

[no conversation from 0:00:00 to 0:01:00]

Hannah Debelius: Hello, everybody. I'm gonna give it another minute here since I see a lot of people are still joining us.

[no conversation from 0:01:05 to 0:02:07]

Hannah Debelius: All right. It's a minute after, so I think I'm gonna go ahead and jump into it. Although I think we'll have a couple more people joining us as we get into this.

Thanks so much for joining. You are in the right place, if you are here at the – I cannot believe it – final quarterly call for the Waste pilot. We have some great speakers and some wonderful things on the agenda for you today. So, we appreciate you taking the time and wrapping up the two-year Waste Pilot with us.

For those of you that somehow don't know, my name is Hannah Debelius and I'm in the Building Technologies Department of Energy. You can go to the next slide. I have had the wonderful opportunity to work with all of our commercial and public sector partners throughout the Waste pilot. As usual, I am joined by my colleague, Bruce.

Bruce, would you like to say hello?

Robert B. Lung: Hello.

Hannah Debelius: All right. Short and succinct. I like it. We can go to the next slide.

Today, we have some wonderful things on our agenda. We are actually gonna start with a bit of program update and let you know about what's happening with the pilot, since this is our last quarterly call. Then, we have two great organizations with us today.

We've got REMADE, which stands for Reducing Embodied Energy and Decreasing Emissions, and RILA, which is the Retail Industry Leaders Association. Of course, we will have Q&A at the end and you all have such great questions and discussion items, usually. So, I'm looking forward to that.

Speaking of getting your input, we can go to the next slide because we are going to, once again, use Slido. This is a tool that right now, you should open up another window in your browser, or you can use your mobile device. You go to Slido.com and then you enter the event code, #WASTE. This tool is what we'll be using to

collect Q&A throughout the whole presentation today, so we can take questions at the end. Also, we have a couple of different polls that we'll be launching.

Go ahead and take the time right now to open up that browser and go to Slido.com, and put in the event code #WASTE because that's how we'll be engaging with you all.

With that, I am gonna open up our first poll here. So, if we can move over to Slido and launch that poll, it would be wonderful. Also, I don't know, Anonymous is a big fan of the Waste pilot and I like that.

This first question for you is what does circularity mean to you? It's an open, short answer. Circularity will be the theme of our discussion today for the final quarterly call. So, would love to hear some of your thoughts.

All right, closed loop, for sure. Return, so probably returning materials back into the system. Sustainable innovation. Nothing wasted. I think that's probably reusing everything. Cradle to cradle. Systems thinking. Yeah, absolutely. Our word cloud here generates, of course, based on popularity. So, a lot for closed loop, which is great.

What I'm excited about today is that we're gonna be looking at it from a lot of different angles. We'll have our manufacturing perspective and then also in looking at supply chain as well. A little something for everybody. Continuous.

All right, great. Thank you so much for everybody who... Our event code is #WASTE. Sorry, I apologize if I said something different. I might have said – oh, it was in the chat. Okay. I thought I said #WASTE. Great. The event code is #WASTE, not DOE, if you're looking for it in the chat.

Great. Well, we can go ahead and close that poll, then. Thank you all so much. However, you all should leave Slido open because we are gonna be collecting questions throughout the whole session today so that we can ask our panelists at the end. All Q&A will be through Slido, so you should leave that up, but we'll switch over back to the slides.

Another option for you, if you are looking at Slido for questions, is that you can also hit the little thumbs-up button to like somebody

else's question. That's what moves it up to the top of our list, so we'll be sure to get to that one sooner.

This is our wonderful list of pilot participants. So, thank you so much to all of you who have been with us for the last two years. It's been an incredible experience with so many sectors represented, and such great engagement throughout the peer exchanges, and everything we've been doing.

As a reminder, we also have a waste team on the DOE and support side of things – you can go to the next slide – which is not only my colleague Bruce and I, but also Eli and Ethan, who you all might be working with on the manufacturing side of things. Then, Clifton and Andrea, who are often the first to get back to you and offer a lot of support for our program.

As a reminder, we also have developed a lot of resources throughout this entire pilot program. You can go to the next slide. We've also redone the resource page so it's a little bit easier for you all to navigate. You can check out all of the resources that we've put together because you all have been such excellent and involved partners.

In fact – you can go to the next slide – just a reminder, we've got a couple of featured solutions up right now from Bendix, Steelcase, Sprint, and the City of Beaverton, Oregon. Just a few of the partners that have been engaged with us and helped to contribute to all the solutions on the Solutions Center. I think it really just speaks well of how much work and effort all of our partners put into making this pilot something that really did explore waste as a topic and waste reduction. Then all of the tangential topics to that, like energy efficiency's relationship to waste or embodied carbon, and those sorts of things.

