Bruce Lung: Hi. Good afternoon. Thank you for joining us for today's Waste Reduction Network webinar. My name is Bruce Lung and I'll be serving as the moderator. Before we dive in, there are a few housekeeping points I would like to cover.

Please note that today's webinar will be recorded and archived on the Better Buildings Solution Center. In a few days or weeks, you'll receive a link to today's recording and slides following the webinar.

Next, I just want to make sure everyone is aware that you'll be in listen-only mode, the attendees, so your microphones are muted. If you experience any audio or visual issues throughout the webinar, please send a message in the Q&A box located at the bottom of your Zoom panel, and one of our staff will get to it real quick.

Next slide please.

Once again, this is me. I'm Bruce Lung. I'm your moderator, and we're looking forward to having a really good webinar today.

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Just to let you know, we'll be using Slido as the interactive platform for our Q&A and polling today. If you'll please go to www.slido.com on your mobile device or computer, on your browser, today's event code is #WRM. You don't have to hit the hashtag, just the letters W-R-M.

Also, if you would like to ask our panelist any questions, please submit them at any time throughout the presentation. Then we'll be answering your questions near the end of the webinar. You can also select the thumbs-up icon for questions that you like. That will cause them to become more popular, and they'll move further up to the top of the queue and hopefully have a better chance of getting answered.

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I just wanted to give you a quick idea of all the folks that have joined, all the partners that have joined the Waste Reduction Network in the Better Plants and Better Buildings Program. We have two new partners as of this webinar, Flexco on the industrial side, and Vornado Realty Trust on the commercial building side.

This network is open and available to all partners in Better Buildings, Better Plants, Better Climate Challenge. If you're interested in waste reduction and you have a goal, feel free to come and join us.

Next slide please.

I just want to give you a quick idea of the team behind the Waste Reduction Network. In addition to myself, there's Marta Drzymala from BTO, who is very good and is helping us work on ideas. We also have Jasmine Schmidt from ICF and support, Julie Cox from RE Tech Advisors, as well as a subject matter expert at the Oak Ridge National Lab named Subodh Chaudhari. If you ever read our newsletters, he is the one who is behind the "Tip of the Month" articles.

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I want to give you a quick idea. If you're ever on the Solution Center, this is where we keep all the information related to the Waste Reduction Network, all the news that's going on with it, all the new solutions, partners, that kind of thing. So, feel free to visit our page and, if possible, learn some of the new solutions out there.

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If you are interested in joining the Waste Reduction Network, it's pretty easy. It's basically a bring your own goal type of thing. So, if you have a goal or if you just want to set up a goal, you can bring that in. On the industrial side, we have a variety of options that people can choose, and your TAM will be able to help you during that process, as well as giving you tips from the network and stuff like that.

As with all the other data that we collect, whether you're doing energy or if you're Water Savings Network, our data deadline is May the 5th of this year.

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For today's webinar, we're going to talk about molecular plastics recycling within the context of circularity. I don't think I need to tell people that circularity and sustainability and recycling of materials is a big deal. We know that at DOE recycling of plastics has actually been a pretty big deal. We have two consortia just related to sustainability and plastic recycling. The first one we have here is the BOTTLE Network or the BOTTLE Consortium, as well as the REMADE Consortium that focused on sustainable manufacturing.

We also have had some guest speakers during our – when we had a pilot of the Waste Reduction Network, we had some guest speakers during a plastics recycling working group, some speakers from the American Chemistry Council. We talked about some of the advancements in manufacturing techniques. Then REMADE also gave us a speaker.

We also had some internal presentations from partners. That's where learned about things like the GaBI tool, which is widely used as a kind of lifecycle assessment estimator, depending on what product mix you're making and how easy it is to recycle some of the products that you're making.

In addition, we worked with the Oak Ridge National Lab to develop a white paper, in which we had some contributions from some of our biggest partners, the Waupaca Foundry and the Volvo Group. So this is definitely a topic that we're staying on top of and want to help bring to your attention.

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Today, we'll have Christopher Layton, also known as Chris Layton, from Eastman Company. The nice thing with Eastman is that this is a company that has been doing a lot of right things, going back to the 1930s. They installed combining power systems back then.

They've also been a longstanding partner, a sustained partner with the ENERGY STAR Industry program. They've been in the Better Plants Challenge and now also in the Better Climate Challenge. So we're definitely interested in hearing from Chris. I think what you'll see is that this new methanolysis plant and process is a good example of what a forward-looking company can accomplish.

