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CALIFORNIA ENERGY COMMISSION

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COMMISSIONER WORKSHOP ON NEAR-ZERO VEHICLES AND LOW-CARBON FUELS

REMOTE VIA ZOOM

Session 1: Near-Zero Emission Vehicles and Biomethane

WEDNESDAY, JULY 29, 2020

10:00 A.M.

Reported by:

Martha Nelson

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AGENDA

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P R O C E E D I N G S

10:00 A.M.

WEDNESDAY, JULY 29, 2020

MS. RAITT: Good morning. It's ten o'clock we'll go ahead and get started.

Welcome to today's IEPR -- oh, excuse me -- to today's Workshop on Near-Zero Emission Vehicles. Excuse me. I'm having a technical problem. I'll be right with us.

I'm Heather Raitt, the Program Manager for the Integrated Policy Report, which we refer to as the IEPR. Today's workshop is being held remotely, consistent with Executive Orders N-25-20 and N-29-20, and the recommendations from the California Department of Public Health, to encourage physical distancing to slow the spread of COVID-19.

Instructions for attending or participating in the meeting were provided in the notice and include both internet and call-in options. The notice is available on the Energy Commission's webpage.

We're broken this topic into two sessions in an attempt to lesson technology fatigue and encourage participation. This morning's session

is on near-zero emission vehicles and biomethane. And session two starts this afternoon at 2:00 p.m. and will focus on liquid low-carbon fuels.

This meeting is being recorded. We'll post a recording and written transcript on our website. Also, today's presentations have been posted on our website.

We'll be taking a poll later today to better understand who is attending.

Also, attendees have the opportunity to use the Zoom Q&A to pose questions to the panelists, discussing the near-zero vehicles and biomethane. So to do that, attendees may type questions for panelists by clicking on the Q&A icon. And before typing a question, please, check to see if someone else has already posed a similar question and, if so, you can click the thumbs-up to vote on it. The questions with the most thumbs-up clicks are up-voted to the top of the list.

And then we'll reserve about five or ten minutes at the end of the panel for the attendee Q&A. And so, given time restrictions, we're unlikely to elevate all questions received. Also, we will not be taking Q&A for the first

presenter, only for the speakers on the panel.

So now I'll go over how to provide comments on the material in today's workshop. There will be an opportunity for public comments at the end of the session, so that will be a little after the noon hour. You can click the raise-hand icon to let us know you'd like to make a comment. And if you change your mind, you can click it again and your hand will go down.

For those on the phone, press star nine to raise your hand and we'll open your line during the public comment period.

Alternatively, written comments after the workshop are always welcome and they're due on August 19th at 5:00 p.m. And, again, the meeting notice provides all the information for providing written comments.

And then with that, I'll turn it over to Commissioner Monahan for opening remarks.

Thank you.

COMMISSIONER MONAHAN: Great. Thank you, Heather. So welcome, everybody, to our virtual IEPR workshop series. Today, as Heather noted, we're going to be focusing on near-zero emissions, fuels and vehicles. You know, a lot

of our workshops so far have been focusing on program towards zero-emission vehicles and fuels. But this workshop is, I think, particularly important because we have a legacy fleet of vehicles that are highly polluting, especially our heavy-duty diesel fleet of vehicles.

And this workshop is really focusing on how do we both address the legacy fleet of vehicles and how do we, in a time when we don't have a large number of zero-emission vehicles, particularly for medium- and heavy-duty applications, how do we make sure that we are attentive to the opportunity to reduce pollution in the near term by switching over to, say, natural gas and biomethane-fueled vehicles?

So this is -- I'm really looking forward to this discussion. And I think it's undeniable that the Low Carbon Fuel Standard that California passed over a decade ago has really helped to accelerate investment in both drop-in fuels and just reducing the carbon intensity of the current set of petroleum-based fuels.

So this discussion, I think, will be, you know, the backdrop of how the Low Carbon Fuel Standard is already changing the carbon intensity

and complexion of the California fuel mix, transportation fuel mix, is an important grounding part of the discussion before we get more deeply into what the opportunities for both biomethane and liquid drop-in fuels.

So with that, I'll ask any of the other Commissioners -- let's see, Commissioner Douglas is present -- if you have any remarks, or if Commissioner McAllister is on the dais, as well, he's welcome to make any remarks.

COMMISSIONER DOUGLAS: Hi. Good morning. Commissioner Douglas here. I don't have any remarks, except to say that I'm looking forward to this session and the subsequent ones.

COMMISSIONER MONAHAN: Great. Thank you.

Well, let me then turn to our first speaker, who is Jeremy Martin. Jeremy is the Director of Fuels Policy and a Senior Scientist in the Clean Transportation Program at the Union of Concerned Scientists. He's also a former colleague of mine when I was at the Union of Concerned Scientists. Jeremy and I worked together on various fuel issues, including California's Low Carbon Fuel Standard, so it's -- I am particularly excited to have him provide

some opening remarks.

So Jeremy works on state and federal transportation fuels policy, lifecycle analysis, and he is focused on the intersection of transportation and fuels with energy and agricultural policy. He has a PhD from the Department of Chemistry and Chemical Engineering at the California Institute of Technology. And before working on fuels policy, he worked in research, development and manufacturing of computer chips.

So Jeremy has a wide range of skills and I -- to me, he's probably the most sophisticated thinker on biofuels and other transportation fuels in this that I've encountered, so I'm really looking forward to his opening remarks.

Jeremy, I turn it over to you.

MR. MARTIN: Well, thank you very much. And I guess we'll go to my first slide.

And, yeah, as Commissioner Monahan said, it's -- we're former colleagues. And, really, when I entered this work, Commissioner Monahan was a great mentor and, really, a leader in this work at UCS, so it's a great pleasure to present some thoughts to her and the whole Commission to

inform this IEPR process.

So this slide comes from a paper I wrote a few years ago, back in 2016, summarizing what I thought were, you know, the key things about the role of clean fuels in a low-carbon transportation future.

And really, I think, you know, two high-level thoughts I'd start with which, you know, a lot has changed since 2016 but I think these two things remain more or less true, you know, the first one was that clean transportation is basically about using less oil and using more renewable electricity and being smarter about how we produce and use biofuels. So biofuels are an important part of the picture and a tricky one that I'm going to talk about.

The other real top line message from this report, which I tried to summarize in this short figure, is, you know, a synopsis of 60 pages of our report in, whatever that is, seven bars is that the lifecycle really matters, so it matters what we make fuels out of, as well as what we make fuels into. And that has a big impact on lifecycle and so that's true for biofuels, it's also true for electricity and, indeed, it's even

true for petroleum-based fuels. So how they're produced, what goes into them, as well as what final fuels are produced is important.

So I'm going to talk about that a bit in my talk today but I'm going to start, you know, with the big picture perspective.

The next slide? Really, can we advance the next slide please?

So this is just the overall energy use in the United States over the last 70 years. And if you go to the next slide, you'll see that there was a period of about, almost exactly, 50 years in which we really had only one transportation fuel in the United States. All the fuels were made from petroleum, so more than 95 percent. And at the bottom you see a little natural gas there which is, basically, pipeline fuel, so not powering any kind of vehicles.

But that started to change in the next -- oh, we're already there -- with biofuels in the last decade or so -- I'm sorry, go back on if you could -- which now account for about five percent of transportation energy -- and I'll come back to that figure later, and so five percent is important to remember -- but -- so that's not a

huge amount. But, of course, it's the biggest change in our transportation fuel mix since the -- since my parents were children and the last of the coal-fired steam locomotives were being replaced with diesel locomotives.

Okay, so now we'll look at the California slide. So this is the data from the LCFS looking at the alternative fuel use in California, and we've zoomed in. We're not looking at the gasoline, diesel, jet fuel, just the non-petroleum fuels. And, you know, a decade ago, basically, we just had ethanol and a small amount of natural gas. But over the last decade, of course, we've seen growth in biodiesel and renewable diesel, biomethane. And just starting to come into focus is the role of electricity in the transportation fuel mixture.

So if we go to the next slide, I thought, as we look to the future, I should start with this view, which the CEC commissioned a couple of years ago from E3. So if we go to the next slide, so this exercise was to look at, you know, how to get an 80 percent emissions reduction in California. And, of course, with transportation being the largest source of emissions, it's a

major focus of emissions reductions over that time frame. The next slide looks through the fuel mix that they were forecasting. So this is just two years ago, basically, and you see almost a complete elimination of gasoline and some reduction in diesel but much more modest than the reduction in gasoline.

So if we go to the next slide, you know, the reason for that was that, you know, at least two years ago, when this report came out, the feeling was that, you know, especially in the heavy-duty space, really, zero-emission vehicles were going to be a minority of the fuel mix, the vehicle mix, so even out through 2050. And, you know, this was striking, as I was looking at it in the last week or so, because, you know, just in two years, I think, the perspective on what's a reasonable expectation has changed.

And so if you go to the next slide?

So I was really, I was thinking, struck by this idea that they often discuss in kind of political science and what there call the Overton window, right, that ideas have to move from being seen as unthinkable to just -- and sort of gradually enter the people's consciousness as

realistic, and that's necessary before policymakers are willing to embrace them. And clearly technology, like zero-emission trucks, were, just a couple years ago, not seen as plausible for the whole -- for most uses of heavy-duty goods movements. And now, in a short amount of time, that window, they've really entered the window of, you know, what I think the public starts to view as plausible and acceptable and, maybe, even popular on their way to being implemented as policy.

So we go -- and, of course, there's a lot of other technologies here which are kind of coming in and out of the Overton window over time. You know, maybe cellulosic biofuels are moving further out than they were ten years ago.

But -- so, anyway, let's go to the next slide.

So, obviously, what was striking to me is, right, this report came out in June of 2018 from E3. And just a couple of months later, you know, with the Paris Agreement and the Global Climate Action Summit in San Francisco, really, the bar was raised with the bills in the legislature focused on getting to zero in the

electricity grid, and the governor's executive order on carbon neutrality saying, we're not going to get to 80 percent by 2050 but to 100 percent by 2045 and, really, and get to negative after that.