Great. Speaking of the end of the pilot – you can go to the next slide – we are going to be transitioning the pilot into a full-out continuous program, which I'm really excited about. I think that for those of you that have been engaged in the pilot, your experience is gonna look pretty similar in that we are gonna continue to offer peer exchanges, and webinars, opportunities to contribute to solutions or to get resources from us.

We're also gonna continue the option to track your waste goal with us. We know that when you all came into this and brought your existing waste goals, or maybe you set one during the pilot – we had a couple of partners do that – the waste goals were incredibly

diverse. Certainly on the commercial side of things, a diversion goal was the most popular. But we also had goals about waste reduction or a specific item within your waste stream, like Styrofoam and wanting to eliminate it.

All of those goals will still be open to you all to pursue as part of the Better Buildings, Better Plants Waste Reduction Network, which is the new name – or will be the new name, if I didn't mention it. If you've been with us in the pilot and you're on this call right now, you don't need to do anything in order to transition into this Waste Reduction Network.

However, what you're gonna see is that we are looking to expand this network and getting more people involved, which hopefully will mean even more robust content. But you can expect that same level of engagement from us and you'll continue to work with the same points of contact that you've had throughout the pilot.

One thing that we're also gonna pursue – you can go to the next slide – is that through the last two years, we've done some things as a large pilot group, and we've also broken up into the industrial or the commercial side of things to pursue a couple of different topics. So, through that experience and through a lot of the feedback that you all have given us on Slido polls and through Better Buildings Summit the last two years, and that sort of thing, we've identified some of these categories as things that are specific topics of interest to our commercial or industrial partners.

So, this will be a short list that we're choosing from in the near term to continue to engage you all in the Waste Reduction Network. But as always, we're open to feedback and input, and discussions that you all want to have to help us pursue the right direction for you all as the Waste Reduction Network.

All right. With that, I am excited that we have three panelists speaking today. We have Ed Daniels from REMADE Institute. Then, Erin and Kaela are both from RILA. We'll be kicking things off with Ed – we can go to the next slide.

Ed Daniels is responsible for managing technology R&D projects that are focused on recovery and recycling of materials, and integration of recycled materials into the manufacturing supply chain. In this capacity, he's also responsible for evaluating the performance metrics of the projects and the REMADE research portfolio. This one, I added in from lower down on his bio, but he holds 14 patents and has authored more than 125 papers on energy

and sustainable technology. That's the first bio I've read with patents, so that's pretty cool, Ed. We are excited to hear from you.

Ed Daniels:

Okay, great. Well, it's a pleasure to be here this afternoon. I actually gave a little bit of an overview of REMADE about a year or so ago to your members, so some of it maybe they have seen before. But I think I've updated the deck, based on what's been going on at REMADE.

The focus at REMADE, we are one of the USA Manufacturing Institutes. Our byline is that we are accelerating the transition to a circular economy through investing in technology, research, and development. Next slide, please.

Our strategic goals are to develop transformational technologies to expand materials recycling, recovery, reuse, and remanufacturing. Our performance targets, we want to reduce the consumption of primary feedstock or raw materials and substitute for that an increased use of secondary feedstock or recycled materials. In so doing, conserve the embodied energy that would otherwise be consumed by production of primary feedstocks and also to reduce greenhouse gas emissions. Next slide, please.

So, the way the Institute is actually structured is our research portfolio aligns to five nodes. These nodes are systems analysis and integration, which is essentially the node where we conduct a research on materials slow analysis, develop performance metrics for the Institute, and then develop data with regard to materials use and consumption in the economy and to standardize and harmonize all the data sets so that we have a consistent set of data that we can use to evaluate our projects.

The research agenda, then, does cover the complete lifecycle of products, beginning with the design for the product. Manufacturing materials optimization is the actual manufacturing process, if you will. Our particular focus is how we integrate secondary materials in the manufacturing process. Of course, a key aspect of our work is focused on remanufacturing, which is actually a \$50 billion a year industry in the U.S. We would like to see that grow significantly because there are, of course, significant energy and environmental benefits associated with remanufacturing and end-of-life reuse.

Then, recycling and recovery, where our research is focused on gathering of materials, identifying materials, sorting, separation, contaminate removal, reprocessing and recycling. For those of you

who have a particular interest in polymer recycling, we look at technologies including mechanical recycling as well as chemical recycling. The focus of the Institute to date has been on four classes of materials. These include metals, polymers, e-waste, and then fibers, which would include paper and textiles. Next slide, please.

We also have a very significant education and workforce development program that has been established to ensure that we have the workforce that will be required to deploy and to utilize the technologies that are being developed as part of our R&D portfolio. So, we have developed to date over 50 hours of online training, 14 online short courses in topics such as plastics recycling, remanufacturing, design, and also systems analysis.

