Episode Title: Biobased Product Regulation -- A Conversation with Kathleen M. Roberts and Richard E. Engler

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Richard E. Engler (REE): Yes. I mean, you've got wood, you've got crops, you've got seaweed, you've got algae.

Lynn L. Bergeson (LLB): Give me your seaweed, your wood, your fiber, your pulp.

Hello, and welcome to *All Things Chemical*, a podcast produced by Bergeson & Campbell (B&C®), a Washington, D.C., law firm focusing on chemical law, business, and litigation matters. I am Lynn Bergeson.

This week, I took part in a roundtable discussion about biobased products with my colleagues Kathleen Roberts and Dr. Rich Engler. Over the last several years, there has been a very significant trend toward the use of renewable biobased chemicals. Although these chemicals often have similar if not identical functionalities as non-renewable fossil fuel-based chemicals that they are intended to replace, there are a number of very significant regulatory challenges in the way these chemicals can be brought into the market.

In this conversation, we discuss what these commercial challenges are, why the U.S. Environmental Protection Agency (EPA) has in most cases premarket approval authority over the commercialization of these chemicals, and get down into the science of what exactly constitutes a biobased chemical. I am really excited to have Rich and Kathleen on this episode. Rich managed EPA's Green Chemistry program when he was at EPA and has considerable experience with identifying exactly what EPA focuses on when the Agency is in the position of reviewing biobased chemicals in the premarket approval process. Kathleen is Vice President of B&C Consortia Management (BCCM). In her capacity as Vice President, Kathleen manages the Biobased and Renewable Products Advocacy Group, also known as BRAG.

BRAG has, as one of its primary goals, aligning the regulatory framework for biobased and more traditional fossil-based chemical substances. Biobased chemicals are a really exciting and important field, and I'm very pleased to be able to share this conversation with you. So without further ado, here's my conversation with Kathleen Roberts and Dr. Richard Engler.

All right. We're talking today about one of my favorite subjects, that being biobased chemicals. We've probably all heard a lot about what biobased chemistry can do in terms of providing a more sustainable alternative to conventional fossil fuel-based chemicals. But we also know that biobased chemicals present a number of regulatory and legal challenges. So I'm going to ask you, Kathleen, to tell me what a biobased chemical is. And then, Rich, I'm going to ask you the same question, and then we can move into what some of the regulatory and legal issues are that caused you, Kathleen, to become Executive Director of the Biobased and Renewable Products Advocacy Group.

Kathleen M. Roberts (KMR): The first question was, "What is a biobased chemical? Or What is biobased chemistry?" In simple terms, because that is how I think, it really is a chemical that I view as derived from a sustainable source, so either plant sources, which is usually what we think of, or algae, and it is not a fossil-based or petroleum-based chemistry. Of course, we know that petroleum, and coal, and oil were all subsequently -- many, many decades and centuries ago -- plant based. But that is sort of the line that we draw here is derived immediately from a plant-based material versus petroleum-based. We know that for the members of BRAG, one of the objectives that most of the organizations that are part of us are looking to do is to identify those more sustainable sources, recognizing that petroleum accessibility is going to probably become more limited going into the future, and a lot of the stockholders are really looking for situations where a company is showing sustainability, so many groups are looking to develop chemistries that are biobased in hopes of replacing some of the similar chemistries that are petroleum-based. Rich?

REE: Yes, there are ways to measure biobased. There is an ASTM -- American Society of Testing and Measurement, that's what the ASTM stands for. But there's an ASTM standard where they measure new carbon: How has the carbon been captured from the atmosphere? Essentially CO2 being removed from the atmosphere by an organism, whether it's a plant or an algae, and then being incorporated into biomass, which then goes into the chemical supply chain. You can actually scientifically measure whether it's biobased or fossil, so if you've done some chemical transformation, you can still tell if the substance that you're making was made from a recent carbon source.

