from today have told us that waste typically comprises one to three percent of their conventional inventories. Well, we know that if we look upstream, it's many, many times higher.

Our state environmental quality commission, which is the board that our agency reports to, has told us that it is important for both informed policy making and also maintaining credibility with the public that the state's emissions inventory accurately reference emissions associated with the consumption of goods just as it treats the consumption of energy.

We could influence these through waste prevention, green purchasing, sustainable consumption and recycling.

So we're starting on a project to supplement Oregon's conventional greenhouse gas inventory with a process to help policy makers and the public understand the magnitude of these consumption related emissions, and yes, that's even the emissions that occur overseas.

You'll hear more about our related project underway at ETA (ph) at the Webinar (ph) in August and I'll just mention that these emissions are really very, very large.

We've also recently adopted a waste prevention strategy in response to our statutory waste prevention goals and also directions for our governor's advisory group on global warming that Oregon should strive to achieve these goals for their very significant greenhouse gas benefits.

While all the work under the strategy has a greenhouse gas benefit, I have listed four specific projects here. In the interest of time, I'd be happy to take questions about any of them during the Q&A period or following this presentation.

So, that's my comments. Thank you very much.

UNIDENTIFIED PARTICIPANT: Thank you. We have one more presenter. Last, but certainly not least, Jay SHEPARD from the Washington State Department of Ecology. Jay, are you on the line?

JAY SHEPARD: I'm on the line.

UNIDENTIFIED PARTICIPANT: OK, the floor is yours.

JAY SHEPARD: Thank you. We, too, at the Washington – at Washington State had a – have a climate action team that is working at the behest of the governor.

Last year, they developed a report of progress to move forward. They identified several actioneries and have formed what they called implementation working groups to develop actionable strategies that will reduce the amount of greenhouse gases generated immediately, or as soon as possible.

Those groups include a group on the state environmental policy act, a group on growth management. Another group on green building, another on forestry, another on agriculture and finally our beyond waste working group, implementation working group.

The goal of this group is to significantly expand source reduction we use from recycling and composting to realize large amounts of greenhouse gas reductions. As David was explaining before, we want to increase organic technical materials recycling. Reduce the use of urgent materials, fossil energy and reduce the landfill gas emissions. Next slide please.

We have formed – we are working around eight task areas. The first one is looking at our collection processing infrastructure within the state and the finding – determining if there's ways to optimize that system that is already effective in collecting recyclables.

The second group is looking at expanding, recruiting and developing in state businesses that can use recyclable materials and their manufacturing processes using incentives such as investments financing.

Our third task group is looking at removing organics from the disposal screen and putting them to higher and better uses such as healthy soils, bio-energy production, new products production, et cetera.

Task area four is looking at products which specifically products to reach framework legislation that – for consumer products focused on the lifecycle of the products and their cradle to cradle design and their materials and energy content.

The fifth area is – relates to business activities and expanding byproducts synergies between business to business – business to business.

Also looking at zero ways business practices designed for the environment and other emerging technologies that we can come up within the industry in the state.

Task six looks at our own internal environmentally preferred purchasing practices at the state level and seeking ways to improve that.

Area seven looks at supporting and expanding reuse within the state both – both at consumer and industrial levels and task number eight is the one that we, I think, all want to work on is achieving higher levels of pollution prevention waste production upstream in all sectors.

Next slide please.

We are working on this right now, we have – working at a break-neck speed. We will be developing recommendations in all of these eight task areas and bringing them to – back to the larger climate action team for their consideration and those should advance next to the legislature. Hopefully we'll – they will get adopted during the next session next winter.

I co-lead the Beyond Waste Implementation Working Group along with Sago (ph) Jackson from Sohomas (ph) County and Jody Schneider (ph) from Pierce County Recycling Composting and Disposable which is a limited liability corporation in Washington and our Web page for our particular working group is at the bottom of this – this slide.

The complete climate change Web page is also available on the Department of Ecology Web site. Thank you very much.