We also are relatively unique among the manufacturing centers, USA manufacturing centers in that we offer certificate pathways in certain courses. So, this is where participants take a series of short courses. Following that, they are actually tested and then can receive a certificate in those areas. Next slide, please.

So, this is just one that we offer, which is emerging trends in plastics recycling. This is a five-part series of short courses. All of our courses are offered by experts in the field. The short courses that would be part of this series are mechanical limitations, ways to overcome limitations in in mechanical recycling, end-of-life and the circular economy, chemical recycling, plastic flows through a materials MRF, and then product design considerations.

All of these courses are offered online. Of course, that was primarily in response to the limitations imposed by COVID. But as we emerge out of that, we would be offering those courses in person, depending on the needs of industry. Next slide, please.

We are a membership organization. To date, we have 130 members. These include 64 industry members, 31 academic members, 29 affiliate organization, and then 6 national labs. Since our inception, we have actually grown significantly. When we started out, we had something like 15 members, about five years ago. So, there is, of course, a significant interest in materials efficiency in industry. That, of course, includes remanufacturing, recycling, and how do we handle these materials at end of life. Next slide, please.

Our technology portfolio today, that is as of September 21, we have 61 projects that we have funded. As a result of those, ten have generated inventions or intellectual property, 38 works have been

published and/or are awaiting publication as a result of that research agenda.

With regard to our metrics, we do have rather rigorous metrics, with regard to the expectation, with regard to our research portfolio. So, we have targets for embodied energy, primary feedstock reduction, secondary feedstock increase, emissions reduction. Where we are today as a result of all of the projects we funded through RFP4 are that we are at 90 percent of our five-year goals for embodied energy, almost 100 percent of our emissions reduction, and slightly lower on our primary feedstock production. We just recently closed our RFP5 solicitation and have developed recommendations for those projects, and have submitted our recommendations for DOE, who make the final determination on which projects will be funded.

The basis for all of the research that we do, technology research, is our technology roadmap. We update our roadmap annually. It is available on our website. You can download it. The primary changes to the roadmap this year, we've identified a number of new high-impact research areas that are listed here. These include developing methods to mitigate fatigue damage in metals. This is primarily focused on remanufacturing.

Integration of sensing technologies that provide real-time automated monitoring and control of key manufacturing processes that would allow those processes to use more secondary materials, given the fact that secondary materials generally have a little bit greater variability in materials properties than the primary materials. We're developing machine-learning tools to guide manufacturing processes. Then, are looking at also a design for remanufacturing framework that would enable products to be designed for remanufacturing at end of life. Next slide, please.

We do, as I said before, we currently have about 61 projects. Our projects are collected in a portfolio. So, there is a strategy to the projects that we fund. As an example of that, some of the work that we're doing in films and flexibles packaging includes multiple projects, including projects that will allow us to determine how you actually recover those materials at a materials recovery facility. Then, how you process those materials, once they are recovered, to enable them to be reused in industrial applications.

A third project that's related to this is that we have also done a fair amount of systems work that is to characterize materials flows of these materials in the economy, so we know where the

opportunities are to recover and reuse these materials. We do that for all of our project portfolio in different classes of materials, different polymer types. As an example, we do PET, polyethylene, polypropylene, and then in metals, it's aluminum and steel primarily, although we do also have some projects focused on precious metals recovery, and so on. Next slide, please.

I'm not going to go through each of these slides. I've included a similar slide here on e-waste. So here, we're looking at a key challenge with e-waste is actually on the collection system or the collection infrastructure, if you will. We have a project that's being conducted out at Idaho National Lab on looking at the logistics systems for collection, pre-processing of secondary feedstock from e-waste in order to increase the recovery of those materials. Then, we're also looking at chemical recycling as a mechanism for recovering plastics from e-waste and actually separating the metals from the plastics content of e-waste. Next slide, please.

I'll skip over this one, in the interest of time. But I've included examples here, I think, for each of our classes of materials. I think the slide deck is gonna be available. Next slide, please.

That's my final slide. I would like to say, in conclusion, that REMADE is entering its fifth year of operation. We will likely be operating under a cooperative agreement with DOE for another two years. We have, to date, as I said, funded about 61 projects, total R&D investment of right around \$65 million. We have a total portfolio that we anticipate funding up to a level of about \$105 million.

We will be issuing RFPs in the near future. We just closed one, as I said. But we will be issuing additional RFPs in the future to focus on some of the key areas that are outlined in our technology roadmap that we don't yet have projects onboard to address those challenges.

With that, I would also point you to our most recent impact report, 2020 Impact Report, which contains a lot of information about what these technologies, what our research portfolio looks like and what the potential impact of that portfolio is with regard to emissions reductions, energy savings, and so on.