Just to introduce Chris a little bit more, Chris is Eastman's Director of Circular Policy Strategy. He helps the company build sustainable solutions to the global waste crisis and leveraging Eastman's molecular recycling technologies.

He works with other partners throughout the value system to help shape a constructive policy landscape that will foster a circular economy, particularly with plastics and recycling. He has more than 15 years of related business experience, and a passion for creating a more sustainable future. So, he's going to help Eastman make the most of the world's resources.

With that, I'll hand it over to Chris.

Chris Layton: Thank you, Bruce. As Bruce said, I lead Eastman's circular policy strategy and communications team. I thank Bruce, Marta, the whole DOE team for giving us this opportunity.

As he said, Eastman has partnered with the DOE since 2010. We're Better Plants and Better Climate Challenge partners. So I'm really excited today to share a little bit about who we are and what we're doing to try to create a circular economy.

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So quickly, by way of background, and then I'll share a little bit of what I'd like to accomplish today. I've been with Eastman for about 25 years. I started in environmental but moved into technology and have spent most of my time in commercial roles.

So, in my current role as leader of our circular policy strategy team, my team and I are responsible for engaging with our brand partners, NGOs, standards bodies, more or less anyone that will listen to us, to educate folks on what these molecular recycling technologies are and are not. Then most importantly, to help build collaborations and partnerships to drive policy, drive innovations and investment to help improve the infrastructure, to increase recycling and create circularity.

So hopefully today, I'd like to do two things really. First, make sure or share with you a little bit of what molecular recycling is. For clarity, I'll use molecular recycling. It's a term we use at Eastman because we think it represents what these technologies do, but it is sort of an umbrella term. So similar terms that you'll hear will be chemical recycling, advanced recycling, enhanced. All are sort of umbrella terms for a variety of different technologies. I'll talk about molecular recycling, and then I'll highlight the two specific technologies we practice.

The second objective is beyond just that basic understanding. We'd really like to share with you some of the partnerships that we've done that are hopefully increasing recycling and/or driving circularity for various materials.

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Quickly, before we begin, just a little introduction of who we are. Eastman is about a $9 billion specialty materials company. This year we'll be 140 years old. We're headquartered in Kingsport, Tennessee, but we have a team of more than 14,000 people located at manufacturing plants, research centers, and sales offices throughout the globe.

While we may not be a household name, there's a good chance you use a product made with one of our materials, as we sell to customers in over 100 countries, across a wide variety of applications. When you think of plastics, think of applications like houseware, small appliance, medical, electronics, auto, and food, beverage, personal care, and cosmetics packaging.

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Our mission as a company is to improve the quality of life in a material way. So, as we thought about that mission, we thought about the next 100 years of our company. We quickly realized that as a society we're facing three challenges that could potentially impact that quality of life.

First, how do you sustainably care for ten billion people? We're fast approaching ten billion people.

Secondly, most people would admit and agree that we have a plastic pollution problem.

Lastly, climate is changing and with that comes a whole host of consequences.

So, we have chosen to put our money where our values are, and we have been investing in these two molecular recycling technologies, with the goal of bringing those technologies to bear, those innovations to bear, on trying to solve this triple challenge.

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I talked about the plastic pollution challenge, and this slide sort of quantifies that challenge. If you look at it as an industry, we generate more than 460 million metric tons of virgin plastic every year. When you subtract out what goes into durable goods, you still end up with more than 350 million tons of plastic that has reached the end of its life. The unfortunate reality, illustrated on this slide, is that only a small percentage, less than 10 percent actually gets recycled. You see close to 80 percent ending up in a landfill or incinerated, 20 percent leaked into the environment. Obviously, that's not sustainable. Obviously, that's part of why we have a problem.

So, when you think of these molecular recycling technologies and what we're trying to do, we're trying to bring them to bear on this system, complement that existing mechanical recycling system to be able to tap into those streams that today are otherwise going to landfills, incinerated or, in the worst case, ending up in the environment.

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Before we go much further, I want to make. I'm throwing some of these terms, "molecular recycling," "mechanical recycling," around. I'm assuming everyone knows it. But what I'd like to do is maybe – the simplest way to explain molecular recycling is to contrast it versus mechanical recycling, what you and I probably would think of when we think of recycling.

So, for mechanical recycling, simply think of starting with a relatively homogeneous material. Clear water and soda bottles, natural milk jugs are the best examples. The materials get put in the curbside bin, collected, sorted out, chopped up, and then generally remelted with the addition of some virgin plastic to create a new article, oftentimes going back to that original bottle, other containers, or other materials. A very simple, very efficient process that allows us to recycle a lot of materials.