It's important to note that biobased chemicals aren't -- biobased chemicals, in general, are not novel. We've been using biobased chemicals for decades, centuries. Seed oils, vegetable oils like corn oil and soy oil, have been used as chemical feedstocks as well as food for decades. Ethanol was one of the first biobased chemicals. It was manufactured by fermentation of plant-based sugar or starch, so biobased chemicals have been around for a long time. What we're seeing now is a lot of novelty in biobased, for exactly the reasons that Kathleen mentioned. More and more manufacturers are looking to incorporate biobased chemicals into their supply chain, and so we're seeing innovation in the biobased chemical space, looking for new opportunities to make -- whether it's traditional things, like ethanol, or novel chemicals from a biosource.

KMR: So building on that, in an attempt to address your second question, Lynn, these novel sources -- as Rich said, we've been making chemistries out of corn and soy and other biobased sources for a while, but now we're looking at some novel approaches. Some of that's related to concerns with taking items that could be used for food and making chemicals out of it. There are parties that have raised some concerns with that. People are looking at all different types of plants, and even what would really be considered waste products, and seeing if there's a way that they can make some of these chemistries out of it.

It is that -- looking, investigation into these novel sources -- that has raised regulatory issues, because although these chemistries that are being developed, in most cases, are being developed to substitute in for an existing chemical that might be petroleum-based or even a plant like a corn or soy-oil based chemistry -- someone might be looking at a different source to make something equivalent. But under the regulatory scheme, that is under the Toxic Substances Control Act, or TSCA, those new novel sources in effect result in what EPA considers a new chemical. It's that new chemical situation that has raised regulatory challenges for the market.

We refer to it as the new chemical bias, which means that because EPA views it as a new chemical, it goes through review, which is certainly not a problem -- I mean that's appropriate -- but often what we see happening is that EPA may put some restrictions on this new chemical where the older chemical doesn't have those restrictions. That makes it very difficult for the manufacturer of the new chemical to get on the marketplace.

LLB: Got it. For those listeners who are just joining us, I want to make sure I understand. Many, many chemicals that are used widely in commerce and have been for decades are based on non-renewable fossil resources. More recently -- although certainly not right now -- biomass has been identified as a renewable, and perhaps more sustainable, feedstock for the development of a whole variety of chemicals. They can be used in lieu of fossil-based resources. These chemicals might serve the same functionality, but they are chemically different -- at least at one level -- and we want to park that thought off to the side.

I also want to speak to the point you raised, Kathleen, about some of the issues around biobased resources and how there might be controversies as to whether they are truly more sustainable. For example, you were probably thinking of corn, that a certain portion of the biomass from corn has been deflected into the chemical market, as opposed to perhaps using it for non-chemical production purposes. There are a whole host of sustainability issues that we're not going to talk about here related to that. The narrow topic that we wish to focus on is if you have a sustainable feedstock that is renewable and presumptively perhaps less toxic than a fossil feedstock, the U.S. chemical infrastructure and regulatory system treat them differently, correct?

KMR: Correct.

LLB: Before we get into the regulatory construct, Rich, perhaps you can help us understand how they might be similar yet different.

REE: There are a couple of examples I can use. One is in a petroleum refinery. In a petroleum refinery, crude oil goes in. It's reacted, it's distilled, it's separated. You end up with multiple petroleum streams, these different products that are different ranges of boiling point or carbon ranges. Those substances are identified by their carbon range or boiling point and the fact that they are from petroleum. If you had a biobased source that you could use and feed into that same refinery, the product that you got out would be the same carbon range, the same boiling point, but it would *not* be made from petroleum.

EPA views that as a different chemical substance, even though it may have gone through the exact same process, has the exact same characteristics in that final stream, petroleum stream -- or in this case, biomass stream -- product. EPA views those as distinct because the source of the substance -- the source of the carbon -- was part of the identity of the substance. So you may end up with chemically indistinguishable products, but because they started with different sources of carbon, they are different from a regulatory standpoint.

LLB: They really are the same though, right? It's just the source of the material is what is different, and the source is embedded in its name.

REE: Its legal name.