Again, thanks a lot for asking me to join you this afternoon. I notice that some of your participants are already members of the REMADE Institute, which is great. For those of you who are not, you might want to take a look at us, take a look at our website and

see if there's an interest in your organization in joining with us and attacking some of these really significant challenges. Thanks.

Hannah Debelius: Great. Thank you so much, Ed. I really appreciate it. I know Bruce dropped the impact report into the chat.

Just as a reminder, we are accepting questions the whole time on Slido.com, with the event code #WASTE. I'll also say that our next presenters are gonna have two more polls within theirs. So, Slido is also the tool that you have. If you didn't already, it's a great time to open up a new browser, go to Slido.com, and put in the event code #WASTE. That's where you'll be able to participate.

With that, I'm excited to welcome Erin and Kaela. Erin Hiatt is the lead for RILA's corporate responsibility portfolio, encompassing its diversity and inclusion, sustainability, and responsible sourcing committee and EFG engagement activities. She organizes educational content, and convenes and facilitates benchmarking discussions, resource development, and stakeholder engagement for corporate retail issue leads in each of these areas.

She's also joined by her colleague Kaela. Kaela Martins as manager environmental programs and retail compliance center. Kaela Martins maintains programs for the retail compliance center in RILA as a whole that focus on helping retailers improve their performance through benchmarking, education, resources, and program management tools. She also leads the RCC Zero Waste Network and Energy Management Network, which both provide a forum for retail executives to hear from experts and engage in peer-to-peer benchmarking on the implementation, management, and oversight of retail waste and energy programs.

So, lots of great sustainability and waste DEI things in there. With that, I think I believe Erin, you're going first? I'll turn it over to you.

Erin Hiatt: Great, thank you so much. I'll also share, too, even since we submitted, that Kaela is now Senior Manager. So, you can join me in congratulating her.

Hannah Debelius: Congratulations! That's wonderful.

Erin Hiatt: Yeah, she's been doing an awesome job with her portfolio. I'll kick us off with a little bit of an overview about just who RILA is, how we approach the circular economy, and how this fits in conceptually with what we do. Then, Kaela's really gonna walk us through some discrete examples of it, while providing some

connections to some of the industries we know that are represented on the line today.

I know we were gonna kick off with a poll, where we were just curious to understand from the group how your organizations or institutions may connect to the retail industry. We'll obviously be sharing several examples of projects that we've done but want to make sure that tie in for where this impacts you all as maybe part of a retail supply chain or a piece of the community where retail operates could connect to it.

If we could launch the first poll, that would be perfect. I'll say, too, we didn't perfectly capture who you represent. Please do feel free to share that in chat. It would be great to see who comes through.

Okay, this is really helpful. I won't keep us on here for too long. Maybe we can pop back in there later. But it looks like a lot of the connection points are really within the retail supply chain. So hopefully, this is interesting for you all as either connection points with retailers or with parts of the supply chain that work alongside retailers on some of the key trends and issue areas that we're looking at.

On the first slide, just giving you a logo page view of who we're talking about when we say Retail Industry Leaders Association. These are our members. Actually, a few who've joined recently that even this isn't up to date with. We've seen a big uptick in trade association engagement during the pandemic, unsurprisingly. But we represent the largest brands that operate in the U.S. in the retail industry. Essentially, the stores that you might visit on just a weekly basis tends to be the top three to five companies within any of those categories.

We work across several different issue areas. We work in public policy, we've got groups focused on supply chain and logistics, asset protection and loss prevention, HR. But on the next slide, I'll give you a snapshot of what our overall sustainability and CSR structure looks like at the organization.

On the next slide, you'll see the communities that myself and some of my colleagues, including Kaela, respectively lead. As was mentioned, my portfolio is CSR, in the broadest sense. Kaela touches, too, those key operational communities relating to it for energy management and particularly for this topic, zero waste. So, when we think about circularity, we think about all of issues cross-functionally, but circularity has a natural tie-in here.

You can obviously understand how it connects to zero waste and sustainability, where the pyramid heads for those issue areas at our member companies come together to benchmark and share information, and help us work on projects to address their challenges. But the connection points to ESG as a broader key theme for stakeholder engagement and expectations has been an incredibly active and accelerating area recently. There are even these broader connection points into where you might see environmental justice impacts of waste with our diversity inclusion committee, too.

We're trying to recognize intersectionality of these topics. Then, we touch on issues like chemical components, what does that mean for the circularity process? What do some of the merging regulations look like? It really is all of these different issue areas connected and even beyond this in the retail operations scope.

The other tie-in I'll make too is a key thing that we've released earlier this year are some retail climate priorities under RILA. Part of that is around waste management and looking at issues, like recycling and the emissions associated with it. Not only the manufacturing and processing of those materials, but emissions associated with end of life and the different choices that may be made around materials, as well.