So if we go to the next slide, so, you know, and of course that, soft of changing the terms of debate, made possible that. And, of course, process on technology and demonstration projects and support and, you know, tireless advocacy by my colleagues at UCS and many others, you know, helped us to push through, you know, this advanced clean truck rule and really went a lot further than seemed realistic a couple years ago, and really set us on a course towards 100 percent zero-emission vehicles by 2045. So this is in California

If we look in the federal context on the next slide the -- of course, we haven't put these things into regulation yet, but at least one house of Congress is really starting to think about what a more ambitious agenda on the climate would look like and, you know, talking about a zero-emission grid by 2040, 100 percent zero-emission vehicles in 2035, and trucks in 2040.

And something that, you know, for many -- for most of my career seemed implausible is really starting to put a federal Low Carbon Fuel Standard, you know, on the table as a direction we should be going.

And so I guess I'd say this, the Overton window for Low Carbon Fuel Standard and for a lot of technologies behind that have really been shifting fast and things are seeming, not just sort of theoretically possible, but even plausible and smart. So big changes recently.

So if we go to the next slide, so what does that mean for, you know, for the clean fuels please for near-zero; right? Because I guess, to put this very succinctly, I'd say, you know, the thinking now is perhaps we can cut the petroleum fuel use in half by 2040, cut it in half again by 2050, so something like 75 percent of current transportation energy could be replaced with renewable power and hydrogen by midcentury, so that still leaves us, you know, 25 percent left.

Even with this very, very ambitious goals for zero-emission vehicles, we still need 25 percent of the transportation energy, kind of current

levels of transportation energy, to come from some other kinds of low-carbon fuels. And I mentioned before, like, currently, biofuels account for five percent of transportation energy, so 15 percent is five times more than we have now.

So even -- I think the point I wasn't to stress is that even when we set really ambitious targets for zero-emission vehicles, that still leaves a big space where we need other low-carbon fuel options to fill in. And, you know, I picked 75 percent. You know, it could be 85 percent. With 12 percent of jet fuel, I don't see how it could be much more than 85 percent. You know, maybe if your estimate is at 65 percent but the point is it's several times the amount of low-carbon fuels that we have today and, also, a different set of fuels than we need today.

So let's go to the next slide.

So I'm going to kind of go back and forth to versions of this slide for a little bit now, which is a very coarse kind of thought about the lifecycle, really thinking about, you know, what are the feedstocks we need to produce fuels and what are the different fuels we need to produce

over -- and I'm going to draw lessons from the last decade and really think about the implications, you know, with the targets for 2050 and what that means for the interval in between, the next 20 or 30 years.

Yeah, go to the next one.

So the largest source of biofuels by far today is corn grain ethanol.

Go the next slide.

Of course, that is mostly used as 10 percent ethanol. And that came on fairly quickly, right, btw 2005 and 2010.

Next slide.

And, of course, to make all that ethanol, we needed a lot more corn. And so, if we go to the next slide, that corn was far -- growth of corn demand was far in excess of growth in yield. And so if you look here, this is the number of acres planted into corn each year in the United States. And, you know, prior to the E10 transition in about 2005, we were less than 80 million acres, generally. Since we've been at E10, we've been above 90 million acres. And we can't just keep adding 10 million acres of corn planting every few years. So, clearly, this

strategy, this kind of process that we went through then, isn't a repeatable strategy to power transportation.

Go to the next slide.

But -- so I think we need to take that lesson and sort of live within the footprint of the agricultural system that we have but there's still a lot of opportunity to make bigger emissions reductions within that footprint, and we've seen that already in the Low Carbon Fuel Standard. We've seen, you know, more efficient ethanol producers that can reduce emissions by 20 percent compared to a typical ethanol facility. There's an application out for comment right now in the Low Carbon Fuel Standard for carbon capture and sequestration at an ethanol plant which would lead, in some cases, to carbon intensities of less than 40 grams a megajoule or 60 percent lower than gasoline.

And there's more opportunities by improving farming practices so that we can lower the carbon intensity of the feedstocks going into biofuel production. And even, as we use less gasoline, to think about using the ethanol that we have more efficiently in ethanol blends that

can make cars more efficient.

So I'm going to leave this here. But the point is that there are key opportunities within the existing footprint of ethanol and corn and to continue to make progress and deliver much bigger climate benefits from the same fuel source.

Okay, next slide please.

So the other big source of what I'll call sort of commodity agricultural products going into biofuels, this is most of the biofuels we have today, are vegetable oils and second-use oils and fats, and those are being made into the bio-based diesel fuels and sustainable aviation fuel.

Next slide.

So most of the biodiesel today is -- more than half is made from soybean oil. And if you look at the share of soybean oil production in the U.S. going to biodiesel, it's gone from nothing to about a third in 20 years. Again, obviously, this is not a sustainable trajectory. We can't keep increasing the use of soybean oil. It's particularly concerning because when you take soybean oil out of food markets, it's

probably replaced, not with more soybean oil, but with palm oil, which has a lot of negative climate impacts associated -- from associated deforestation in Southeast Asia, so that's not a good strategy.

Next slide.

So in California, as you'll probably know, most of the biodiesel is not made from soybean oil, it's made primarily from these secondary fats and oils, distilled corn oil, tallow, used cooking oil. And with the exception of a small amount of the used cooking oil, most of this is not -- these are secondary products and that's preferable to using the food-grade vegetable oils, but they weren't waste products; right? They were going into animal feed, or soaps and detergents, or other products. And, so, and moreover, that resource is not scalable; right? California is now collecting these secondary oils and fats from all over the country and all over the world. And 90 percent of what's produced in California is coming from elsewhere.

So, particularly, as I think about, you know, how would we build on California's policy in other states or in a federal Low Carbon Fuel

Standard, like, clearly, we can't just expand the amount of -- we can't see the same rate of secondary oil and fat use in the country that we do in California because there just isn't an adequate resource to supply that.

So next slide.

So I'll just, very briefly, comment on sustainable aviation fuel. I mean, from my perspective, if you're thinking about what you make fuels out of and what you make fuels into, sustainable aviation fuel is, generally, made from the same feedstocks as renewable diesel. Often, it can even be made in the same facilities in very similar processes with hydrotreating. So, really, that's one pool as far as I'm concerned. And the limits on the feedstock availability are limits that apply to both.

So there's, you know, a decision about, you know, which is the priority. And I think, you know, if you can air quality co-benefits that are greater for one than the other, that would be a good way to decide, but there's a limited ability to scale all of these commodity ag product-based biofuels over the future.

So let's go to the next slide.

Oh, yeah, and I just wanted to say, so this is sort of where we are now, right, mostly ethanol, a bit of the biodiesel, and very small amounts of carbon removal entering the picture.

If you go to the next slide?

You know, I think where we want to head is, you know, I think there's a continued role for ethanol but there's -- obviously, the demand drivers for renewable diesel and sustainable aviation are larger. And so, you know, thinking about, how do we shift the balance, kind of within the same footprint, towards those fuels is one key strategy. And the other one is really to emphasize, how do we put carbon removal into these pathways, so we get more climate benefits from the same sort of footprint of agriculture in the same set of fuels? Okay, next -- or feedstocks.

So now I wanted to say a little bit about biomethane, and it's coming from these waste sources, manure, wastewater treatment, landfill gas.

Go to the next slide.

This is from a fact sheet my colleague, Jimmy O'Dea and I worked on a few years ago,

really highlighting that, you know, it's a good idea to capture waste methane and use it to displace fossil natural gas and -- but there's a very limited potential supply of these waste biomethane sources, particularly compared to, you know, the amount of natural gas we use.

In the next slide, we look at the natural gas consumption by sector in California and, you know, a very small amount of it is used in vehicles. And from my perspective, given that we have a limited ability to displace fossil gas with the same carbon renewable gas, it makes sense, over time, to think about prioritizing the far-too-deep carbonized. Industrial applications, I think, are the hardest to decarbonize.

Interestingly, some of those industrial applications are actually in -- what would be classified as industrial operations are actually in the transportation fuel supply chain; right? So using hydrogen, whether that's to power fuel cell vehicles or at oil refineries, using renewable natural gas in ethanol facilities in place of fossil natural gas, you know, these are applications where natural gas could be replaced

with renewable natural gas. And I think those are valuable ones, in addition to the sort of more obvious use directly as a transportation fuel.

Next slide please.

The last thing to highlight here is that, you know, one of the -- of course, the lowest carbon score is assigned in the LCFS, which is dairy and agricultural biomethane and that's because it's a strategy to avoid methane emissions from agriculture, and we can do that while displacing fuel, so that's good. But it's important to sort of not let that get ahead of the sort of most important variables that we should think about when we're thinking about our food systems and really making them sustainable. Mitigating methane is an important part of that but it's by no means the only part. So making sure we have, you know, good and healthy food and that it's safe for the workers and good for the environment in the places where it's produced is, also, you know, I think a key part of making sure that biomethane is a productive strategy and not a problem.

So let's go on.

So just to wrap that up, sometimes we see much larger estimates about how much biomethane is possible, which mostly rests on a view that you could convert biomass to biomethane through the gasification processes. I'll talk about this.

I'm skeptical about this for a couple reasons. One, is that, you know, particularly with ag, I mean, the idea of taking a powerful greenhouse gas pollutant and turning that into an opportunity to displace fuel doesn't really apply when you don't have a methane-based source to begin with. And the second thing is that there are other opportunities for using biomass that I think may be more valuable than turning it into biomethane.

So let's go on and I'll talk about biomass.

Oh, I'm sorry, before I do that, just to wrap up, right, so using biomethane to displace fossil methane is a useful strategy. Even better, if we can kind of do that into low-carbon fuels where we can get the emission benefits, tailpipe emission benefits, as well, and if you can combine -- build carbon removal into that

system, you know, I think that's where you really get the highest and best kind of outcome from this waste resource, as well as mitigating the emissions on the front end.

Next slide.

So, lastly, I want to make a few comments about biomass. Today, we make a little bit of electricity from biomass but it's really the future where biomass looks like it has a bigger role in transportation and decarbonization.

Next slide.

So on the next slide, I thought this report, that came out recently from Livermore, is very instructive at really highlighting the importance that biomass can play in carbon removal. And this is a long report. There's lots of good stuff in here and I don't have much time.

So I'll just, in the next slide, pull out, you know, kind of the key summary and highlight that when they looked at, you know, the best opportunities to use California-based biomass to maximize the climate benefits of it, it was really targeting a zero-carbon fuel, like hydrogen, and adding that to carbon removal. And

when you do that, of course, you both get the transportation energy source and you get the negative emissions which, I think, over time become really valuable.