LLB: And so from a legal perspective, it's completely different.

REE: Right.

LLB: -- and considered perhaps in some instances new, and hence subject to regulatory limitations that don't apply to something that is considered not new or existing.

KMR: It may be worth jumping in here, for the non-chemists who might be listening or in the room -- like myself -- that when we're talking about the source name, we really are referring to what's called Class 2 chemicals. We know -- when we think -- when *I* think of chemistry -- in college, we had those little molecular structures that you put together. Those are for distinct -- called Class 1 chemicals -- where you can draw the molecular structure, so your acetone, your acetic acid, even your benzene. That's not what we're talking about as far as these source names.

For these source names, we're talking about a Class 2 material that isn't a distinct structure. It's a UVCB, which stands for unknown, variable, complex biological materials. Now we know why they go by UVCB. But the point is that as you're listening to this and you think "Source-based name? I've never seen that before." That's because, unfortunately or fortunately, depending on how you look at it, you have to get into the very deep weeds of chemistry and how EPA defines some of these chemistries that the typical man on the street may not be aware of. Sorry for that side note.

LLB: No, that's an important distinction that is probably overlooked by us mere mortals, but it sounds like, given the nature of the regulatory system and the public's growing demand, interest in providing sources of chemical products that are thought to be, and demonstrated to be, more sustainable, and renewable, that this might be imposing regulatory challenges on both manufacturers that are looking for renewable feedstock sources but also on the government, in terms of allowing these products into the market in a way that can be ensured they are safe and truly identical to that which they might be replacing. Correct, Rich?

REE: Yes, it's really about developing a level playing field. When you have a traditional source that's on the market, you bring in a novel source, and what you're making is functionally the same. You've got nearly identical, if not absolutely identical, indistinguishable composition. Because the source is embedded in the name, you end up in a different bin, in the new chemicals bin instead of the existing chemicals bin. Therefore, you end up being regulated differently under TSCA. And there's a different expectation upon EPA for looking at an existing chemical versus a new chemical. The real challenge is if you then derivatize that substance -- so you're using that as a starting material, and you make something else from that -- the source goes -- it becomes embedded in the name of the derivative as well. If you get further steps down the chain, that source name continues down the supply chain. At each step, you may have that source get embedded in the name, and if you change it from a traditional source to a new source, you have yet another new chemical notification and yet another opportunity for regulation.

LLB: You know what would be really helpful here is an example. Is there a specific example that you can offer our listeners to help everyone understand this source naming challenge?

REE: The example I like to use is corn oil. We're all familiar with corn oil; we've probably bought in the grocery store. If you take corn oil, you can chemically convert it to a number of things. You can convert it to biodiesel. That would be "corn oil fatty acid methyl ester" would be the name of the biodiesel that you make from corn oil. You can also make that corn oil into a detergent molecule that you might use in a hard surface cleaner, in a spray cleaner. Or you can take that corn oil and convert it and make it into a polymer. So you have these three different derivatives that you can make from corn oil.

If you then use soy oil instead of corn oil, and convert it into a biodiesel and you convert it into a detergent and you convert it into a polymer -- even though corn oil and soy oil are very similar compositionally, from a chemistry standpoint, EPA views those as different chemicals. If you then bring in a novel source -- like an algal oil, or even an oil that was produced by a microbe, where you took the corn oil gene and put it into the microbe because you want the microbe to make the corn oil instead of growing corn and taking corn oil -- those would be, again, new, a different biodiesel, a different detergent, and a different polymer. And so, in the supply chain, each one of the manufacturers of those downstream substances would have to say, "I've switched from corn to soy to algae. I've got now three different chemicals." They may be indistinguishable from a chemistry standpoint, but EPA views them as distinct.

LLB: Yikes. I'm sensing, from this discussion, that the regulatory burden that is triggered by changing the source material could pose some very formidable challenges to commercializing those products. In other words, we strive to embrace new products that are based on more sustainable renewable resources, and yet there seem to be regulatory burdens associated with that that could frustrate that objective.