Very excited to chat a bit more with you, but I'll turn it over to Kaela to share some more direct examples of what this work has looked like so far and how we hope it might help inform and connect to what you all do day to day.

Kaela Martins:

Thanks, Erin. Thanks, everyone, for joining today. Glad to be here. I think for the next slide, Erin briefly chatted about the roles we have with sustainability structure. But wanted to quickly mention and highlight the Retail Compliance Center, or the RCC for short, which is public to everyone, not just our members. Within this, we have a number of resources related to environmental compliance and sustainability that apply in retail. Increasingly, we're seeing where there were once voluntary sustainability initiatives, many are crossing over into the compliance side with more policy going into place and the increase in consumer and stakeholder pressure.

In addition to the communities Erin just mentioned that provide peer to peer benchmarking and conversation, through the RCC, we ensure that retailers are staying up to date with regulations and any variations in state requirements in areas such as solid waste. In

thinking through, what are some of the new trends and innovations in areas such as sustainable packaging, which is one I'll touch upon later. The RCC is really the hub for a lot of RILA's content and resources for our sustainability environment-focused communities.

With that said, we picked a few hot topics for the retail industry right now that we wanted to share with you today that we thought would be interesting to this group and may have impacts for you as well. The first one I'll start with, which is on the next slide, is extended producer responsibility.

I'm assuming some of you may be familiar with this, but it essentially makes product manufacturers and distributors, which retailers can fall under for their private brands, responsible for their products at the end of life. This responsibility is intended to provide incentives to prevent waste at the source, promote more circular design, and establish public/private partnerships to help address waste program challenges.

Most of the EPR legislation we saw this year was focused on packaging. Made in Oregon recently passed EPR packaging legislation of their own. So far, what we're seeing the impact to retail and manufacturers in these states is through a product stewardship organization, which they'll pay fees to, retailers and manufacturers will have to ensure consumers are properly educated on disposal. There's a reduction in the amount of packaging material retailers and manufacturers are using. There's an increased use of post-consumer recycled content, and then expanded collection access.

We can expect that in 2022, more states are going to pass packaging EPR bills and retailers will look to their supply chains for help meeting packaging EPR program targets and goals. The other important piece retailers will turn to their supply chains for is data sharing. Visibility to that data is really going to be what drives resilient and sustainable supply chains. The more transparency there is, the easier it will be to make decisions that can create a more circular economy.

On the next slide, I'll showcase more of what RILA is doing in this space. Upon seeing an increase in packaging EPR proposals this year, we developed an industry viewpoint that is meant to be reactive to existing proposals, proposals likely to pass. In this viewpoint, we provided retail considerations on key components of legislation, such as the definition of a responsible entity importer

and producer, fee structure and how funds are implemented. We spent a lot of time analyzing the definitions here.

In some of the proposals we saw this year, the scope of who is a responsible entity could cast such a wider scope than is appropriate for a retailer. So, it was essential for us to clarify that in that legislation, that retailers only be held responsible for fees applied to the packaging of their private brand products.

In addition to this viewpoint, we've been engaged with a variety of stakeholders, which you'll see listed here, to ensure that the retail perspective is included in the frameworks, guidance, and resources that touch on EPR, like the Recycling Partnerships Circular Economy Accelerator. Right now, they're focusing on a guidance memo for when packaging EPR legislation is passed. Super-important for the retail perspective to be included there.

I've also listed here several public resources we have that may also be useful to you in this space. We're tracking packaging EPR legislation, any product stewardship-type laws including packaging but also mattresses, paint, batteries. We're also tracking where there's legislation around single-use plastic packaging. We brought up EPR here for this group as retailers may come to some of you who are not retailers with questions. There's clear impacts for non-retail manufacturers and producers in this space as well.

The next topic we wanted to dive into on the next slide was sustainable packaging. This has probably been the bulk of my work this year, but for our retailers, it's been a continual conversation because of the increase in policies, such as EPR. But also, consumer demand and consumers having a continued understanding of the environmental impacts of the products and packaging consumers are buying.

There's also the stakeholder pressure piece. Investors in particular understand that businesses have a key role to play in tackling urgent challenges, such as climate change. Investors are becoming increasingly assertive in holding companies to account on environmental, social, and governments issues.

RILA has put together a lot in this space this year. We recently hosted a call series on sustainable packaging, focusing specifically on LDPE film, which is a common material used in retail. The intent was to consider what future needs might be for packaging and retail supply chains to better enable sustainability. These calls were actually initiated by a couple of our retail members who

wanted to bring together other retailers to see where those gaps were and what those future needs may be.

So, we covered different sustainable packaging strategies and how retailers are tackling those, like alternative materials and reuse, elimination or reduction, and end-of-life considerations. In addition to hearing from retailers, we brought in a supply chain consulting company called Chainalytics to help facilitate conversation. They had ample experience in sustainable packaging and design.