So next slide.

I think I'm not staring at a clock but, oh, yes, but I'm running out time, so I'll just quickly wrap up.

I think, you know, for biomass targets, from my perspective, the best long-term use is zero-carbon fuels and carbon removal. That coupling is a really powerful one. But there are going to be places where these hard to decarbonize fuels, like aviation fuel or certain applications for distillate fuels, would also make sense. And, probably, the logistics will be kind of key to figuring out which is the best option in any given circumstance, right, if you have access to a hydrogen pipeline or if making a liquid fuel works out better logistically.

Next slide.

So this is just, you know, all the pathways that I see in the future. I'm not going to repeat them, just to say that, you know, I think we want to be headed towards these zero-

carbon fuels and carbon removal, but there's certainly a wide variety of applications that make sense as we head in that direction.

Next slide.

This a few things I did not talk about. I'll call them more exotic things, so, you know, using what's called green hydrogen or power-to-liquids or power-to-gas, direct air capture just to do carbon removal, all of these are interesting technologies from a long-term perspective, but I'm just, I'm happy to comment on any questions, if you want, but just to acknowledge that they're there.

Next slide.

So just to close, you know, my view is that, in the long term, renewable power is really the primary strategy for clean transportation but low-carbon fuels have an important role to play, both for the legacy fleet but also for hard-to-decarbonize sectors and to really capture decarbonization opportunities over the long term.

With those low-carbon fuels, as we think about how to prioritize them, it's important to look for opportunity to steadily reduce carbon intensity, target them towards the harder-to-

decarbonize applications, you know, build carbon removal into the supply chains, and really keep an eye on, you know, where the feedstocks are coming from and whether those fuels are having a, you know, work, support sustainable agriculture and forests so that we don't have any bad outcomes while we're trying to decarbonize our transportation sector.

So, anyway, that's my summary. And I'm happy to answer any questions.

COMMISSIONER MONAHAN: Okay. Thanks Jeremy.

Commissioner Douglas, if you want to join me on the dais, you're more than welcome. I think we have about ten minutes, is that right, Heather, for questions from the dais? I'm going to assume that's the right amount. Heather, you can tell me if that's not right.

MS. RAITT: Oh, you're right. Sorry.

COMMISSIONER MONAHAN: So, Jeremy, can you walk us through the carbon sequestration? What does that look like for biofuel?

MR. MARTIN: Sure. What -- I mean, well, so right now what see in the ethanol production already is that there's, in these fermentation

processes, there's sort of pure CO2 emitted in reasonably large quantities now; right? So capturing that is just one of the most cost-effective places to do CO2 capture for sequestration.

So I think -- and really, when you think about carbon removal or what's sometimes calls, you know, BECS, bioenergy carbon capture and storage, I mean, you want a sort of low-carbon source of biomass. And then if you can sequester that, you're doing carbon removal. And then so I think --

COMMISSIONER MONAHAN: Is there any -- are there any programs? Like are there any projects happening, either in the U.S. or globally, to sequester that carbon?

MR. MARTIN: Yeah. Absolutely. Well, so, you know, one of the big pilot projects was at an ethanol plant in Illinois. But, actually, there's this application in front of CARB right now, just for final comment, with Texas ethanol plants working with Oxy to do carbon sequestration from ethanol production. And that will reduce the carbon intensity of the ethanol down to, you know, around 40, plus or minus,

grams a megajoule. So that's already happening --

COMMISSIONER MONAHAN: And why --

MR. MARTIN: -- and there's lots more --

COMMISSIONER MONAHAN: -- why is it, so, Jeremy, why is it that we can't do it from a coal-fired power plant, but we can do it from an ethanol facility? Like what makes the economics work out better?

MR. MARTIN: Oh, well --

COMMISSIONER MONAHAN: Or is that outside of your expertise?

MR. MARTIN: No. No. There's two big reasons.

I think one is that a coal-fired power plant has, you know, a diluted CO2 in the exhaust and so you have to separate the CO2 from a lot of air, and then that's a lot of work, where the CO2 coming out of the ethanol distillation is pure CO2 that requires -- doesn't have to be separated from air.

So that's the kind of fundamental and scientific thermodynamic reason why it's so much easier to do it at an ethanol plant.

I mean, the other one is, I think, you

know, if you have a marginally cost-effective source. I mean, it may also be that in the power sector, right, replacing coal with a low-carbon source, you could go to a lot of trouble to take some of the carbon out of the CO2 exhaust of coal. And when you're done you still have a positive net emission and a relatively high expense where -- so -- and you have good alternatives in renewable energy that are cheaper to achieve even lower carbon results.

In the transportation side, you know, you have harder-to-replace fuels, higher costs, you know, higher priced products, and an easier to capture CO2. So I think that there's both kind of economic and technical reasons why these opportunities in the fuel supply chain are really emerging as, you know, kind of more prominent and more promising than some of the power sector ones which people paid more attention to a few years ago.

COMMISSIONER MONAHAN: And can you walk us through what it means that other states and the federal government may be adopting a Low Carbon Fuel Standard? What will that mean in California if that happens?

MR. MARTIN: Sure. So, I mean, I think when we think about -- there are certain technologies where having more people enter the field lowers -- you know, gives you benefits of scale and lowers cost. But in other technologies where the fundamental economics are driven by, you know, a scarce feedstock or resource, you know, then having more people enter is going to, you know, obviously mean that there's not as much to go around.

So I think that's where, you know, we definitely have some underutilized resources. And, you know, there's a lot of opportunity on the, you know, on the biomass-based fuels and biomass. And that's a resource which has not been heavily tapped yet.

I'd say, on the biomethane, there is some more opportunity but it's not -- it's, by no means, unlimited. And so as you have more states or the whole country looking for it, the scaling of that will be more limited.

And then in the vegetable oil-based space, I think that's where there's a really constrained supply. And so, you know, particularly with those, you know, kind of

renewable diesel, biodiesel, the sustainable aviation fuels, we really need to get those to new feedstocks before they can scale on a broader level for the whole country because there's just not that much used cooking oil and animal fats in the marketplace beyond what we're using now.

COMMISSIONER MONAHAN: Commissioner Douglas, do you have some questions for Jeremy?

COMMISSIONER DOUGLAS: Maybe just one or at least one.

So, you know, I might have just missed this in your presentation, but when you -- you know, what do you see as prospects for fuels from wood waste? Because we've got a lot of it here in California --

MR. MARTIN: Sure.

COMMISSIONER DOUGLAS: -- and it causes us a lot of challenges.

MR. MARTIN: Yeah. I mean, I think that's -- I think finding ways to make efficient use of the wood waste to get climate mitigation is a really valuable opportunity.

I guess the question, in a way, is that there's -- well, so the first question is as we think about taking that out of the forest, you

know, that often creates a lot of controversy and skepticism about can it be done in a way which is really good for the forest and not, you know, just maximizing the extraction for the purpose of use? So that's not my expertise. But clearly, you know, to have that be a positive project, making sure that that's a priority and that the removals are, you know, advancing the sort of health of the forest is critical.

COMMISSIONER MONAHAN: Um-hmm.

MR. MARTIN: But then when you take it out the question is, you know, you've got people saying, well, we can gasify it to make biomethane. You've got people saying, oh, we can make it into jet fuel, or we could make it into electricity and do carbon capture, hydrogen. And you can't do all of those; right?

I mean, at the moment, it's an underutilized resource. But when you look at people's roadmap for 2050, you've got sort of at least four groups that sort of want all of it, and they can't all have all of it.

So you know, from my perspective, in the long term, you know, if we can get all of the carbon sequestered, then that's the maximum

climate benefit. And so that points to, you know, using it towards zero-carbon fuels, like hydrogen or electricity. But, you know, but we -- but I think the liquid fuels also have a reasonable -- I mean, you know, there's going to be some demand for liquid fuels for quite a while, so if those pathways work out better.

I mean, this long report from Livermore, you know, did justice that I don't have time to do, or probably expertise at the moment but, right, like if you want to sell the hydrogen, you need to be -- have proximity to a hydrogen pipeline and those aren't there now. So, you know, if you want to get started on this project now, hydrogen is not the appropriate target today, depending on logistics.

And so it may make a lot more sense to do something where you get a high value and media that you can transport better. And so I think there's a lot of opportunities for liquid fuels in that regard because they're more transportable.

So I guess I'd support, you know, especially towards developing those supply chains that make good use of the resource and, you know,

get started with that now. And if liquid fuels are the growth area now, then by all means, let's do that. But let's look for opportunities to capture CO2 because there's almost always CO2 that comes out of the liquid fuel production process, a portion of it. And then over time, you know, can we capture more of it

?

So, I guess --

COMMISSIONER DOUGLAS: Okay.

MR. MARTIN: -- does that make sense?

COMMISSIONER DOUGLAS: Sure.

MR. MARTIN: Okay.

COMMISSIONER DOUGLAS: You know, one more question, and I think that's -- you know, one more.

The other question I have, you mentioned briefly how the industrial sector can be a particular challenge and might be a place for some more specific strategies. And I just wondered if you could elaborate a bit on that?

MR. MARTIN: Sure. Well, in some way -- well, it's interesting, because when you start talking about the lifecycle of fuels, I mean, actually, the lifecycle of oil is what's

happening in refineries and in oil fields, and those emissions are usually classified as industrial sector emissions. In fact, you know, refineries are a pretty big piece of the industrial sector. And of course, when we're talking about carbon capture and ethanol plants, those are industrial sector sequestration; right? So -- and so, actually, even if you're using biomethane, you could use it as a transportation fuel in a CNG-powered truck, but you could also use it to replace fossil natural gas that's going into the fuel supply chain in those other areas.

So I think that's the -- so I think there are these key areas in the fuel supply chain which are already a part of the industrial sector and are opportunities to, you know, use a renewable source to replace a fossil source for biomethane, the implement carbon capture and carbon removal in those pathways. And I think with that learning from there, that we can then think about, you know, in parts of the supply chain which aren't focused on transportation, like making steel or concrete or something --

COMMISSIONER DOUGLAS: Yeah.

MR. MARTIN: -- you know, hopefully there

will be some lessons learned from making gasoline and ethanol that we can implement there, both in terms of policy and in terms of technology.