KMR: Absolutely, and not just for the manufacturer, the top-level manufacturer of that material. They may choose to say, "We'll address the regulatory challenges, because we believe that this new product supports our sustainability goals, and we're going to move forward with it." But as Rich said, "Now I, as a new manufacturer, have this new product, and I try to sell it to Rich's company." Rich's company wants to change it, as he discussed. Because it's considered a new chemical, now *Rich* has to jump over that regulatory challenge of having *his* product go through new chemical review. If Rich chooses to do that, because, again, maybe it fits within his corporate structure or what have you, if he sells it to you, Lynn, you also pick up that burden. As it stands right now, we're being very -- we're relying on the value chain to sort of proceed in the sustainability avenue because it's the right thing to do. It *is* the right thing to do, but there shouldn't be these hurdles, these road challenges in front of us to go forward, and that's really what BRAG is looking to do, is to see if we can work with the Agency, work with parties that are developing these, and see if we can limit these regulatory challenges.

LLB: Let me push back just a little bit, because I recognize, based on my legal perch, that EPA, which is the federal agency that is in charge of implementing TSCA, which is a federal law -- none of this is state. It has a duty and responsibility under TSCA to ensure that all new chemicals that are brought into the marketplace are safe. There seems to be an underlying inference here that these chemicals that are based on different sources pose no human health or environmental risk. How do we know that unless EPA reviews each of these chemicals?

REE: In our view, EPA should have the opportunity to review the new source. So we have a -- if it's a new algal oil, EPA should look at the new algal oil. But if EPA looks at that algal oil and goes, "You know what? That looks just like the corn oil that we've seen in the whole supply chain of corn oil-based products that are already in place in industry. If the algal oil and the corn oil are indistinguishable, then the hazards associated all along the supply chain are indistinguishable because the composition is the same." So once EPA reviews the new substance versus the existing substance, they find that they're compositionally equivalent, then the hazard should be equivalent, and the associated risks anywhere in the supply chain should be equivalent.

LLB: Rich, that's an excellent point. It's a good place to pause now, because when we return to the conversation, we're going to talk about some of the organizational activities that BRAG is up to address exactly these regulatory anomalies.

Jason Bierfeldt: Just cutting in here to remind our listeners that B&C offers more than podcasts. For more information and to keep up to date on regulatory changes in the fields of chemical law, policy, and regulation, check out B&C's suite of blogs and articles. Everything can be found on lawbc.com. The site will show you how you can access our TSCAblog®, where we keep you up to date on all things TSCA. All right, back to the conversation.

LLB: Kathleen, I'd like to talk a little bit about the organization that you lead -- one of many, as part of your Vice President of the BCCM organizational structure. BRAG -- when was BRAG formed? How many members do you have? And can you give our listeners a sense of some of the advocacy activities in which you have been engaged in 2018 and where you're headed in the New Year?

KMR: I'd be happy to. BRAG's about four years old now, I think, and we've got about eight to a dozen different companies. Actually, BRAG is interesting because we have companies, but we also have trade associations that are part of BRAG, so groups that obviously have members that have interest in biobased chemistries recognize the importance of work that BRAG is doing, and so they are associate members. Then, as I stated, we have a number of companies -- small companies, international companies, U.S.-based companies -- that are part of the group as well.

Interestingly, when we first organized, one of the very first projects that we endeavored to pursue was trying to get, as Rich had mentioned before, sort of that regulatory even playing field for reporting under the TSCA chemical data reporting, or CDR. That's got nothing to do with new chemical bias, but under the CDR --

LLB: Is that a federal reporting requirement?

KMR: It is. It applies to chemical manufacturers and importers in the United States, and the reporting burden for diesel derived from petroleum was less than the reporting burden from biodiesel. When the group got together, it was in the midst of a CDR reporting, so that's probably why it was front and center to the members. But we scratched our heads and said, "This isn't right." We approached EPA, we submitted a petition, and we were successful in getting that petition granted. Now biobased diesel, or biodiesel, has the same reporting requirements or the same reporting burden as petroleum-based diesel. That was a great win. We were very excited about it, but certainly weren't satisfied. We knew that there were more areas where this uneven playing field, as far as regulations and burden, were out there, and so we really chose to focus on this new chemical bias that we've been chatting about during this podcast.