But that always requires that input of new virgin material. There's limitations on what you can do. So, it alone will not create circularity. It needs other technologies, and that's where molecule recycling can be a key complement to that.

With molecular recycling, we have the ability to handle a much wider variety of feedstock. So don't think about that clear water and soda bottle. Think instead maybe the colored shampoo bottle in your bathroom. Think about the clamshell packaging that you purchase meats or vegetables in. Think about textiles like carpet. Things like that, materials today that get into the recycling system, but probably either drop out or don't get recycled in any meaningful way.

So, in molecular recycling, we take those materials and, either through thermal or chemical means, we break them down into the basic building blocks. That allows us to purify those building blocks.

Then we and other practitioners feed it into our existing processes where we can build a whole host of products without any sacrifice in safety, quality, or performance, because we've gone back to the basic building block. You can potentially do that an infinite number of times, just always going back to the building block. So, the two technologies very much complement one another.

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As we've been on our journey, when we first started trying to launch these technologies in 2019 and trying to communicate what we were doing, as a company of chemical engineers and chemists, we love to talk about the technologies. While you get policymakers, NGOs, customers that will entertain that and will be curious, they're generally focused on the benefits.

So, we've pivoted a little bit to try to communicate what we see as the benefits or some principles to guide how we're making investments in these technologies. I won't go through all of them, but I'll highlight a couple that are pretty important as it relates to these specific technologies.

First, we're only investing in these technologies where they are true material-to-material, meaning we're taking a waste plastic that was otherwise going to a landfill or incinerator and recycling it into a new material. We're not doing waste-to-fuel or other things like that with this.

Secondly, we're only investing in these technologies when we can get to those new finished products with lower greenhouse gas emissions than we otherwise would be able to achieve using fossil feeds.

Third, these technologies need to be thought of as complements to the existing mechanical recycling technologies. They are used in addition to mechanical recycling, in addition to reuse and rebuild. They are not a solution that gets us to circularity. It's going to be multiple solutions of innovations.

Then lastly, it's this idea of transparency. While the base technologies that we're using are technologies that we've perhaps practiced for many years, using them to recycle waste baskets at this volume is relatively new, so we felt that it was very important to be transparent. We achieve that transparency through a third-party certification for the products that we sell, the International Sustainability and Carbon certification.

What that does is it allows us to give comfort to the value chain. So, when a brand partner ultimately makes a claim related to recycled content or other environmental benefit, they know they have a clear chain of custody through that process, and at the start of that process an appropriate amount of waste plastic has been recycled.

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So, as I said, Eastman has been practicing or operating two molecular recycling technologies since the fourth quarter of 2019, what we call carbon renewal and polyester renewal technologies.

The carbon renewal technology is a form of gasification. As you can see, it's fairly robust in terms of the types of plastics that we can see. We found some things that we don't like, PVC or other halogens. Nylon can be a little problematic. But otherwise, a fairly robust technology. Some examples of things that we're feeding today into this unit would be carpet fiber, some amount of textiles, cellulosic polymers, some polyolefins.

The way carbon renewal technology works is you take those hard to recycle materials, and high-temperature, low oxygen to gasification. We're breaking those polymers back down into the basic building blocks of carbon, hydrogen, and oxygen in the form of synthesis gas.

We can purify that syngas such that it's indistinguishable from the same syngas today we produce on fossil feeds, which for us would be coal. We then feed that syngas into our existing manufacturing processes. Then we produce a whole host of products, everything from a fiber, a cellulosic fiber we call Naia that goes in H&M apparel. We produce a cellulosic polymer that goes into the eyeglass frames for Warby Parker. We even produce a biodegradable compostable polymer called Aventa from that. Basically, because we've gone back to that basic building block, everything else after that is very similar.

Polyester renewal technology, as the name implies, is focused on polyester. Again, don't think of clear water and soda bottles. Those are best handled via mechanically recycled. Think of hard to recycle polyesters, shampoo bottles, dairy products, over-the-counter medicines, thermoformed clamshell packaging, textiles, carpet, et cetera.

Through either a glycolysis or a methanolysis process, in short ethylene glycol or methanol, we're able to use those materials, catalysts that then simply unzips that polymer, takes that PET, breaks it down to the basic building blocks, in our case DMP, dimethyl terephthalate, EG ethylene glycol, the building blocks for polyesters.