COMMISSIONER DOUGLAS: Okay. All right. Well, thank you. I think those are my questions for now.

COMMISSIONER MONAHAN: Great.

Jeremy, we just have one last question. And, actually, it's coming from the Q&A. It's a popular one, ironically, also from a former Union of Concerned Scientists staff person, Julia Levin.

So there's a question about the Lawrence Livermore National Lab report --

MR. MARTIN: Um-hmm.

COMMISSIONER MONAHAN: -- which found that California could generate about 4 billion GGE of methane -- or biomethane per year. And that's looking at the technically available and sustainable organic waste feedstock.

MR. MARTIN: Um-hmm.

COMMISSIONER MONAHAN: Do you have any comments on that finding which, you know, seems more ambitious in terms of the amount of biomethane that could be generated sustainably?

MR. MARTIN: Sure. So I don't have the details at the tip of my fingers but, broadly speaking, I'll make a couple comments.

The first one is I suspect that that's -- I mean, that taking this broad definition that I commented on briefly, right, where you're not just talking about the sort of waste methane that's coming from landfills, water treatments and agricultural operations, but also looking at all of the available sources of biomass and imagining gasifying those to make biomethane. So I'm pretty skeptical about the value of that. Biomethane -- I mean methane's a potent greenhouse gas pollutant. Methane is not a particularly valuable transportation fuel. And you know, I think biomass has a lot of other opportunities.

So, to me, I look at that biomass resource and say, you know, I'd prioritize either making it into the things like aviation fuel and diesel where we clearly have demand that's going to be impossible to meet from like the waste oils and fats, or making it into zero-carbon fuels and capturing all the CO2.

So you know, the report goes into lots of

scenarios and, certainly, making biomethane is one possible path forward. But I think what they found is, you know, if you make hydrogen, you can capture all the carbon. If you make methane, you capture some of the carbon and then you release a bunch of it when you burn it.

So, yeah, it's certainly possible if you devote biomass to that purpose to make some more. But in my -- from my perspective, that's -- it's not at all clear that that's a wise use of that resource.

COMMISSIONER MONAHAN: Great. Well, thank you. I think we're at time. So, Jeremy, really appreciate your expertise in giving us this grounding introductory session for the rest of our workshop, and so thank you.

And I think I'll pass it now over to Heather, who is going to help introduce our panel.

MS. RAITT: Yeah. Thank you, Commissioner.

And thank you, Jeremy.

And before I go to the panel, we will just do a quick poll, just we wanted to get a better sense of who is in the audience today. So

if you could just take a moment to look at that and give us sort of the answer that best describes the type of organization you represent or if you're representing yourself, of course, we'd like to know that too. And we'll just wait, just give it a few seconds, and we'll close out the poll in about ten seconds here.

(Whereupon a Zoom poll is taken.)

MS. RAITT: All right, I guess we can close there.

So we got about half the people who participated. Thank you for everybody who answered. And it looks like we have a pretty good diversity of representatives, but mostly from the utility and energy service providers. So thank you, everybody, for participating. It just helps us to get a better sense of who is joining today.

And so with that, we'll move on to our panel, and it is on near-zero vehicles and biomethane. And it is being moderated by Tim Olson from the California Energy Commission. And Michael Comiter will help moderate the Q&A from attendees.

So go ahead, Tim. Thanks.

MR. OLSON: This is --

MS. RAITT: There you go.

MR. OLSON: -- this is Tim Olson. (Indiscernible) an Advisor, Policy Advisor, for the Fields and Transportation Division (indiscernible).

MS. RAITT: Uh-oh. Tim, your sound is off.

MR. OLSON: (Indiscernible.)

MS. RAITT: Hmm. Maybe I should go ahead, and I'll give you another chance here.

MR. OLSON: (Indiscernible.)

MS. RAITT: So it looks like Tim is going back to computer audio.

Well, maybe I can just go ahead, and we'll just go to our first presenter, if that's okay?

So the first presenter is Doug Patteson from the California.

MR. PATTESON: Good morning.

MS. RAITT: Good morning. Thanks Doug.

MR. PATTESON: Can you hear me okay?

MS. RAITT: Yeah. That sounds great, Doug. Thank you. Go ahead.

MR. PATTESON: Great. I'm Doug Patteson.

I'm a Supervising Engineer with the Central Valley Regional Water Quality Control Board. The Central Valley Region is one of nine regions in the state. We are overseen by the State Water Resources Control Board. And our mission is to protect water quality from discharges of waste.

Next slide please.

The greatest issue in the Central Valley, at least the greatest acute issue, is nitrates in groundwater. There are a lot of sources of nitrate in groundwater, municipal wastewater treatment plants, septic systems, industrial and food processing, as well as agriculture, including animal agriculture.

Next slide.

A six-year study done by a representative monitoring program found that there were elevated nitrate concentrations above drinking water limits at all monitored dairies, kind of confirming that dairies are a significant contributor to nitrates.

Next slide.

The Regional Board regulates dairies by permit. The first permit was issued in 2007. Prior to that there was a state regulation called

Title 27 that had some general requirements for confined animal facilities, but the first dairy permit was in '07. It has requirements for ponds, including a requirement for pond liners for new or expanded ponds. But many -- most of the ponds that were existing prior to 2007 are not lined.

But more than 90 percent of the nitrate flux to groundwater is from land application areas where manure is applied to crop land. The Dairy General Order has requirements for land application areas to manage manure so that the uptake of nitrogen is maximized and leaching below the root zone of crops and, eventually, to groundwater is minimized.

The Regional Board intends to revise the General Order to improve management practices or require improved management practices. That order is currently under petition and being reviewed by the State Water Board. We anticipate that they will issue an order addressing the regulation of dairies. And we will coordinate our revision of the Dairy General Order with that.

Dairies that have digesters that only

accept manure from the dairy can stay under the Dairy General Order. And with or without a digester, there are the same water quality issues. Digesters are a benefit to air quality, for sure, but they don't really increase nor decrease the threat to water quality from the dairy.

In 2010 the Regional Board adopted a dairy digester order that allowed for the addition of other substrates to enhance biomethane production. It has -- that Digester General Order has, potentially, the same requirements for the dairy operations as the Dairy General Order does. But substrates, when there are added, can increase the salt and, in some cases, nitrate loading.

Next slide.

In 2006 the Regional Board began an effort to address the key issues of salt and nitrate in groundwater. That effort is called CV-SALTS. That stands for Central Valley Salinity Alternatives for Long-Term Sustainability. And its goal is solutions that will lead to enhanced water quality, as well as economic sustainability in the valley.

With regard to nitrate solutions, there are three goals: the immediate goal of providing safe drinking water to impacted communities and individuals; a goal of reducing the nitrate impacts to water supplies, and that's where revising the Dairy General Order would come in, and more stringent requirements; and finally, to restore groundwater quality, which is a long-term goal. Even if all discharges ceased today, it will be years, and in many cases decades, before groundwater quality is restored.

And that is my presentation. Thank you.

MS. RAITT: Thank you, Doug. This is Heather.

I'm not sure if we have Tim.

MR. OLSON: Yeah. Can you hear me?

MS. RAITT: You sound great, Tim.

MR. OLSON: Yeah. Can you hear me? Okay. Sorry. I just closed out and came back on.

Okay, so our next speaker is Tom Swenson from Cummins-Westport, also known as Cummins. It's a joint venture between two companies. And Tom can explain, maybe, how that all materialized over time. But this company is the innovator and creator of a low NOx, low nitrogen oxide natural

gas engine for, originally, 8.9 liter, then 12-liter engine and now, I think, a 6.4 -- or 4.6-liter engine.

MR. SWENSON: 6.7.

MR. OLSON: And -- 6.7. I'm sorry.

MR. SWENSON: It's all right.

MR. OLSON: So please go ahead, Tom.

MR. SWENSON: Yeah. Great. Well, thank you for that introduction Tim.

And just a little bit of background on myself. So I've been with Cummins, it will be 17 years on Saturday, so it doesn't -- time flies, I guess, when you're having fun. It certainly does not feel like 17 years ago I joined the Cummins team. Prior to that, I did ten years at the Sacramento Air District, working on incentive program development. And then sort of bringing this sort of all into a complete circle for today's discharge anyway, I actually started my career as an intern at the Energy Commission in the Transportation and Fuels Office. So I'm very familiar with the building, having worked there for a number of years as I was trying to figure out what I wanted to do in life.

And then, so just briefly to touch on

Tim's point, so Cummins-Westport is a joint venture between Cummins and Westport Innovations, which is a Canadian company, and so we do that jointly. But all of the engine design, engineering, manufacturer, service, support, warranty, all that is handled through the Cummins channel, so it is handled through an established network.

And some folks may have heard that that joint venture is going to end at the end of next year, so at the end of 2021. And when that occurs, it will shift over to 100 percent Cummins. And from a user perspective, they won't see any difference. We've already done all of the transfer and integration work into the Cummins platforms, so it will be totally seamless because it's already happened.

All right, so let's jump into the next slide.

So at Cummins, we're kind of the, well, maybe the last one standing, if you will, as an independent powertrain provider, we -- our whole mission in life is to provide powertrains that meet the needs of customers and so that really requires a portfolio of solutions. So we've got

natural gas and we'll talk about that in more detail in the next slide. But we're also heavily invested in batteries and hydrogen, hybrid solutions, and then, you know, advanced diesels. There's, you know, there's going to be applications that are -- that require diesel engines for a variety of reasons.

And, really, one of the key messages that I wanted to share is, you know, the days of a one-size-fits-all solution are gone. We used to be able to apply diesel engine, you know, basically, however we wanted. And you could put, you know, you could put a very large engine in a very light load application, and it would work fine. With after treatment and emission regulations, that really has changed. You don't have that flexibility anymore. Even if it wasn't a good fit, you could make it work. And that just doesn't exist anymore.

And so, you know, when we kind of boil it down to what's required, we kind of think about it as medium- and heavy-duty vehicles are all about moving people, goods, and services. I mean, they're called commercial vehicles for a reason; right? It's in the business of moving

things. And so when we talk to fleets, they are -- they really do want to do good things for the environment and sustainability and that kind of stuff but they have -- but their mission is to cost effectively delivery payload to a destination, so whether that's people or goods or services.

So matching the right technology to the right application is critical because at the end of the day the vehicle has to have enough carrying capacity and range to get the job done. And so a couple of cautions as we're matching technologies with applications.