UNIDENTIFIED PARTICIPANT: OK, thank you so much to all of our presenters. We have about 15 minutes at the end of this session now for questions. If you do have a question, please remember, don't use the raise your hand feature. Use the chat feature on the far right-hand side of the screen.

If we're unable to answer your questions, either we don't have the information or we've run out of time, we'll send you an email later. So, now I have some questions. I believe this is for Richard, with the California Air Resources Board.

To what extent is the scoping plan that you mentioned in your presentation. To what extent does that address the impacts of goods which are identified in David ALLAWAY's presentation is very important.

DAVID ALLAWAY: We have a whole section of that that is devoted to goods movement, you know, items coming into the ports, which California has some massive shipping terminals and then the trucking or taking them by train and distributing them around the country.

Even moving things around within the port facilities and if you go to the Air Board Web site, and then climate change. You can look for goods movement and just get a whole overview of what we're doing in that regard.

UNIDENTIFIED PARTICIPANT: OK, thank you. We have a few questions here for Clark Williams with the California Integrated Waste Management Board. Clark, could you explain more on the commercial recycling measure. What things will be done to increase commercial recycling and where could someone find more information on the subject?

CLARK WILLIAMS (ph): As far as find more information on the subject, I think you can get a good idea of our efforts underway by going to our Board Web site and putting in climate change in form of our commercial site.

We had submitted as I mentioned some measures to ARB (ph) for consideration of scoping plan development process. Those weren't included in the main body that was released today. Our understanding is they will be releasing from appendices in our report next week.

And we're hopeful that more details on commercial recycling will be incorporated into those appendices of that scoping plan.

UNIDENTIFIED PARTICIPANT: OK and another one for you Clark. Will the life cycle analysis of organic diversion alternatives include anaerobic digestion?

CLARK WILLIAMS (ph): Yes.

UNIDENTIFIED PARTICIPANT: OK, great. And this one I believe is for Hawaii. The largest volume export from the United States is waste newspaper out of Los Angeles to China. If California can export waste paper to China why not from Hawaii considering it's only half the distance to China. Maybe someone from California can answer that, as well.

And Steven (ph), are you still on the line? OK, that might be something that we e-mail an answer to. Moving on, for Washington, what is the best source for understanding the 71 tons of upstream impact for every ton of waste?

UNIDENTIFIED PARTICIPANT: I'm not sure where that source of information came from. Is that, again is that to Washington?

UNIDENTIFIED PARTICIPANT: I believe so. I may have directed it to the wrong person.

UNIDENTIFIED PARTICIPANT: Was that David?

DAVID ALLAWAY: I actually don't think it was directed to anyone in particular. But let me try and answer it. Sometimes we hear this oft quoted statement that for every ton of waste in the trash can that there is 71 tons of waste upstream in production.

I should know but actually don't know exactly where that number came from. The analysis that I've seen to try to estimate similar numbers show that a lot of those wastes are carbon dioxide, processed water, and mining overburden.

They are really not the same kinds of waste that has the same kinds of waste that have the same – in particular in the case of the mining overburden and water the same sorts of greenhouse gas impact as garbage does.

In terms of where that number came from, again, exactly, I don't know but the World Resources Institutes in the early part of this decade came out with a report called The Weight of Nations. And then, Jay SHEPARD, actually you were mentioning to me a report from the early '90s that tended to estimate these upstream burdens as well.

Do you…

JAY SHEPARD: Right, there was a report done by The Office of Technology Assessment that no longer exists. It was a branch of the Congress. It was called Green Products by Design, published in 1992 which demonstrated that municipal solid waste was only one – or excuse me, was 180 million tons of the total US generation of solid waste compared to the total waste which was in excess of 11 billion tons.

So it was a small fraction and the rest of it did come from production processes. A person who has done a lot of research on the subject is Robert Ayres, A-Y-R-E-S. You can find him on the Internet. He has done some very interesting research on the subject.