You get back to that small molecule. It allows us to purify that molecule, such that it's indistinguishable from the same molecule we produce today on fossil feeds. Then we feed it into our existing polymer lines, and we can produce a whole portfolio of products with really no compromise in safety, quality, and performance versus what we do on fossils feeds today.

So, all that said, it's probably pretty obvious of how we're diverting materials that would otherwise end up in a landfill or incinerator or maybe downcycled at best. What's less obvious is that when you start with waste plastics, you've eliminated many steps or several steps in the traditional fossil-based production process. We're not having to extract oil or natural gas. We're not having to refine that into naphtha. We're not having to craft the naphtha into ethylene and propylene.

You've eliminated all those steps. So, as a result, you can get to that syngas. You can get to that DMP and ultimately those finished products with significantly lower greenhouse gas emissions than you could otherwise. In the case of carbon renewal, that can be anywhere from 20 to 50 percent lower greenhouse gas emissions, depending on the type of plastic we're feeding, how far it's coming from the source of generation to our plant, and what, if any, preprocessing we need to do in order to get into our range. For carbon renewal, that range is about 20 to 30 percent.

So again, both pretty significant reductions, and it kind of highlights how these technologies can be leveraged and not only drive circularity, but in so doing you're also helping address the climate issue, and of course you're able to get recycled content into applications that help that, caring for the society fast approaching ten billion people.

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As Bruce kind of highlighted today, we are upping those two technologies, and between the two we roughly are recycling about up to maybe 50 million pounds a year. We're in the process of starting up a new methanolysis, a new polyester renewal technology that when we get it lined up and up and running will allow us to recycle up to about 250 million pounds of waste plastic, so almost a fivefold increase. It will be one of the largest of its type, if not the largest of its type in the world.

That's starting up here in Kingsport. Earlier last year we announced two other projects, our intention to invest in two other projects. One in Normandy in France, our Normandy region in France, and a second one in the US. Between those two projects, that allows us to achieve our circularity goals, which will ultimately mean recycling more than 500 million pounds of waste plastic by 2030.

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I talked a couple times about hard to recycle polyesters and feedstocks. This picture is worth a thousand words. This is an example of the types of materials that we are feeding into our process to recycle.

I mentioned the colored and opaque shampoo bottles and milk drinks, the clamshell packaging. We also take the waste screens from today's existing mechanical recycling, because they purge their systems. They generate waste screens. We're able to take those materials that are polyester-rich and are able to recycle them.

Sometimes those materials get downcycled. So strapping is a great use of – you know, after so many times of going back to a bottle, there's no choice but to sort of downcycle it into something like strapping. Well, that strapping is PET-rich; we can use. The same thing with carpet fiber that we do.

So, this is an example of when we say hard to recycle, this is the stuff we're doing. You'll notice if there is a clear bottle in there, it hitched a ride. It's not what we're going after to recycle.

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As I said, today we can do up to about 50 million pounds with methanolysis unit that's starting. That number will go up to 250 million pounds. People are always like, "Hey, how much is that?"

Well, it's a lot. So, we're up about two hours northeast of the University of Tennessee, in the Oak Ridge Lab. Neyland Stadium is home to the volunteers and one of the largest stadium in the country. Two-hundred fifty million pounds would fill that stadium two and a half times, at least. So, it's a lot of waste plastic.

It by no means solves the problem on its own. That's just a small bite out of a larger problem, but it's a meaningful start and one that we're pretty excited to get going.

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I talked a little bit about the input. Let's now talk about the output. As I said, one of the advantages, one of the ways this technology complements mechanical is by going back to that building block. You can produce a monomer and then ultimately the finished polymers, where this is no change in the safety, quality, or performance of that versus what you produce on fossils feeds.

So, it allows us to get recycled content into applications, where that previously would have been limited. So you can see this is a list of companies that have been buying Renew products, as we call them, since we started up in 2019.

We can see there's a wide diversity of applications, power tools, shampoo bottles, clothing, some cosmetics brands, and a lot of eyewear. So, a very diverse set of applications enabled by this technology.

All these companies are leaders in their respective space, and they recognize the value of using more sustainable materials. It allows them to meet their sustainability goals, as well as differentiate themselves and grow their businesses. One of the key parts as we think about collaborating across the value chain is having good partners to help pull that demand along.

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So, a lot of information pretty fast, but hopefully you have a better perspective of what molecular recycling is. What I'd like to do with the next few minutes is show you some examples of how we're leveraging these technologies, how we're collaborating differently with folks across our value chain to increase recycling, to drive circularity.