One is I see people talk about averages. And averages can be quite perilous because when we're looking at a particular technology fit you get -- maybe I'll simplify this by saying, I've never met an average fleet. They have their own particular needs and requirements. And so saying that, oh, it meets an average requirement can be really dangerous because there's some that it will work and some that it won't.

The other would be not to sort of judge a book by its cover in the sense that just because a vehicle looks the same doesn't mean it's used

the same. So it can be very dangerous to say, yes, this will work just because it looks the same.

So next slide please.

So we, as Tim alluded to, we've got three platforms right now. We call them near-zero. I guess under the classic definition the Air Resources Board has recently redefined their zero as something that's not 0.2 grams NOx technology but that's kind of how we've, historically, looked at it. And this covers a good chunk of the heavy-duty cycles and platforms, so 6.7 straight trucks and more medium-duty 9-liter refuse, transit, vocations, and then 12-liter regional delivery, and some over the road.

And they -- all of them, I mean, they're running on, basically, methane, and so, you know, renewable natural gas, which is actually the same as compressed and liquid, it's just a different way of storing them. You know, it will run on biomethane, as well as, you know, traditional pipeline gas.

So then the next slide, next couple of slides, actually, so this is availability of the products. I mean, basically, it comes down to

what color do you want the truck to be painted. You know, we've got good ability of class, multiple platforms. These are built down the same assembly lines. And I'll note that the engines are all built in the United States on existing Cummins assembly lines, so it's not a special build. It's you order one, we put it in the queue, we build it.

And then I think the final slide is just some photos of some of the applications that we've done. This isn't, you know, this isn't all of them, it's just a sample, so it kind of gives you a flavor of the variety of equipment that are in service today.

So with that, Tim, I'll hand it back to you and look forward to answering any questions after everybody else is done.

MR. OLSON: Thank you very much, Tom.

And our next speaker is Phoebe Seaton, who is with the Leadership Council for Justice and Accountability and has a number of insights in these areas.

Thank you, Phoebe, for joining us and please go ahead.

MS. SEATON: Sure. Thanks so much. I

don't have a PowerPoint presentation. I figured I didn't have the motor or intellectual capacity to get through a PowerPoint and talk intelligently in five minutes, but a little background about who we are.

We are a community-based advocacy organization, the Leadership Council for Justice and Accountability, based in the San Joaquin and Eastern Coachella Valley. For the purpose of this conversation, I think our work in the San Joaquin Valley is focused heavily on kind of the relationship, kind of between an among, land uses, economic development, and environmental justice and environmental quality, which is how we got into the biomethane space and, in particular, the biomethane space as it relates to dairies.

So I just want to kind of thank the earlier presenters who highlighted the issues of dairies, and groundwater and dairies in terms of air quality and that. There are questions when it comes to biomethane and renewable natural gas or natural gas alternatives, generally, is what are the benefits? And are there benefits, in fact, to this new technology? And then at what

cost? And is that cost worth it? And who's paying the cost?

In the area of biomethane, I think we are seeing and we're learning that we're seeing way more capacity than earlier anticipated with zero emission. And to the extent that we invest in biomethane, is that just extending our timeline to get to true zero emission? And so we really question the value of creating what's often been called a "bridge fuel" if we can just skip that bridge and move to more clean energy that is beneficial to all Californians and beyond.

At what cost? I think there's two issues that we have really tried to highlight in the area of biomethane, and one is the extreme cost, both in the up-front and capital costs, and the ongoing costs, and trying to develop a better understanding of the subsidies from ratepayers and consumers that will have to go into biomethane production, distribution and procurement, and seeing -- not seeing any kind of light at the end of the tunnel to kind of the subsidy train that biomethane and calling into question, again, is it really -- should it be on the ratepayers and on consumers to foot the bill

for this fuel? And in particular, when it comes to dairies and biomethane, should it be on ratepayers and consumers to foot the bill for cleaning up methane coming out of dairies?

The biggest issue and kind of greatest area where we focus is kind of at whose cost? So who is paying the price? And not just on the economic side but on the environmental side.

As Doug mentioned, the Dairy Monitoring Report demonstrated that every monitored dairy showed contaminated groundwater under the dairy. And the digesters do not do anything to address groundwater contamination.

We also -- the digesters also address some of the greenhouse gas emissions but do not address the volatile organic compounds coming out of dairies, the dust coming out of dairies, the NOx coming out of dairies.

And I think there is a built-in assumption when we kind of look at digesters that it's a foregone conclusion and an assumption that there is all of this methane, all of this manure that exists and it's, you know, natural law or what have you when, in fact, we could do better. And we really, again, call into question those

assumptions that we have to have all of this waste.

The kind of related is what we're seeing in Merced, all the way to Tulare and Kern, was the advent of digesters, also matched with sort of industry trend with consolidation, we're getting bigger and bigger and bigger dairies in communities that are already suffering from contaminated drinking water and air quality.

Right now, I think, in Merced, we're looking at three dairy expansions, going from -- roughly, you know, doubling in size, some from 2,500 to 5,000 dairies [sic], which just means, you know, more groundwater contamination, more air quality issues, and more order issues in those communities.

So aside from the ratepayer costs, aside from the consumer costs, you have some of the lowest-income Californians, some of the most environmentally distressed communities kind of really shouldering the burden of this potentially unclear benefit of renewable natural gas.

And that's it.

MR. OLSON: Okay. Thank you, Phoebe. Thank you for the comments.

And our next speaker is Matt Miyasato, who is the Technology Officer, Chief Technologist at the South Coast Air Quality Management District, a long-time key person in that organization in helping address their serious issue with extreme nonattainment tailpipe NOx and PM and other criteria pollutant issues in Southern California.

So please, Matt, proceed.

MR. MIYASATO: Well, great. Thank you, Tim, for inviting the South Coast, and me personally, to participate.

I also want to thank the Commissioners for having the South Coast AQMD on the panel.

I think it's important to have a different perspective, so I was really happy to hear Dr. Martin's perspective on renewable feedstocks, and then the panelist with their discussions on, you know, how does this affect their area of interest? And I want to get -- take a slight step back and look at the perspective that we take from the South Coast AQMD.

For those of you who aren't familiar with the South Coast, we are the local air pollution

control agency in Southern California. So when you think of the Great L.A. Region, we are the four counties of L.A., Orange, Riverside and San Bernardino Counties. We have 44 percent of the state's population within our region. And, also, 40 percent of all the cargo or the container cargo goods that come into the United States come to the two Ports of L.A. and Long Beach within our region. So we're bearing the brunt of goods movement through our area. And so we're a big portion of the state's economy, as well as a big portion of the state's population.

If you could go to the next slide?

There's been a lot of discussion recently about, you know, how COVID is affecting the air quality. They have been saying, you know, that air quality has been really pristine, it's been great. If we look at the actual data, this is from March through June, we actually did see heavy-duty traffic decrease. This is the Caltrans sensor data on the freeways. It decreased about 20 percent. But then if you go to the next slide, you'll see that, actually, the air quality in our region just accumulates and continues to be the worst in the nation.

Go the next slide, Harrison.

This is how the air pollution evolves through the day. This is 10:00 a.m. Next slide. 12:00. Next slide. 2:00 p.m. And if you stop here at 4:00 p.m., you'll see the orange color is USG unhealthy for sensitive groups, the red is unhealthy for everyone exposed to the air mass, and then that maroon color is very unhealthy air. And if you go to the next slide, Harrison, it shows you kind of the peak AQI, Air Quality Index, of the EPA. It's an amalgamation of ozone and PM2.5. But it's showing the health effects associated with not having control over air quality in our region.

And I take this really personally because I actually live in Chino. You can see, that's part of the maroon dot there that's expanding over the Inland Empire.

And if you go to the next slide, we know what the major sources that are contributing to our air quality problems. It's mobile source. And in particular, if you look at the left bar chart, this is the inventory in 2023 when we need to meet the federal standards for clean air, it's mostly on-road mobile sources.

So the top box is heavy-duty diesel trucks. And to give some perspective, we have to reduce those emissions by 48 percent -- that's that first dashed line -- by 2023 in order to achieve clean air for our region. And then in 2031, that's the bar chart on the right, heavy-duty trucks remain the top category, and we've got to reduce 60 percent from today's emissions. So we have to reduce emissions from all sectors, but in particular the heavy-duty trucks. And so we're all about NOx reductions.

If you go to the next slide, and this is my final slide, I just want to say that we've been partners with the Energy Commission for as long as I've been at the District, and even before that, so I've been there almost two decades believe it or not. And we have partnered with the Energy Commission when methanol, if you remember those days, first came to the floor as a clean alternative fuel.

We have developed the near-zero natural gas engine that Tom had mentioned. We originally had proposed to call it PDC, or pretty darn clean, but I guess they went to ZNE for near-zero emissions. But that Cummins-Westport engine is

90 percent cleaner than the existing standard. We worked with the Energy Commission and the Department of Energy to commercialize a technology that is currently available. And we want to see the wide proliferation of that technology because it can reduce NOx emissions, help with our air quality problem, but also help in local communities that are impacted by the transport of goods and diesel technologies through their communities.

But that's not to say that we're not working and, probably, one of the more passionate advocates for zero emissions. I noticed that Dr. Martin's slides, he had a picture of one of our Volvo LIGHTS trucks on his slide. That's one of our programs that we're working with partners on to develop zero-emission technologies. We're working, also, with Daimler Trucks North America to produce zero-emission trucks. So you know, we're working with two of the largest truck manufacturers in the world to produce and commercialize technologies that have zero tailpipe emissions but they're not ready in mass quantities.

So we really see the use of biomethane,

renewable fuels, in concert with a near-zero tailpipe emission technology, could really help us not only achieve the state's greenhouse gas goals but, also, our local community goals for reduced toxic emissions, but also our regional goals for clean air.

And so with that, I'm looking forward to the discussion on the panel, and look forward to any questions. Thanks.

I'll turn it back to you, Tim.

MR. OLSON: Okay. Thanks. Thanks Matt. Thanks for the presentation.

Our final speaker on this panel is Cliff Gladstein, who is a Founder/Co-Founder of Gladstein, Neandross and Associates, a long-term kind of raconteur of this whole area. And he is going to talk about some of his recent work in this area.