In addition to them, we've also invited groups like the Recycling Partnership and the Sustainable Packaging Coalition, and even property landlords. Just to insure that we had the right expertise at the table, but also the hope that some of these external groups may see the need or the interest for a pilot or project to kick off.

Now that those calls have wrapped up, we are actually in the works of developing two public resources, one being this Pro-Con Packaging Sustainability Strategy, which in a sense will just be a summary of the calls. But then, the other resource we're working on is this Distribution Center of the Future resource. Thinking about what really needs to be true to accommodate sustainable packaging at the distribution center. Part of that is working carefully and creatively with multiple teams internally and externally, such as suppliers and manufacturers. We're really excited for these two resources to come together.

I've also listed here a couple webinars and calls that we've had. So, we've done quite a bit of work with our retailers and also organizations like Ellen MacArthur Foundation and closed-loop partners who have created several resources of their own. But the other resource I'll just quickly mention that we're working on in partnership with FMI is a sustainable packaging clearinghouse, which is intended to be a catchall highlighting sustainable packaging issues, challenges, and potential solutions through resources, guidance, news, and events. Not just what RILA and FMI have put together, but what several external organizations have put together in this space.

Again, that will be a public resource. So, we look forward to sharing that with you all.

Moving on to the next slide, we also wanted to briefly touch on this topic of unsold inventory and maximizing value there. COVID-19 has created an increased amount of unsold excess and

seasonal inventory. What prompted us here to touch on this was the consideration of if manufacturers could take back unsold inventory, which is one perspective we hadn't thought about. We had hosted a webinar where we dived into what are some of the approaches retailers could take to solve for inventory issues. What we came up with were these four here.

Liquidating. This could be considering selling through secondary online market channels. Donating, managing unsold inventory by identify community needs and establishing donation programs. Repurposing, recycling, working with post-consumer textile recovery companies who can take unsold products and find ways to reuse the textiles or to appropriately recycle them when there's not an end-market. Then, destroy. That's really the last option or last resort for retailers to go through product disposal and destruction, especially with waste handling and disposal costs varying depending on if the product is regulated waste.

But again, the other piece of this, to add a consideration, is sending that product or inventory back to the start of the supply chain for manufacturers to dispose of, repurpose, resell, et cetera.

Moving onto our next slide, our last slide, both for a poll. No surprise that environmental justice is a growing hot topic for retailers and likely for most of you in this group as well. At the start of Biden's presidency, he named environmental justice a critical priority, asking every federal agency to address environmental inequalities. The EPA also made commitments to increase the consideration of environmental justice in the regulatory process and in enforcement, which is a major place of impact for retailers.

I've listed some impacts here, but for the purpose of this group and the time remaining, I'll focus on the solid waste, raw materials sourcing, and siting facilities.

As we touched on, reaching recycling goals in the U.S. will require significant investment in expanding and upgrading the recycling infrastructure. But some of the trash and recycling facilities, with the diesel truck traffic, smells and noise are historically located in overburdened communities. The challenge will be to create the needed infrastructure without further burdening communities or going further to find ways to improve infrastructure while at the same time improving communities.

There are similar concerns around raw material sourcing and manufacturing facilities. Increased enforcement is likely for facilities located in or near environmental justice communities. So, this expanded scrutiny has the potential to disrupt the upstream supply chain. To avoid some of those complications, this is an area where companies will need to work to engage stakeholders and develop meaningful relationships with communities to be able to better understand and respond to concerns of the community before conflict occurs.

You can read more about our thoughts on this in this blog linked here, Environmental Justice in Retail. We also hosted a webinar this year with Beveridge and Diamond PC and BlocPower, just giving an introduction to environmental justice for retail.

With that, I know I covered a lot in a short amount of time, but I'd like to thank you all for your time. I know we have a poll to close us out before questions. So, we can jump to the poll. I see, as Andrea mentioned, I know we have a lot of links here. As she mentioned, we will share these slides, so you can click through those resources.

The question that we had is based off of the topics that we covered today. What are some of the ones that your organization has prioritized? If you don't know, or you're unsure, or there's others, we'd like to know if there's something we didn't cover today that's been super-important to your organization.

What we're seeing so far is environmental justice has been a big one. Other, as well. Then, tied are some of the other ones. EPR and environmental justice. Makes sense. I'll keep this up and let us transition into Q&A, when that makes sense.

Hannah Debelius: Yeah, absolutely. Thank you so much, Kaela and Erin to you both. I really appreciate the breadth of topics that you all covered. DOE also has an environmental justice initiative called ERP through the Biden Administration that you mentioned. So, we're certainly also considering that. I appreciate you bringing it up. Also, I appreciate, it looks like Tim put his other in the chat, which I appreciate.