And The Weight of Nations report is very good as well.

UNIDENTIFIED PARTICIPANT: And that's the report that was published in 1992 that you mentioned?

JAY SHEPARD: The first one, Green Products by Design, was produced in '92. The Weight of Nations from the World Resources Institute was, I think late '90s, or early 2000, wasn't it David?

DAVID ALLAWAY: I think that is correct.

UNIDENTIFIED PARTICIPANT: OK, thank you. What actions can state or local government make to produce greenhouse emissions from products manufactured overseas?

DAVID ALLAWAY: Again, this is David. I guess I'll try to take that one. There is really two approaches for dealing with these overseas emissions. And to put this into context, let me share with you a statistic I recently found that a third of China's carbon dioxide emissions in 2004 were a direct consequence of producing goods sold to other countries.

You know, that's really significant. And it's become a topic of hot debate as people, as nations debate the post kettle (ph) world. How should those emissions be allocated? Should producers bear all the responsibility for the emissions that they produce?

Or should consumers share in the responsibility for those emissions. It's a very interesting policy discussion. But generally speaking there is two approaches. And I'm sorry, let me share one other statistic here that I think is very meaningful.

Some researchers at Carnegie Mellon University estimated that in 1997, the U.S. had a carbon trade deficit that added somewhere between two to seven percent above and beyond our conventional – the emissions in our conventional inventory.

And by 2004, it had grown to somewhere between three and 21 percent above and beyond the emissions in our conventional inventory. And much of this shift was because of outsourcing of production to other countries and because much of that production shifted to China whose energy sources tend to be dirtier than those in the United States. So with that as context, what can we do about it? One thing we could do would be to try to protect domestic manufacturing.

If it is true, if domestic manufacturers can produce goods cleaner than overseas manufacturers, then there is – then we have a compelling policy interest in keeping production local. And I'll emphasis this doesn't have much to do with transportation.

It's not the freight impact I'm talking about. It's about the fuels that are used to make the products and, you know, and the materials in the first place. So that is a bit of a game changer.

And I will share antidotally that sometimes Oregon manufacturers, you know, when I as representative of the State Environmental Agency come out and say hey there is environmental benefits to increasing manufacturing in this state.

They kind of scratched their heads and asked if I could be quoted on that. And I say yes with the conditions that we're not entirely confident in this data. So that's one approach. The second approach is technology transfer.

And that's to help other nations and other manufacturers clean up their act and to produce things in a cleaner way. The third approach would be to encourage buying local.

And, again, that's not buying local for the freight benefits, although there are freight benefits also, but for the broader environmental benefits and potentially some other sustainability benefits for our local economies. And, I think I'll stop there.

UNIDENTIFIED PARTICIPANT: OK. A few more questions and I'm sending a note now. A lot of people are asking where they can get these presentations or contact some of our presenters. If you go to the Web site I just gave you all of the presentations are there.

And each of our presenters was kind enough to put their contact information on their slides. So, if you have questions you can e-mail them directly if you want more information.

A couple more questions, one about American Indian tribes. American Indian tribes are often in remote areas. Does anyone have a suggestion about how they can implement a recycling program or reduce waste in remote areas?

And what is the best way for those tribes to reduce greenhouse gases. Is there anyone not can field that one right now? OK. We have another question that is kind of general for all of the states.

Someone asks besides California, do any of the other states represented here today have a state wide mandatory diversion rate? If so, what is that rate? Or if not, do you know what your diversion number was for 2006?

JAY SHEPARD: This is Jay SHEPARD at Washington State. We have a goal of 50 percent. Our 2006 recycling and diversion combined number was, I think, I have to look it up again, but it's right at 48, 49 percent.

UNIDENTIFIED PARTICIPANT: So, that's a goal, not a mandatory rate, right?

JAY SHEPARD: Correct.

UNIDENTIFIED PARTICIPANT: OK.