MR. GLADSTEIN: I always like the term ecopreneur more, Tim. Thanks Tim.

And thanks, Commissioner Monahan, Commissioner Douglas for inviting us here to be here today.

I'm going to quickly go over a recent assessment that we conducted of the near-term

supply of RNG that will be produced inside the state of California for California transportation uses, not the general supply of RNG.

Next slide.

I think the key elements of this slide that I'd like to point out are the two bullets in the blue -- two bottom bullets in the blue box, and that was at the end of 2019, only 2.7 percent of all of the RNG consumed in California, which was 139 million DGE, was actually produced inside the state of California. And the energy weighted CI value, which will be important later in this presentation, of that, of the RNG that was used in California, was 32.7 grams per megajoule.

Next slide.

We set out to do an assessment of the industry. There's been a lot of really good work that's been done by others, by ICF, by UC Davis, on trying to project what the RNG or biomethane supply could be. What we did was a little different than what they've done in the past. And we actually went out and did a tally. We actually talked to developers and accounted for all of the projects that they were actually developing and all the fuel that they're actually

supposed to be producing by data certain.

Next slide.

Won't go into detail here, you could read this later, but this is the -- some of the questions that we asked developers in order to determine whether or not we would include their projects in our assessment.

Next slide.

Here are the findings. And what we did, essentially, is we projected forward to January 1, 2024, under the assumption that any project that was real today, that's in development today, if it's not online by January 1, 2024, then it's probably not a real project. It's probably something that we wouldn't want to include in our assessment. And this gives you a sense of the number of facilities that should be online and producing RNG by January 1, 2024, essentially three-and-a-half years from now. And you can see that the dairies are going to be the largest single number of facilities.

Next slide.

This gives everyone a sense of where the gas will be coming from on January 1, 2024, the RNG. Recall that what we did, essentially, is

did a survey. We ended the survey on July 1, 2020. We know that there are going to be more projects that are going to come online.

So, essentially, this projection of fuel supply is going to be -- is conservative. Pick your number, whichever language you understand best, MMBTU, standard cubic feet, GGE or DGE. I like DGE because the vast majority of RNG in transportation is used in heavy-duty trucks. So there's going to be 119 million DGE of California-produced RNG that's going to be available on January -- what we project will be available for California end users on January 1, 2024.

Next slide.

What we also tried to do is get a sense of what the energy weighted CI value of that fuel would be and, also, track when it would be coming online. This table provides a sense of what the CI value will be. I think the important number is down on the lower right-hand side. That's minus 101.74. Now compare that to the 32 CI value of the RNG that was coming in that California was consuming at the end of 2019.

Next slide.

We also tried to tally the amount of money, both public and private, that was being invested in these facilities. We got data from 129 of the 160 facilities. And from the facilities that we secured information for, that's down in the table below, we also tried to do a little projection and extrapolate what the missing 31 facilities might add to the economic investment. And when you just do an average of all of the facilities and you add the -- and you apply that to the 31 facilities, then you come up with 1.2 billion.

Next slide.

These are the environmental benefits that we project if you assume that those vehicles are 2020 near-zero natural gas and they replace 2020 diesel trucks in the former slide. We did some projections regarding the cost benefits -- I mean the cost effectiveness of the fuel that would be produced by California sources. And the key element there is that third bullet down, that the cost effectiveness of the emissions over a 15-year period, which we're just following these HVIP assumptions about useful life, would be about $12.00 per metric ton of CO2e and $29,700

per ton of NOx.

Thank you for this opportunity.

MR. OLSON: Okay. Very good.

Heather, I'll turn it back over to you to go to the next stage.

MS. RAITT: Actually, we'll just ask the Commissioners if there had any questions of the panelists?

And so if every -- the panelists could go ahead and turn your videos on.

And, Tim, your video?

And we'll take questions from the virtual dais.

COMMISSIONER MONAHAN: Great. Thank you. This is a really interesting panel.

I have a question, I guess, first for Doug.

I'm curious, the water quality control strategy for dairies, am I -- did I read that right, that it was -- that they were passed in 2010? Are there other regulations that are helping to drive down nitrate emissions and to protect water quality on dairies?

MR. PATTESON: The Dairy Order was adopted in 2007. And it is the main regulation

to control nitrogen, well, any threat to water quality, be it nitrogen.

We have also adopted orders for both the operations and feed lots and looking at other animal agriculture. Dairies are the primary ones.

And, as I mentioned, CV-SALTS is kind of a program where our goal is to, you know, eventually restore water quality but, in the short term, to make sure people are -- have safe drinking water.

COMMISSIONER MONAHAN: I guess I'm trying to understand, are the regulations sufficient to protect groundwater or is there a process for strengthening those regulations? I'm just, I'm trying to understand more, you know, what does -- a dairy that's actually following the regulations, would that lead -- would that protect the groundwater and it's just a matter of, over time, the water getting cleaner and cleaner as these regulations are fully implemented?

MR. PATTESON: Yeah. Well, you know, it's really site-specific and there are a lot of variables. But, yeah, in a lot of cases, even

under the best conditions, and I'm talking particularly about the land application, and this is true for all farming, too, they use the commercial fertilizers, as well, that it may not be possible to operate efficiency enough to have a sufficient yield, as well as be sure that groundwater is not degraded.

And that's why CV-SALTS was created. It's kind of an alternative compliance mechanism versus our typical, you know, permitting with limits. And one to the main components is that dischargers, permittees who discharge nitrate or salts, work collaboratively to find solutions on a -- you know, for the basin to restore water quality.

COMMISSIONER MONAHAN: And, Phoebe, it seems like you have -- do you want to jump in with your position?

MS. SEATON: Well, I think Doug kind of mentioned, is that we are -- in the presentation, Doug mentioned that the -- kind of several community-based kind of organizations did file a petition with respect to the order, that is concurrently under review, that it isn't sufficient. And, in part, I think the issue that

Doug raises is the balancing of what is, you know, kind of farm practices that support kind of maximum economic yield and environmental protection.

So that's, I think, a lot of the cost benefit that we're talking about here, as well, and certainly on the water side. So, hopefully, I think those regulations will be stronger within the year.

COMMISSIONER MONAHAN: Well, thank you.

And then, Cliff, I had a question for you about the cost effectiveness numbers, which were good in the world of carbon and NOx. Did that include -- like can you walk us through how that calculation -- how you did that calculation? Was that just on the basis of the fuel or was that -- did that include the vehicle incremental --

MR. GLADSTEIN: No.

COMMISSIONER MONAHAN: -- cost difference?

MR. GLADSTEIN: No, that includes the vehicle using, you know, conventional modeling techniques used by ARB from EMFAC, I believe it was, the calculation. Of course, you know, one of the reasons why you get such a good GHG number

is because we're making the assumption that all 119 million DGE of California RNG is going to be consumed in California-based near-zero emission natural gas trucks. And those vehicles -- I mean, that fuel has a carbon weighted energy intensity of minus 101, almost minus 102 grams per megajoule. And that's what yields the very low $12.00 per metric ton carbon CO2e reduction, cost effectiveness.

COMMISSIONER MONAHAN: I see. So can I just restate to make sure I understood, Cliff? So it assumes then that, basically, the methane emissions would just be like released into the atmosphere from dairies or from waste treatment facilities that wouldn't be captured, so that becomes a real -- a major driver, the capturing of that methane that would otherwise be released into the atmosphere?

MR. GLADSTEIN: Correct, you know, using the standard methodologies used by ARB to calculate the benefit of any fuel use, any low-carbon fuel use.

COMMISSIONER MONAHAN: Got it. And then one last question, and this is for Matt.

Matt, as you walk through, I mean, the

enormous challenges that the South Coast is facing on air quality and, you know, one thing that struck me with Jeremy Martin's presentation was when he talked about how our perception of the role of zero-emission vehicles has really shifted over the last several years in terms of, you know, much more optimistic in what kind of penetration that we can see in the heavy-duty space than we would have expected two years ago. And I'm curious about how the South Coast is thinking about, you know, the role of, I would say, you know, kind of these longer term technologies on emissions and the near-term opportunity with, especially, natural gas trucks to be able to improve air quality? Can you talk about that tension and that, that you're wrestling with, at the Air District?

MR. MIYASATO: Yeah. Sure. Thank you, Commissioner. That's something that keeps me up at night, almost every night, and has been for the last five years or so because we know that we have a federal deadline, 2023, which is right around the corner, that we've got to reduce NOx emissions, I think I showed in that chart, about 50 percent across the board. The biggest

contributor, the lowest hanging fruit, as it were, is on-road heavy-duty diesel. So if we can replace those diesel trucks with a cleaner technology, you know, 50 percent or more cleaner, then we've got a shot at, at least, making progress toward healthy air for the, you know, 17 million residents in our region.

But that's not to say we don't have our eyes toward a zero-emission future. So we have been working, as I showed on that, my final slide, with the two largest truck manufacturers in the world. You know, five years ago they didn't want to play with us. They were saying, you know, we can sell diesels all day and make a profit and we're happy. But now, as Dr. Martin had mentioned and as you mentioned, Commissioner, the world has changed significantly and we're starting to see progress on those fronts.

However, you know, we are working, the district and other districts up and down California, to commercialize those zero-emission trucks, not only battery-electric but fuel cell trucks. And we're working with our friends at the ARB on the ZANZEFF Program, as you know. But if we take all of those projects and the

timelines by which they are to complete and, hopefully, commercialize, that's less than 1,000 trucks in the next two years. Maybe, if we're lucky, we'll get multiple manufacturers that can produce at an unheard clip and then we get 5,000 trucks in the next two years. We have to, just at the ports, replace 15,000 trucks, and we're not going to do it by 2023.

And so, you know, we're, as you mentioned, we're up against this federal deadline for clean air in 2023, let alone 2031; right? So by 2031, we're got to further decrease NOx emissions by 60 percent. And there, in 2031, we see there's a mix of near-zero emission trucks, as well as a good amount of zero-emission trucks, but it really depends on how early the market can capture these technologies, and the infrastructure.

So to maybe briefly answer your question, we think near-zero technologies are commercialized, they're ready. We have over 200 trucks that are operating now that are, you know, fully commercialized and vetted by the ports and others. And so we'd like to see those incentivized, get a greater amount of vehicles

out there, reduce NOx emissions, until we can see a larger number of zero-emission trucks that are commercial and ready for service.