We're gonna be moving into Q&A. So, we can go ahead and bring that up. Which again, all of the questions we've accepted have been through Slido. I see some in there. It's a great time to add any other questions you have. Also, again, you can hit that thumbs-up in the corner to indicate that you are interested in that question. Then, it'll

rise up to the top of our list, so we're more likely to be able to prioritize that.

So, if I could also invite Ed to join us again on video so that we can jump into these questions because it's gonna be a mix of questions for all of our panelists. However, the first question here is for RILA. The question is, what emerging technologies are you seeing to mitigate the issue of plastic waste from packaging, especially plastic film?

Even though this is actually directed to RILA, I think after they speak, Ed, if you'd like to weigh in on this, I know that plastics reduction is a big part of REMADE, as well. I'm not sure if Erin or Kaela want to be the ones to kick us off here.

Erin Hiatt: Kaela, you want to jump in first? I'm happy to weigh in after.

Kaela Martins: Yeah. This is actually part of one of the resources we're developing here. We talked a little bit about some of the sustainable packaging strategies that retailers are focusing on. There's elimination and reduction, alternative materials and reuse. We're seeing some retailers who are completely eliminating plastic film and plastic waste from packaging.

Then, there's some who are also thinking through alternative materials and reuse, and thinking through items. Right-sizing packaging is an example of that. Ensuring that packaging is right-sized and there's not extra space in some of the packaging there. Also, there's lightweighting, which there are pros and cons to that.

I'll pause there. I actually want to pull up some of the other things we have. Erin, if you want to add in there.

Hannah Debelius: Actually, Kaela, I've got a clarifying question, which is that for our other commercial partners who might not be as familiar, could you explain what lightweighting is?

Kaela Martins: Yeah, absolutely. That is just a reduction of the actual thickness of packaging. In some cases, you might see that packaging does not need that level of thickness, particularly with plastic film. So, lightweighting is actually just reducing the thickness of it to a point that it doesn't change the protective packaging qualities and you're still able to ship that, but just reduce the thickness of it.

Hannah Debelius: Great, thanks.

Erin Hiatt: Yeah, I feel like a really well-known example is, as you may notice, plastic water bottles becoming thinner and thinner over time is an example of lightweighting, where you've realized you don't have to compromise a lot of performance elements, even if you're using less material.

I think all I'd add here is, again, the hierarchy Kaela mentioned, if there are options for elimination or reduction, that's a lot of what's getting promoted within the industry. There is some really interesting public content from the athletic brand prAna, for example, who is doing a lot of experimentation with their use of plastic film, which is in the form of a poly bag. You got the piece of clothing shipped to your house in one of those poly bag inserts, they're using alternative materials.

A lot of the time, it's a pretty low-tech solution. I think in retail, a lot of the time, perception is reality with customers. If they think a pure paper mailer is a more sustainable option and there's a way to source that responsibly through the company, a lot of the time just doing a plastics alternative, if you still need that protective quality to it, is where we're seeing some innovation there.

But I will mention, too, we had an interesting discussion not too long ago about some different innovations within the industry that Chainalytics was sharing. It is fascinating to see whereas there used to be paper with a plastic liner to help repel against water impacts, if you did have something primarily packaged in that, there are some other alternatives where it might be dissolvable or also paper-based. Or at the very least, can be accommodated in a recycling stream. It's been interesting to see it for these applications where you still need the protective qualities.

Hannah Debelius: Great. Thanks so much. Ed, anything to add there?

Ed Daniels: Yeah. I would mention that first of all, the challenge with plastic film is certainly critical from a number of standpoints. The first is being able to collect the material from a materials recovery facility. So, we've been working with recycling recovery systems and the American Chemistry Council and have a demonstration project where we're actually recovering high-quality film bales from a materials recovery facility.

The challenge is that typical equipment, when you try to recover these films, they will typically be contaminated with paper products, which are also thin, as they go through the processing line. In our project, we've been able to reduce the paper

contamination to below eight percent by weight, which is significant in that it does allow you to recover a bale that can conceivably be reused. We're looking at a number of different market applications for these recovered materials, including in construction industry, as a matter of fact, in buildings for insulation and as alternatives to conventional gypsum wallboard.

Now, the thing about films, though, is that you have single-layer films and then you have multi-layer films. Multi-layer films are especially challenging because it's not straightforward on how you recycle those materials. What you need to be able to do is to essentially separate the different layers from each other, which it's a challenge. But we've been looking at a number of different technologies that actually enable us to do that.

One process that we've developed is just using extrusion technology that would break down these multi-layer materials into different product fractions, different molecular weights, that can then be reused to reformulate different polymers, if you will. We're launching another project that will actually be looking at delaminating multi-layer plastics to recover the individual films. We're quite excited about that.