My purpose in sharing these is not to show off what we're doing, nor is it to suggest we've got this all figured out. Far from it. What I really want to do is hope to maybe trigger some ideas of how to think differently about collaborating, how to think differently about driving system change.

We've been at this for three years. Some things have worked well. Some things have not. We've made good choices. We've made bad choices. But what we have learned is to very quickly learn and be able to adapt, because it turns out that solving the world's waste plastic and climate, and caring for societal challenges is a little harder than we would have expected going into it. So, it's absolutely critical to have a little bit of courage to take the risk, but then know when you're going to fail, and review and adjust quickly.

So, as I talk about these different examples, I won't go through any of them in great depth, but I will highlight what we're doing in all of them and how we're sort of changing the system as a result. If you think about molecular recycling as a complement to mechanical, think of it in three ways, and you'll see this kind of reflected as we go through the examples.

First, we are complementing mechanical by being able to recycle the waste screens that mechanical generates, and then creating that virgin-quality material that's needed to replenish that system.

Secondly, and you'll see this come across, we're able to recycle materials that today don't get recycled in any meaningful way through that system, and many times will go directly to a landfill, an incinerator at best.

Lastly, and I highlighted this, is we're able to get recycled content now into applications, where today that would have been prohibited from a quality, a fitness for use, a food content requirement.

So, the two technologies sort of work hand-in-hand to drive circularity, and hopefully that comes across in the examples, and again, hopefully triggers some ideas for you all.

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Without a doubt, the best way to reduce virgin plastic usage and create circularity is to convert to more reusable, refillable applications. So, we make a product called Tritan that has great durability, great chemical resistance. It can withstand hundreds of lifecycles. So, as a result, it finds itself in a lot of these reuse/refillable type applications.

In Europe, as they are working towards their green plan or circular economy action plan, they're requiring restaurants and other facilities to convert a portion of their packaging to reusable/refillable models. So, we've been collaborating with McDonald's and various partners in their value chain to be able to transition to more reusable food service ware in their stores throughout France, Germany, and elsewhere.

It allows us to get Tritan, based on recycled content, into those applications. We're just now beginning to figure out how do we get those materials back, be able to recycle them leveraging our technologies, to then in turn return it back, essentially create circularity through this reusable/refillable tableware.

A great example of how we're doing and a great example of where we learn it. In store this works really well. We saw as many of these things walk out of the store as stayed in the store. For takeout, a different story. So just another example of how some things worked well, some things haven't. Multiple players in the value chain to accomplish kind of a really interesting story around reuseable/refillable.

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Another example of getting new materials into the system or doing a better job with materials that do get into the recycling system today. I don't have actual data, but sort of anecdotally, as consumers we do a pretty good job of recycling stuff from our kitchen. We do a less good job of stuff in our bathroom. Then certainly when we get out of the house, we don't do a very good job.

Some of that stuff in the bathroom, think of your shampoo bottles, some of your over-the-counter medicines, maybe vitamins, come in opaque or colored PET bottles, and usually that's to be able to provide some barrier property that prevents the deterioration of the active ingredients in those materials, whether it be shampoo or an over-the-counter medicine.

When those materials do end up in the recycle system, they are contaminants. The recycle system is often optimized around clear PET bottles. So colored and opaque PET becomes a challenge. So for us, the problem we were looking to solve is: how do you maintain the benefits of that material, but yet solve the issue?

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So that's where we partnered with several brands, several folks in our industry structure, and leveraged the recycling partnership and the PET Coalition to figure out: how do we pool our resources, be able to provide grants so that material recovery facilities, MRFs, and reclaimers are able to invest and be able to do a better job of capturing these materials once they get into the system, creating essentially a bale then that can go to folks like us and can be easily recycled, where today those materials would drop out as a contaminant and then end up most likely in a landfill or they're downcycled at best?

We have several advantages. Number one, it's allowing municipalities to get more materials into the bin, accepting colored and opaque PET, accepting thermoforms, so more stuff that can be recycled.

Two, when it gets to those recovery facilities, we are able to remove them out, so they're no longer a contaminant. That's a better quality bottle bale to be returned to a new bottle via mechanical recycling. Then you've created a feedstock for us.

Then part of that also is some education, being able to make sure people recognize that, hey, we need to do a better job in the bathroom. There are some materials in the kitchen that can go in the bin.

The net result is between this initiative, we're looking over the next couple years, to basically increase the recycling of hard to recycle PET, adding 250 million pounds versus what it is today. Again, it doesn't solve the problem alone, but a very significant step forward and a great example of a variety of industry partners coming together to solve a problem.