So you know, we see there's room for both, especially in the near term. And, in fact, in the near term we've got to have NOx emissions almost immediately.

COMMISSIONER MONAHAN: Well, I guess you're basically validating a common strategy of diversification in terms of really investing in all alternatives.

So I think that's all my questions.

Commissioner Douglas, if you have any questions, feel free to jump onto the dais. But, otherwise, I'm going to turn it over to Tim.

All right, Tim, I think you're on.

MR. OLSON: Okay. Thank you, Commissioner. And if you could -- panelists, if you can un-mute your system there so you can speak? I have a number of questions here I'd like to kind of probe.

And so we heard from the panel that California is poised for some pretty significant growth of biomethane, primarily in the dairy sector, but we also have some landfill food waste

diversion, and some in wastewater treatment, some in food processing.

And so I guess one of the questions there is -- and, Cliff, I think Cliff and Doug and Tom, you pointed out that this was really focused on the truck and bus market. It's not really a passenger vehicle option in the state. There aren't a lot of -- there aren't any product offerings that we know of that.

And by the way, from our DMV data numbers, the cumulative in California, about 20,500 trucks, natural gas trucks, growing at the rate of about 1,000 new into the marketplace every year -- in a market where we've got close to 700,000 diesel trucks, of which maybe 200,000 of those are registered out of state and are not subject to our rules, apparently, but there operate in our state. And so you've seen this growth in the sources of biomethane, RNG, and I guess a couple of questions, kind of two sides of this question.

What actions might disrupt that trend, actions, market circumstances, any kind of conditions in the market? And then what actions might accelerate that trend?

And I'd like to start with Tom, get a comment first from you, and then, also, Cliff and Matt.

And, Phoebe, I'd like to have your comment on that too.

MR. SWENSON: Yeah. So good question, Tim. And I like the fact that you kind of talked about the numbers of trucks.

You know, when we look at it at Cummins we see a role for all of these technologies because just, I mean, if you just took the sheer number of trucks that we have to deal with, we're doing everything we can to deliver zero-emission product as soon as we can. But we know that it's not going to be a one, like I said earlier, a one-size-fits all solution. So we have to have a number of technologies and make the right fit in the right place.

Matt will probably remember that we, historically, have tried to force fit some technologies into applications. And, actually, I think set back some of our efforts because the user experience wasn't good. And so I think what could accelerate is that portfolio approach in terms of rules and regulations and guidance that

come, you know, from ARB and CEC and EPA and, you know, the influencers there. I mean, we literally have fleets that are ready to buy into near-zero technology today, but they're worried that it won't satisfy the need in the not too distant future, so they'll lose that investment.

And it just seems like we shouldn't be sending signals to delay. Do we all want a zero-emission transportation future? Absolutely. But we're talking about, you know, decades to get there. And I just don't think, you know, we should be abandoning, you know, current generations for, you know, for future.

You know, what can slow it down? Well, I think this is true for any emerging technology, it's the withdrawal support that's too soon. You know, if you pull the plug, no pun intended, on the support before there's sort of a level playing field, then it's going to stop deployment. I mean, I think it's just that simple.

So I'll look forward to others' comments.

MR. OLSON: Cliff, let's go to you. Do you have any comments on that question?

MR. GLADSTEIN: Yes, I do, but I don't

want to take the rest of the time.

Well, let me preface my comments by saying that, at this point in time, our company, GNA, probably 75 to 80 percent of the work that we do is on zero-emission battery-electric trucks. And, in fact, one of the largest projects that I'm working on is the largest deployment of electric drayage trucks in the state of -- on the east coast.

And so I just want to kind of put some context. You know, we're working directly with all the manufacturers that Matt put on his slide, helping them find opportunities to commercialize those zero-emission technologies that they're developing, so just to kind of set the stage there.

I agree with everything that Tom just said. And I think I might go a step further and say that the policy signals that are coming out of the state of California are decidedly anti-natural gas vehicle and, to a great extent, anti-RNG. And so the market, the fleet operators, the people that we deal with on a daily basis, the people who are making decisions about what technologies to buy, they're making decisions to

buy diesel rather than natural gas because there are no opportunities right now, for the most part, particularly in the Class 7 and 8 sector, for them to buy zero-emission trucks that will do the job that they need it to do.

So, essentially, the perverse incentive that's being created here is to put more diesels --

MR. OLSON: Cliff, you're muted. Still muted.

MR. MIYASATO: And now he's frozen.

MR. OLSON: Yeah. Okay. Cliff, let's see if you -- we'll just try to figure out how to get you back online, and I'd like to go to Phoebe.

Do you have a comment on this kind of two-part question?

MS. SEATON: Yes. If you could remind me of the two-part question? Is it what could stall the deployment on the zero-emission side?

MR. OLSON: Well, this point -- I think Cliff made a point that we're poised for some pretty significant growth, I mean, primarily in dairy, but other -- some markets, and between now and 2024. So what -- the questions were what

actions, either government actions, government interventions, market conditions or market circumstances, might either accelerate that trend or maybe impede or slow down that trend?

MS. SEATON: Yeah. And I think that, you know, I think that the -- you know, from, again, what happens between now and 2024 is, potentially, when CARB's regulations, pursuant to SB 1383 could kick in, in terms of dairy methane. Dairies are, you know -- have, you know, a relatively free ride when it comes to GHG emissions and the contamination, which is, in part, what allows for the mass that creates this carbon negativity on the -- in terms of manure.

So I think the -- you know, one -- a lot of -- one big change that we'd like to see is a shift in policy, and from the financial policy and from a policy standpoint, even stronger towards zero-emission in the form of clean electricity and otherwise, and a shift away from policy preferences for natural gas, oil, and RNG.

Just, I think it does make sense to -- there's a couple questions that I wanted to just -- that fit really well into this question is this issue of -- a question came up but can you

clarify what you meant by the assumptions that will be manure waste? I think that the calculation around emission reduction comes from our kind of assumption that it's a foregone conclusion that we're going to have methane off-gassing into the atmosphere.

I think one thing that we'd like to see a shift is thinking more creatively from a regulatory and a market standpoint about ways that we could address kind of dairy waste in more environmentally friendly ways and not assume that the disposal of manure happens in the least environmentally friendly way possible, and to consider whether we need -- one kind of alarm bell was a slide early on around the expansion in corn, a significant expansion in corn. So for creating market incentives to create manure -- which is, quite literally, what we're doing -- what does that mean for the dairies? Like is it a perverse incentive to grow out the dairy stock, not because of milk, not because of any market need for milk, but for kind of a perverse market incentive to create waste and to create manure?

That's sort of a long kind of answer to your question. So I think in short is the issue

around doing kind of a better job to address the waste that we have, reducing the waste that we have, and putting more and more kind of energy and financial support into actual real emission technologies.

MR. OLSON: Okay. Thank you.

Cliff, are you -- can you just -- you're back on. Very good.

MR. GLADSTEIN: Yes. Can you hear me?

MR. OLSON: Yeah. Can you finish your comment there that you --

MR. GLADSTEIN: I totally forgot what I was saying. Where are we? Is the --

MR. OLSON: Well, we were looking at --

MR. GLADSTEIN: -- CEC workshop? No, I apologize. My phone, you know, of course, decided to cut out exactly when I was making my remarks which is Murphy's Law.

I think at the time, I was simply saying that the incentives that are being created right now are somewhat perverse in that the State of California is sending signals to the marketplace not to invest in these clean technologies that are available today and to wait for the technologies that will be coming in the future.

And what the impact in the marketplace that that has is to put more diesel on the road. And that was what I was trying to say.

MR. OLSON: Okay. So, Matt, can you -- do you want me to repeat the question? It's kind of a two-part.

MR. MIYASATO: No.

MR. OLSON: I'd like to hear your insights.

MR. MIYASATO: Yeah. I appreciate that, Tim. I think I got it.

Your question is really focused on the production of the renewable fuel. And I guess I'm more aligned with Cliff's summary in that we want to see the fuel used for transportation purposes because it provides near-term emission reductions.

And you know, I really appreciate the discussion about -- I think Dr. Martin had 2040, I can't recall the year, but it's 2045, forgive me, you know, and we're talking about other long-term goals that the state is looking at. And I think we, at the South Coast, keep raising our hands and saying, hey, you know, we've got an attainment deadline in 2023, in three years, so

probably two years if you want to look at the calendar. And failing to meet that, there's going to be lawsuits. There's potential action by this administration to put sanctions on California. And so we've got to make significant progress in reducing NOx emissions towards that attainment goal.

And let me just point out a couple data points. HPIV, the Hybrid Voucher Incentive Program that incentivized near-zero 8.9-liter trucks and 12-liter trucks, widely popular, oversubscribed. You know, the ARB has done a great job in that program. But there's a need, I think there's an unmet need, to produce more incentives to get those vehicles out on the road.

The Energy Commission partnered in a similar matter with us to do a pilot program for near-zero emission trucks. That was oversubscribed. We did that in partnership with the ports. We previously had a program with the Energy Commission to do natural gas incentives for trucks. This is when the first round of the zero-emission or near-zero 0.2-gram trucks were on the road. And so there is an unmet need where we can replicate, provide incentives to get more

vehicles out on the road.

The pressure that we're feeling is because the ARB Truck and Bus rule is going to require that everything be 2010 compliant by 2023; right? So all these older pre-2010 trucks need to be turned over or they're not going to be able to register. So here's a perfect opportunity to get those trucks to be near-zero, have them be 0.02 grams per brake force per hour, not 0.2 grams; right?

I know there's concern with folks about, you know, is this a sunk cost and are we prolonging the legacy of combustion fuels? And I think our answer is that those trucks are going to have turn over again before 2031, so why not get a 90 percent cleaner vehicle out on the road today, protect public health, get us toward attainment, and provide the incentives that can help us do that; right?

So I think there is a sense of urgency, Tim, in terms of accelerating that. And we see biomethane as helping unlock this other, you know, co-benefit. We get GHG benefits as well; right? And so that not only unlocks potential incentive funding with GGRF and other cap and

trade revenues but we're getting, you know, a multiple of different state goals and regional goals with a specific technology in feedstock.

MR. OLSON: Okay. Very good.