But clearly, the whole challenge, packaging in general in our economy is, of course, a critical challenge. I think that with regard to PET bottles, it's relatively straightforward to recycle PET bottles. It is the highest volume polymer that is recycled today. I think it's recycled at about 60 percent, maybe something a little bit less than that. But other polymers are typically recycled at rates of down around five percent, at best. That's really where the challenges are.

First, you got to be able to recover these materials, then you've got to be able to process the materials. REMADE has been working on all aspects of the integrative process for doing exactly that.

Hannah Debelius: Excellent. Thanks so much. Ed, we're gonna keep you in the hot seat here because the next question we have is directed to you, which is how is REMADE measuring embodied energy? Is that happening at the product, organization, or industry-wide scale?

Ed Daniels: Actually, that's a great question. It applies not only to energy, but also embodied, as you said, carbon. We actually measure CO₂ equivalent, but once you have CO₂ equivalent, it's relatively straightforward to get to carbon equivalence.

As I said in my talk, REMADE is focused on essentially four materials classes. Of course, there are sub-classes in each of those materials classes. But basically, our evaluation of embodied energy is done on a mass basis of materials. If you will, megajoules per kilogram is the unit that we typically operate in.

When we look at a particular project, for example, if we're looking at recovering, let's stick with the example of plastic film. Let's say we're looking at a polyethylene film. We look at the energy required to recover and reprocess that material relative to the energy that would have otherwise been required to produce that material from primary feedstocks, either natural gas predominantly with some oil in place.

So, there's a delta in that usually. So typically, recycling consumes less energy than production of those materials from virgin sources. Not always the case, but generally that's the case. So, we look at the energy savings per unit mass per kilogram. Then, we look at what the market opportunity is for the specific technology.

If we're looking at, again, sticking with the plastic film as an example, there might be an opportunity for technology to recover, or at least enable the recovery of, as an example, maybe as much as a million metric tons of material per year. So, it's just a matter of taking the per unit savings and determining what the market opportunity is. That gives us the total impact for the embodied energy savings.

We do the same thing for greenhouse gas initiatives. We have a database that we have compiled that actually provides the embodied energy of primary materials, the embodied energy for typical recycled materials, typical processes for recycling materials. We quite often adjust that based on the technology that we're developing. We have similar data sets for greenhouse gas reductions.

Hannah Debelius: Awesome. Thanks so much, Ed. So, a little bit of all those.

We have just two minutes left, so we're gonna get to one more question here. But it's gonna be rapid-fire answers. All three of you get the opportunity to weigh in on – I'm gonna change it a little bit – what is the most innovative thing you see in circularity and designing for reuse? Maybe Erin, if you're up for it, I'll start with you. Just rapid-fire, some innovative you've seen out there.

Erin Hiatt: Yeah. I really think some of the refill applications are really exciting, like we're seeing them move beyond just grocery and personal care. I just think it's gonna be a really interesting, innovative way to have reuse be cost-effective as well because the cost of the packaging can be accommodated for and you're prioritizing durability of the packaging, which also makes it more valuable and maybe more easily recycled, as well. Ellen MacArthur Foundation has a really cool database that Kaela referred to, but I think those are neat ideas.

Hannah Debelius: Great. Thank you. Kaela, something to add here?

Kaela Martins: Yeah. I would say another interesting one is moving from products to services. Instead of having a product that you sell to a consumer and they keep that for the rest of the way, thinking it from a service, through rental or some sort of sharing leasing process. I think that's a really unique and growing circularity piece that touches on reuse.

Hannah Debelius: Great. Thanks so much. Ed, another example you'd like to add before we close out?

Ed Daniels: Well, I think what we're seeing is many companies are keenly interested in integrating end-of-life issues through their design process, certainly much more so than was evident as few as five to ten years ago. I think that the packaging industry is somewhat at the forefront of that because there's a lot of focus on packaging, and what we do with packaging, and why packaging is so complex.

I think there's a lot of innovation that's gonna be coming into the marketplace with regard to how packaging is designed to ensure that it is not a burden on the environment. But first and foremost, packaging is designed to meet a specific need for a product and that is you have to continue to meet those needs.

It's a complex issue, but there's a lot of people that are focused on this these days.

Hannah Debelius: Yeah, absolutely. As a consumer just out in the world, I've seen some of those things.

Excellent. We can switch back to the contact information slide here. Again, I'd like to thank Kaela, and Erin, and Ed all for joining us today. And to all of our wonderful pilot partners. It has been a great time getting to know you all and learning from you over the last two years. I'm really excited to bring you all into the next

phase of the waste efforts, which will be the Waste Reduction Network.

Thanks so much and have a great rest of your day.

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