We have developed what we call our white paper that looks at this nomenclature issue -- which I think we'll be the first to admit is very complicated -- try to put it into some language that's understandable for an informed audience. I'm not sure that, for example, my mother could pick it up and really understand it. But for those in the regulatory circle, it does put everything into some perspective, and we've shared that white paper with EPA, and we plan to use it as a strong educational tool for other stakeholders that are in the biobased arena, and also for legislators out there who are interested in trying to support, as you stated, Lynn, this movement, this trend toward more sustainable chemistries.

LLB: You raise a very interesting point, Kathleen, that we have talked about in other of our podcasts, and that is, the U.S. regulatory system is not stacked against new chemicals, nor is it stacked against chemicals that find their source as a biobase or biomass source versus fossil resources based. My sense is that the laws and regulatory programs that we have in this country are a function of their origin and that part of our challenge as a community of industries and innovators is to help EPA identify opportunities where this field needs to be leveled. In other words, it isn't an intentional bias. It's just derivative of the world as we knew it in the '60s, '70s, and '80s, when many of these laws came into being.

One of the areas, Rich, that I wanted to explore with you is, as a 17-year veteran of EPA before you joined B&C, is the Agency aware of these instances of competitive imbalance, and how willing is the Agency to take the regulatory measures necessary to eliminate them?

REE: EPA is definitely aware. How willing EPA is to address them, I think, is a function of a number of things: priorities at EPA, the resources that they might have that they need to bring to bear to make whatever change is necessary, petitions from stakeholders, for instance, the BRAG petition on CDR, and other drivers that might affect how important it is that EPA take this on as a priority because it's definitely going to be some work.

I wanted to come back to your point about the system being a reflection of the time that they were implemented. In the '70s, when -- after TSCA was passed -- EPA recognized that there were these interchangeabilities among really oil sources so that the traditional vegetable oil sauces -- such as corn, and soy, and sunflower, and similar things -- EPA developed a nomenclature that is source agnostic. It's based on composition rather than where things came from. It's called the SDA nomenclature -- it's short for the Soap and Detergent Association nomenclature -- because it was the surfactant manufacturers for soaps and detergents that really used -- it would select among the various sources. That system is in place, and it's still available to people, but it's only available to the sources that were in commerce back in the '70s. So as we've progressed in the '80s and '90s, and really in late '90s, 2000s, when we're starting to see these other sources -- people really looking to novel biobased sources -- we see these new things coming to market, and they are not allowed into SDA nomenclature. The way the nomenclature system is written, it's limited to what was listed in the '70s. They're not allowed in, and therefore they're on the outside looking in from those preferred sources.

LLB: But why? That seems to be incredibly arbitrary if there are all these sources that could be added to this list. Was it intended to be a finite list, never to be expanded? Why can't EPA just say, "Look, let's develop a system that will enable *new* sources that are in abundant supply now to be added to that SDA nomenclature system." Why is that a big deal?

KMR: I think part of that, Lynn, is your comment earlier that EPA has the responsibility to make sure that they review all of these chemistries that might be coming from new sources. I think Rich had made the point that we're all supportive of that, that we want EPA to review these

chemistries that come in from new sources, and we hope -- and we firmly believe -- that in many cases, as part of that review, they're going to agree with us that these new chemistries from these new sources are equivalent to the old chemistries from the old sources. We hope that once the Agency has made that determination, whether they're added to the SDA list or not, that they will get the benefit of what the SDA -- the chemistries based on the SDA nomenclature have -- and that the further products downstream won't have to go through this new chemical review again; the Agency will recognize that those chemistries downstream are going to be equivalent to the downstream chemistries from corn oil, and therefore the new source doesn't have to be renotified over and over again.