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As I mentioned, when we get outside the home, we're not as good recyclers. Sporting events are a great venue, gathering lots of people who generate a lot of waste materials. We have been partners for a long time with the University of Tennessee's Good Sports program.

In a couple years, we decided to take on a challenge to say, "Hey, let's see if we can set a world record for the most recyclables collected at a sporting event." So, in 2022 we did that at an event in Knoxville.

Last year, we decided to up the ante and issued a challenge to the University of Michigan and some of our value chain partners and we did a recyclable. We maintained our record and broke our record. The net result though was through that sort of sporting event we got more collected from those venues for recycling versus it going into the trash.

Then we had an opportunity to create awareness and education amongst 200,000-some spectators. So, a great way, with a little bit of work, to try to do something positive, accomplish those two objectives.

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We will be one of the largest recycling facilities in the country when we get lined up here in the coming weeks. Unfortunately, the city of Kingsport, where we're headquartered, is one of many municipalities across the country that has discontinued their curbside recycling program because it was not – in short, they were losing money doing it.

So, we thought: what can we do to help create access and bring recycling back into the region? So, as an example, we partnered with Food City, a local grocery store chain in the tristate area. A program started behind the store of collecting recyclables from the employee breakrooms. We've done similar things on our own campus, setting up recycling for it.

Now we're beginning to put – the first things are going in place at food stores throughout the region, such that we have access now for folks in the community. It failed because it's oftentimes really inefficient for Waste Management or Republic Services trucks to be driving up the hills of Appalachia, but those people absolutely do come out of the hills to buy their milk, groceries, et cetera, and provide them an easy, convenient, accessible point to drop off recyclables. We hope it will be a good way to continue an increase in recycling in the region. So again, another cool example of partnership for another company like mine that wants to bring some good.

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The last two examples I'd say are where I'd say we're really challenging the system in terms of what can be recycled. More than three billions pounds of carpet goes to a landfill every year. We've been partnering with a company called Circular Polymers from California. California is an ETR state, where basically there is some funding provided when you buy carpet, to be able to enable the recycling of it.

So Circular Polymers gets residential and commercial carpet in California. They're able to process it to remove the nylon from the polypropylene, from the PET, and they create for us a fiber, a polyester-rich fiber that we in turn can process through carbon removal and polyester removal technologies, and then be able to take that old fiber and make new polymer such as the cellulous diacetate that goes into eyeglass frames, fiber that goes into apparel, and other materials. So a great example of how these technologies are leveraged to create new screens.

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Another example is the partnership we have with the USAMP, PADNOS and Yanfeng on auto. There are 27-some million vehicles that reach the end of their life every year. Automotive is a huge materials market and a huge market for plastics, 36 million metric tons.

Today, when those cars reach the end of their life, they're generally disassembled, shredded to recover the metal. There might be some plastics that get segregated out, but by and large, the value of an old car is in the metal. But you end up then with this screen of a mix of plastic, some glass, some metal. So it is the worst of the worst to imagine recycling.

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So in partnership with the US Automotive Materials Partnership, GM, Ford, and Stellantis, we undertook a project a couple years ago to demonstrate that we could leverage our carbon renewal technology to recycle that ASR. So working with a partner, PADNOS, who is doing the shredding, is doing that first phase of recycling, we were able to get that ASR into a form and of a quality that we could feed it into our carbon renewal technology.

We could take that and be able to then use it to create a polymer, Tritan again, to be able to then make a part that would in turn go back in a car, essentially creating circularity through that. So this is a partnership where a lot of collaboration, a lot of adaptability and innovation is demonstrating how a material that no one in their wildest dreams could have imagined being recycled. Actually, we were able to do some of that stuff.

Now for clarity, it took a lot of work to get that ASR and we were fortunate to have great partners, but another example of how these technologies are able to expand the types of materials that can be recycled.

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Again, hopefully this is giving us some ideas, triggered and sparked some ideas for things that you all might be able to do differently to improve recycling, better diversion of waste, think differently about how to collaborate as you work towards your waste reduction and circularity goals.

Again, Bruce, Marta, thank you for the opportunity and I'm glad to take some questions.

Bruce Lung: Thank you very much, Chris. This is an enlightening presentation. I don't know if you want to say anything about the QR code, but I guess there's another resource that you offer there.

Chris Layton: Yes. In the spirit of transparency, like we said, we have our LCA information published via the website. This one in particular is talking more about the complementariness. So I urge folks to look at the QR code and visit our website if you want to learn more about it. We do try to put as much information as we can there, again, in the spirit of transparency.