DAVID ALLAWAY: This is David AllAWAY at the state of Oregon, we have a statutory recovery goal, which is 45 percent by 2005, and 50 percent by 2009. In 2006, our recovery rate was 47 percent. We also have statutory waste and ration goals, which are 2005, no increase in per capital waste generation and in 2009, no increase in total waste generation. And we define generation, as the sum of recovery and disposal.

UNIDENTIFIED PARTICIPANT: And was there someone else on the line that wanted to answer that question? OK. Here's another question, Wal-Mart reports, that of their total carbon footprint, 92 percent is in the form of embedded carbon in the products base sell. In essence, 92 percent of all their carbon footprint was already consumed in the manufacture and transport to the products by the time they reached US ports.

DAVID ALLAWAY: This is David AllAWAY at the State of Oregon. I'm involved with Wal-Mart and their packaging sustainable value network and I've heard that number from them several times. Some critics would say this is Wal-Mart attempting to minimize the impacts of their fleet and their buildings.

And I think that's an unfair criticism, their fleets and their buildings are still major contributors to greenhouse gas emissions, and they are working on those. But it is true, that given the accounting standard they have chose to use, which is a full life cycle approach. It looks up stream at production, 92 percent of their – what they might – what they might call their span of control is associated with the goods that they sell.

And this is important because it suggest to Wal-Mart that they could accomplish really significant greenhouse gas emission reductions by, shall we say, encouraging their suppliers, like Procter & Gamble, and Kellogg's, and other companies, to reduce the embodied greenhouse gas emissions of their materials.

So that's a very powerful strategy that has the potential to yield some very significant results. Even if, those greenhouse gases emission reductions occur in China, they don't get counted in our state inventories, they still represent a real reduction in emissions.

And I'll emphasize, that global warming emissions are called global warming for a reason. It doesn't matter where the emissions occur, their still going to melt the snow pack in the western states of the U.S.

UNIDENTIFIED PARTICIPANT: OK, thank you. We have a lot of great questions still coming in, but I'm afraid we're running out of time, so, go a head, and send out those wrap up questions, and we'll email you responses. At this point, I would like to send it back to Dana Warn (ph) with EPA, to give us the wrap up. Dana (ph), are you on the line?

DANA WARN (ph): Yes I am.

JAY SHEPARD: This is Jay, can I, Jay SHEPARD the tribal question that, that person that asked a question could contact me, I would love to talk about it because I think it's a bigger, bigger answer than we have time for.

UNIDENTIFIED PARTICIPANT: Thank you. So that's Jay SHEPARD with the Washington State Department of Ecology and we'll make sure that you get the information from the person who asked that question, as well. OK, Dana (ph).

DANA WARN (ph): Thank you everyone for participating in today's West Coast Webinar, on climate change, waste prevention recovery, and disposal. And thank you, all of our speakers, your presentations were very informative and useful, and we really appreciate your involvement. We want everyone to know that our next Webinar is on July 16th, from 1:00 to 3:30 p.m., Pacific Time, and it will be covering compost and landfill issues.

We'll hear from Sally Brown with the University of Washington, and Brenda Smyth from the California Integrated Waste Management Board, and they will cover compost related issues. We'll also hear from Stephanie Young of the California Integrated Waste Management Board, and she will cover landfill related issues. And Gary Liss (ph) of Gary Liss (ph) and Associates will cover zero waste issues.

We hope you can participate. Also, please don't forget to give us feedback on today's session. It helps us to provide you with better information and better webinars. Tommie Jean will provide you with more information on how feedback will work. Thank you very much.

UNIDENTIFIED PARTICIPANT: Thanks again, everyone, for your participation today, on the screen, you see a screen shot of a survey, we have two for you. One is a pop up window that you may have already received, its four very brief questions. And then we'll also send you an email with a link, to give us some feedback, where you can actually enter a little bit more information and talk to us a little bit more.

That really helps us to improve these, monthly, on a continual basis. That wraps up our session for today, thank you so much.

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