LLB: Is it fair to say, Kathleen, that the proposal that you have circulated earlier this year in 2018 to EPA outlines an efficient, elegant, and simple process to make these equivalency determinations? And assuming that that is part of your proposal, could you help our listeners understand what exactly that process is?

KMR: I'd like to think that our proposal was eloquent and simple, but we do recognize that it's a new activity for the Agency, this idea of looking at something and determining whether it's chemically equivalent or not. We know that there are parties within the Agency that believe that -- For our audience members who may not understand, all chemicals have a Chemical Abstracts Service number or a CAS number, and that's equivalent to your Social Security number. So EPA would say, "If it's two different CAS numbers, it's two different chemistries," and we don't necessarily agree with that, so there is going to be I think some education, and discussion, and dialogue to get us where we think we need to go.

But as far as the process goes, we believe that we have an opportunity for parties -- hopefully through BRAG -- to submit to the Agency: "Here's a chemical that's currently on the industry -- excuse me -- on the TSCA Inventory that *is* available to market and be in commerce. And here's a new chemical made from a new source that we think is equivalent to that old one. EPA, we would like you to review it and tell us what you think." That is really what BRAG is looking to do in 2019, to come up with some of these case studies, some of these candidates to go to the Agency and let's test this out. We *think* it's doable. We *think* it could be easy, but we haven't pulled the trigger on it yet, because we are still looking for the industry to share with us some examples that they have that really fit the bill here.

Before I forget, I would say that the white paper, the proposal that we're talking about, is posted on the BRAG website, which is BRAGinfo.org, and would certainly encourage folks who are interested to go in and take a look at it. As I said, it may be a little technical, but it does lay out the regulatory issues, I think, very succinctly.

LLB: Rich, if you were back at EPA as a Ph.D. chemist reviewing the 10,000 or so PMNs [premanufacture notice] that you *have* reviewed, and as former Director of Green Chemistry at EPA, what would be some of the issues you would expect your colleagues to be a little dubious of, given this equivalency approach?

REE: There is a long-standing policy that UVCB substances are largely defined based on their source, so there isn't necessarily a policy shift for EPA to make these sorts of equivalency determinations. Now there is specific language in the Frank R. Lautenberg Chemical Safety for the 21st Century Act, which gives EPA authority to make equivalency determinations, and that's really what we're asking for here is for EPA to flex its new authority muscle. They're not obligated, but they are enabled. They do have the authority now to do that. We're looking for specific examples that we can bring in and say, "Okay, here are the two

products. Here's how we can demonstrate that they are 'the same.'" I put air quotes on "the same," because now we're looking at the constituents as opposed to the sources.

These things are indistinguishable from a chemical composition standpoint. Therefore, they should be indistinguishable from a hazard and risk standpoint, and therefore there is no discernible risk for allowing the new source in making the determination that the old source and the new source are equivalent. If I were still at EPA, I would be looking for that evidence of a compositional equivalence, and therefore I would be comfortable as a regulator making a regulatory equivalence determination, confident that there would not be unreasonable risk to health or the environment.

LLB: One of my questions that has long been talked about in some of our other podcasts is, what are some of the global implications of this? You can say, "What's in a name?" As you just said, Kathleen, if a CAS number is very similar to one's Social Security number, a name is very important, and it might define your identity.

Does this have trade implications? Would this invite global disorder in the naming of chemicals from a U.S., and European, and Asian perspective? Or is there a way this can all be harmonized to enable companies to both manufacture biobased chemicals here and also export them to other jurisdictions seamlessly?