Bruce Lung: Terrific. We have gotten a few questions on Slido. Before we get to them, I'm going to use my moderator's prerogative because there is one important question that I have for you.

The construction and development of this methanolysis plant, do you know how it impacted job creation within the region of East Tennessee? Did you have to bring on new people? Is there promotion potential for existing Eastman employees?

Chris Layton: Yeah, absolutely. Over the past three years, we have significantly grown. That's part of the investment. These technologies for us have the potential to transform our company. It gives us that next level of growth.

So commercial jobs, sales, marketing, product management, supply chain, you've all grown that. Manufacturing obviously, engineering. So yes, it has been a good number. I don't know the number off the top of my head, but it has been a significant number of these folks over the past two years, and we would expect the same thing for our second investment in the US and the plant in France.

Bruce Lung: Okay, terrific, very good. Let me get into some of these questions here. Somebody asked here: who has been providing you with the hard to recycle plastics that can't be mechanically recycled? For example, are you getting it from a municipality or from plastic end-use companies?

Chris Layton: Some combination of both. So the simplest way to think of where do we get those materials, we're going into the existing recycling Waste Management value chain and we're buying their waste. So we're buying off the recyclers. We're working with MERVs to be able to get material directly from them that doesn't otherwise have a home.

But the examples of like automotive, carpet are better examples of where we're having to sort of create new value chains. We do some smaller programs on eyewear, cosmetics jars, where we're basically creating new takeback mechanisms. So it's some combination of the two.

Bruce Lung: Great. Thank you. Another one here: are there cash rebates to the entities providing the recycling inputs for this process?

Chris Layton: Obviously I can't talk about the details of our commercial arrangement, but yes. We are setting up programs where our customers are providing us feedstock. Yeah, we're always negotiating on what the value of that is. Somewhere they're getting the value of providing us that feedstock.

Bruce Lung: Okay. The next one here is: can you talk about the energy intensity of these processes and any opportunities or challenges using renewable energy for the methanolysis plant?

Chris Layton: I don't have a pure energy intensity number. I shared earlier some of the greenhouse gas emissions reductions that we achieve with it. It's sort of related.

In terms of a greening up the processes, so in addition to a goal around circularity, to recycle 500 million pounds of plastic by 2030, we also have climate goals. So we're working towards reducing our Scope 1 and 2 emissions by one-third by 2030, and then carbon neutrality by 2050.

As we think through those plans of how we achieve those goals, we are looking at how we leverage renewables, et cetera, into those things that we do see energy intensity as well. As we look at particularly a second US plant, the France plant, it allows us to be able to do that in the design for the Kingsport facility here, that's been here for the better part of 100 years. Retrofitting is always more difficult than designing it in the front. But absolutely, renewables are part of the plan as we think about those climate goals.

Bruce Lung: Let me ask a little side question that this question prompted me about. Do you recover any waste heat for this plant or does this plant provide some waste heat for other processes?

Chris Layton: We do. The processes in and of themselves, so I'll speak specifically around the methanolysis because that's the one we've been spending most of our time and effort on, that process is pretty high-yield. When I say high, think 90 percent, plus or minus a percent or two, depending on the feedstock, meaning that 95 percent of the PET that feeds into that methanolysis unit – or 90 percent of what goes in is coming out as useable monomer.

That remaining ten percent, there's some amount of solid waste that would have to be landfill. We lose some to waste water. But I believe there's about five percent of material that has a BTU value that can be turned, used for energy to help feed the plant energy sources as needed. Obviously we don't count that as recycled content going out. But the short answer to your question is yes. Any waste screens that have energy value, we are using to essentially heat or energize the process.

Bruce Lung: Terrific. Somebody here asked how they could reach a place where McDonald's or other fast food companies can use the reusable material in the US. I'm not sure if that's widespread yet.

Chris Layton: If you want to do it, you probably need to go to France or Germany right now. That has not started, but we are exploring that as a key market and trying to develop some partnerships. Those are just very early here.

In Europe, you have the benefit of there's a regulatory policy infrastructure that is driving some of these changes, incentivizing some of them. So I don't think anyone would be surprised. The recycling infrastructure, the reuseable/refillable infrastructure in Europe is ahead of where we're at in the US.

Bruce Lung: Okay. As a side note, I'll just mention that Wendy's is a Better Buildings partner. I don't know if you've had any talks with them, but they might be forward-thinking enough to want to participate in this.