KMR: I'm not sure that I could hang my hat on the "seamlessly," but I do know EPA is definitely viewed as sort of the leader in developing regulatory processes. Certainly we're aware that other regions will tend to look to EPA to see what they're doing. I know the UVCB nomenclature issue is being reviewed in Europe, and I can't purport to say that I know the answer that Europe has or what they will come up with. But within OECD -- the Organization for Economic Co-operation and Development -- there's still some discussion going on there, as far as nomenclature and how these reviews and equivalencies can take place. Presumably, if we're successful in getting EPA to recognize that this is a good, reasonable, scientifically based approach, that can be picked up under the OECD umbrella. We have the regulatory cooperation between U.S. EPA and the Canadian equivalent. Again, we would anticipate that there would be some dialogue between those two agencies as well. Will there be trade implications? I think there'll be global implications, but I think ultimately it will be to the benefit of the industry and not to the harm.

LLB: Wonderful. Rich, any thoughts on that?

REE: Yes. The issue in Europe under REACH [the European Union's (EU) Registration, Evaluation, Authorisation and Restriction of Chemicals legislation] is somewhat evolving. REACH is nominally a constituent-based regulation, so the European Chemicals Agency, or ECHA, wants to know what is in the product. It is somewhat source-agnostic. These are the carbon ranges in there; that's how the substance should be identified. As ECHA has been looking at more and more UVCB substances, ECHA has been asking for more information about sources. At least in some of the work that we've been doing with our clients, in some cases, we can be and are specific about sources, and in other cases, we are in fact nonspecific about sources because the client may use a variety of sources to make that same substance. Those identity rules are still being worked out as ECHA reviews the many, many chemical substances that went through registration in 2018. To a certain extent, those substances are ending up with new identities which *don't* match the U.S. identity. Then you have the case where the substance leaves the United States with one CAS number and arrives in Europe and gets a different CAS number. That baffles people, that the substance might change identity while it's on a ship. But the fact of the matter is that different

countries have their own nomenclature systems, so you very much may have a different number in different regions. To the extent that we can move away from that and go back to these more source-agnostic identities, I think there will be a much more efficient transfer among the various countries.

LLB: Understood.

Kathleen, as we're wrapping up here, is there a point or two you'd like to add for our listeners as we move into the new year and what your regulatory priorities are?

KMR: I would be remiss if I didn't do a callout for new members. BRAG is always looking for new members. Again, as mentioned, we have company members, we have trade association members. As people are listening to this and recognize that perhaps they have a stake in the biobased discussion, we'd like to have you as part of our group. Certainly let us know -- again, BRAGinfo.org -- you can contact us that way. But we are looking to address this chemical equivalency issue in 2019. We'll be focusing heavily on it, and the more parties that are part of our group, the more examples we'll have for the Agency, and also I think just the louder our voice will be within the Agency.

Rich, I think we talked a lot about plant sources, and we even spoke a little bit about algal sources, but those are not the only biobased sources. It would be nice if you could point out what else is out there that could be part of our group, and *should* be part of our group.

REE: Yes. Biobased is really making something from any biological source. It could be woody biomass, so it might be sawdust that's left over from a lumber mill; it might be waste from a papermaking process; it might be corn stover, as well as the actual crop. It might be algae that's intentionally grown on a racetrack in Arizona, or it might be algae that's harvested, it might be seaweed. Anything that's grown that has a chemical -- or that has carbon that can be converted into another chemical -- is a potential biobased source. Even waste cooking oil is a biobased chemical -- that waste cooking oil might be used corn oil, but it's not corn oil anymore. It's waste cooking oil, and that has to go through the process and has to be reviewed. Really, if your company is considering manufacturing from any of these sources, or buying a supply from someone who's making a chemical from one of these sources, you're probably affected by these regulatory issues that we've been discussing today.

LLB: Wonderful. Kathleen, thank you. Rich, thank you.

REE: Always a pleasure.

LLB: This has been a fascinating discussion on ways to optimize any biobased material and turn it into something that will make the world a more sustainable place. Thank you.

KMR: Thank you.

LLB: Thanks again to my colleagues, Kathleen and Rich, for speaking with me today. I hope our listeners took away something about the exciting and challenging field of biobased chemicals. If you wish to learn more, check out our website at www.lawbc.com, where you can find a lot more information on this topic and many other subjects.

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