The next one, Ken, we talked directly to you on a plastic material that you were having difficulty planning recycling for, but your contact information is on this slide if you want additional information.

Chris Layton: Absolutely. As you can imagine, over the past three years we've had many folks reach out to us. Bruce, that's how you and I first met, right, there was another network member asking about it. So yeah, glad to entertain, always looking for partners.

Bruce Lung: Excellent. Then: how do you incentivize people to bring their recycling to a drop-off point and not put into a landfill? I guess this kind of depends on the haul-aways, Republic Services and so forth, yeah?

Chris Layton: Yeah. This is part of the challenge. How can you educate people and make it more clear what is recyclable and what is not. How do you make it convenient for them to be able to handle their recyclables?

In a rural area like us, part of the challenge is the county sets up just a handful of convenience centers. That's not really convenient. People generally may not go out of their way to do it. That's part of the reason why we're trying to partner with Food City, because people are going to go to the grocery store. If there's a convenient drop-off location there, might that increase participation?

This is one that certainly Eastman is not going to solve on its own, but that idea of trying to make it convenient, trying to educate folks so they know what can be recycled. All the consumer research that we've done indicates people want to do the right thing. They want to recycle. There's a gap between intent and action. So how can you create things and make it easier for people to do that? That's part of what we're doing ourselves as well as through the PET Coalition and Recycling partnership.

Bruce Lung: Okay. That makes me wonder if there might be in the future opportunities to work with the Safeways and other food distribution companies.

Someone is interested in lifecycle data and wonders: does recycling this way save greenhouse gases or increase them as compared to landfilling?

Chris Layton: Let me answer this this way. We compare versus the virgin intermediate or virgin polymer we produce. So we measure our reduction there.

Today, we use what we refer to as sort of the cutoff method. So we're not taking credit for the avoided emissions. We're not taking credit or penalty for the end of life. We essentially start at zero, where the waste is generated, and then we're capturing that. That is something that we continue to look at, but today we sort of cut off. The waste screens start with essentially zero burn.

Bruce Lung: Okay, excellent. There's another one that's similar, so I'm going to skip that one. A couple of people have asked about commercial real estate, the construction industry, building operation for improving recycling. Feel free to jump in and tackle it.

Chris Layton: Beyond carpet, we probably have not had or tapped into or explored that market for materials. I think it's by virtue of when we look at polyester-rich materials. Packaging is a big one. Fiber is a big one, textiles. Those are the places that we've started because those are the largest markets for polyester materials. So trying to work through those first and foremost has been our focus.

But we know carpet is an example, draperies, home furnishings. They have a lot of polyester in there. That's just not a space though that we have started, but it's a valid opportunity for sure.

Bruce Lung: Terrific. I think that takes care of the major questions that we've gotten so far on Slido.

One quick note and perhaps also a question for you. You mentioned that PET is one of the feedstocks that are easy or good for this process to recycle. The production of PET or what we call polyethylene terephthalate is actually very intensive, energy-intensive. It requires blow molding, compensatory blow molding, and it's very widespread. Almost all soft drinks, water bottles and so forth are PET bottles.

If we get to a point where you start recycling large volumes of PET, you could obviate the need to generate the same volume year after year. Therefore, there could be an energy benefit to this recycling. So that's another thing to keep in mind I think.

Chris Layton: Yeah, absolutely. Again, those are things, as we try to move on to the next phase of our lifecycle program, of beginning to understand can we really quantify the benefit of circularity. To your point, we could get to the point where the amount of virgin plastic needed into that, true virgin plastic, goes down significantly because you have a mechanical screen that's working.

The waste from that and other screens are being leveraged through molecular recycling to return it. So your need for true virgin could go down significantly. With it then you would expect the energy intensity in the greenhouse gas emissions.

Bruce Lung: Okay. Thanks again. I think that takes care of our Q&A session.

If you'll go to the next slide please, I think we want to make a plug for the summit.

Just a quick reminder for those of you still on the phone, April 2 – 4, Washington, D.C. Come on down, get recognized, attend sessions. We're going to have one of our more interactive sessions for the industrial program again there, the choose your own solution. There's also going to be a lot of good building and plant tours. So we look forward to seeing you all there.

Next slide please.

This is our webinar series for the rest of this year. So feel free to peruse the website and sign up for the ones that are of interest. I think they're all going to be pretty good. I'm a little biased in that sense, but feel free to check out our website.

I believe that's our last slide. I'd like to thank everyone for joining us today, and hopefully you all found it very enlightening. We look forward to seeing you all again.

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