Yeah, Cliff, you're raising your hand. If you have another comment, un-mute yourself and --

MR. GLADSTEIN: Yeah. I just -- thanks, Tim. I appreciate it. I just want to make this comment on this perspective that if you invest in these vehicles, that that prolongs their lifespan and prevents zero-emission technology coming into the market.

I can tell you, I've been working with fleet operators, just like Tom has, for the last 25, 30 years. If you build a better product, they will buy it. They are not going to hang out with a product that costs them more and doesn't do the job as well as the product that comes along and does it better and does it cleaner and does it more efficiently and costs them less to do it. So they will dump their trucks, whatever truck, whatever technology it is, even if it's electric, if something better comes along and does the job better and more cheaply.

So I think I'd like to kind of move away from this fallacy, in my view, and I think in the view of the market that once you buy these vehicles they remain embedded and will stay there forever. If you build a better mousetrap the fleet operator is going to buy it.

MR. OLSON: Very good.

Doug Patteson, I have a question. I'd like you to elaborate on the implementation of the laws you mentioned, particularly the new CV-SALTS, the SGMA, and the Safe Drinking Water Act, to the extent you have knowledge and a role in any one of those and how it relates to the dairy farms.

And part of this, can you give us some more insights about where the potential problems occur on the dairy farm? Is it the lagoon? Is it the manure slurry and in the lagoon that's a contamination point? Is it the land application of the nitrogen digestate, nitrogen from the digestate? Is it some other part of that process? And the question would be: What actions might the state take to start resolving that to try to mitigate some of that?

As you may know, when the Department of

Food and Agriculture puts out their grants for the anaerobic digester, they require double lining of the --

MR. PATTESON: Your --

MR. MIYASATO: Your audio went out, Tim.

Cp Yeah. I can try and answer, I think, what your question is.

First, yeah, the big issue with nitrates in groundwater from dairy is through land application. Unlined ponds are a concern, are a source, but the pond is really just the storage spot before that manure, that nitrogen is applied to the crop land. And I think most of the nitrate getting into groundwater is through crops.

And CV-SALTS is -- it's a Regional Board involved, and other staff at the Regional Board, but, basically, the Regional Board is involved but it's also a stakeholder-driven process where the people who are responsible for discharging nitrates and nitrogen to the environment, to groundwater, kind of work together to solve the problem and, also, with the communities that are affected.

And so I don't know that we really know

what the best solution is. But an obvious one is just maximizing the efficiency of fertilization, whether that's from manure or commercial fertilizers.

I'm sorry. I forget kind of what the follow-up parts of your question were but, hopefully, that answered it.

Oh, and you asked about SGMA and SAFER, the Safe and Affordable -- I apologize. I forget the acronym now. But it's -- that's -- SAFER is a statewide funding mechanism to help small communities and small systems who are not able to supply clean water to their -- to residents. And that -- a lot of that is because of nitrates. Pollution in groundwater is also -- because of the drought and overdraft, wells can go dry and small communities have a time replacing those.

And SGMA is interrelated. I guess all three are interrelated and are kind of basin-based programs where people in a certain area try to solve problems locally. But SGMA is really about water quantity and it's overseen by the Department of Water Resources. But, obviously, you know, the amount of water available can have an effect on water quality, too, and have an

impact on the same people that need to work on the water quality issue.

MR. MIYASATO: Okay. Water quality.

Are you back, Tim?

MR. OLSON: Doug --

MR. MIYASATO: Okay. Good.

MR. OLSON: -- so, Doug, is there -- if we're going to see a number of these kind of projects coming forward, is there room for things like programmatic EIRs? Is there a need for any kind of, maybe, demonstration money to try to mitigate some of these potential problems?

MR. PATTESON: Well, the Central Valley Water Board adopted an -- or certified an EIR in 2010 when it adopted the Dairy Digesters General Order that, I think, addressed, you know, air and water quality issues.

So from at least -- I don't know if there's a need for programmatic EIRs still. There's still, I think, obviously, local permitting agencies need to comply with CEQA and do supplement CEQA documents if they're going to approve projects under their authority.

MR. OLSON: So I wanted -- okay. Very good. Thank you, Doug.

I want to go back to another kind of question and that's we've got this progress that's occurred, we've got a lot of growth of instate development, and we've got a production line engine in a natural gas truck, and uptake from pretty much every OEM to use that, is there -- are we done? Is this -- have we -- are we at a point where government incentives are no longer needed and --

MR. MIYASATO: You were back there, Tim.

MR. OLSON: Yeah. Sorry.

Cliff, did you hear my question? And your mute -- and you're also muted.

MR. GLADSTEIN: I'm sorry. I didn't know that it was directed at me, Tim. I apologize.

MR. OLSON: Yeah.

MR. GLADSTEIN: I would -- if the question is, are we at a point where incentives are no longer needed, there's -- no. As long as there's going to be a premium and incremental cost and the choice is between a conventionally-fueled diesel vehicle, which I think we all agree we don't want to proliferate, and we can deploy any kind of alternative, whether that alternative is a near-zero emission natural gas truck powered

by renewable natural gas, if that is a hydrogen vehicle, preferably powered by green hydrogen, or an electric vehicle powered by renewable electricity, those are the options that I think that we should be opting for in every case. All of those options cost more than conventionally technology, so I think that we should continue to incentivize these technologies.

And I think, well, one thing that I would add is that in the age of COVID, well, even before the age of COVID but particularly now, the resources are even that much more scarce, that cost effectiveness has got to be one of the guidelines that we use when we prioritize where to spend dwindling state resources.

As Matt has pointed out repeatedly, we are under some very, very strict deadlines and we need to obtain immediate emission reductions, particularly of NOx, and particularly of diesel PMs.

And so I think, you know, one message that I would like to convey to my fellow panelists and to the Commissioners is, is utilizing cost effectiveness as a key tool to prioritize where we spend our money now, I think,

is very, very important from a public policy perspective.

MR. OLSON: Very good.

Tom, I'd like to hear, yeah, Tom, I'd like to hear your comment. And we're aware that there's a cost difference between a natural gas truck and a diesel truck. Are incentives still needed? And can you elaborate just on what that differential makeup is?

MR. SWENSON: Yeah. Sure. Right. So I'll take the second part first.

The engine cost is, basically, the same between diesel and natural gas, if you look at it holistically. So you take the engine and then the associated after treatment, the engine is a little more expensive for natural gas but the after treatment is a little less expensive than diesel, so it's -- that amount is about on parity. Really, the cost is, with the fuel system, the tanks. That's where the incremental cost is.

And to build on Cliff's comments, if we're meeting a 0.02 gram standard, if that was the universal standard, so that was, in order to sell a piece of equipment in the state, that was

the standard, we shouldn't get any subsidies; right? We'd be competing on a level playing field. Right now, you know, it's not envisioned that the base standard will be a 0.02 until 2027. And we all know that in order for diesel to get there the system, the engine, the systems, the after treatment will all become more complex and more expensive. Where that lands, we don't really know.

But, really, it ought to be, you know, if a fleet goes into a dealership today, and let's just say, for the sake of discussion, they can choose diesel, natural gas or electric under the current emission regulations, without incentives, they're going to buy diesel every day because of the incremental cost, regardless of what, you know, whether it's natural gas or electric or hydrogen or whatever, it doesn't matter.

In 2027, that will change; right? That will go to 0.02. And then you're left with the incremental cost, if there is, which I think there will be with hydrogen and battery-electrics, and those should continue to get incentivized because until the requirement is zero, then the fleet has a choice and they'll

choose the less cost -- or the least cost to get the job done.

You're muted, Tim.

MR. OLSON: Matt, do you have a comment on that? I wasn't sure if you raised your hand on that.

MR. MIYASATO: Yeah. I'd love to comment.

So I think if the question is are we done incentivizing near-zero engines in concert with renewable natural gas, and I think the answer isn't -- the answer is not, to use a double negative, it's not no, it's heck no; right? Now is the time that we need to further incentivize a commercial technology that's cost effective that helps us meet our regional air quality goals; right?

So I think there is this kind of false narrative about this choice between zero and near zero. When zero-emission technologies are commercialized to the point where you have, you know, hundreds that are rolling off the factory line, the South Coast is going to be the first in line to say let's incentivize these and get these out on the road. But the truth of the matter is

they're not ready yet; right? We're going to incentivize these early pilot programs for sure but those are not, you know, TRL Level 9s.

And so let's continue to fund those projects to commercialize those technologies. We are all for that and we're putting our own money up. But if we have the potential for HVIP more like funding to get more 90 percent cleaner trucks out on the road, then, you know -- and it meets all -- checks all the boxes, regional air quality, GHG reductions, you know, local air pollutants and harm to the communities, why can't we fund that? Why shouldn't we fund that? That's what we need to do.

MR. OLSON: Okay. So I have kind of a final question, and I'd like to make this a little, if I can do this, a little bit of a lightning round. And I'd like to hear from each one of you what your top one or two things you would recommend to California state government as an action or actions that should be taken regarding this area, whether it's pro or con. And let's start with Tom first.

MR. SWENSON: So I think Cliff hit on it. I think it's cost effectiveness, especially in

the near term, in terms of targeting emission reductions while continuing to invest in the long term. So that would be my lightning round response.

MR. OLSON: And, Phoebe, could you make a comment?

MS. SEATON: Yeah. Ending subsidies to any programs or projects that kind of perpetuate air and water quality degradation.

MR. OLSON: Matt, how about you?

MR. MIYASATO: Yeah. I would just implore both Commissioner Monahan and Douglas, as well as the entire agency, to consider partnering again with the South Coast on an incentive program that capitalizes on the near-zero engine that we helped commercialize to get immediately emission reductions, not only in the South Coast but across the state, and gets greenhouse gas emission reductions.

MR. OLSON: Doug, do you have a comment? What action would you -- maybe from a different kind of perspective?

MR. PATTESON: Well, as I mentioned, I think digesters are kind of neutral from a water quality perspective. They don't make it worse.

They don't make it better.

But I know there's research. I think UC Davis and others are doing research on making digestion a part of a process to produce a better end product that can be stored and transported and become, I guess, more of a -- a more usable fertilizer than manure. So I guess if there's a way to further that, that could be an improvement.

MR. OLSON: Yeah. Just to comment, similar to maybe what we're seeing in northern Europe in lots of different projects there.

And, Cliff, do you have any comment on what your top one or two things you're recommending?

MR. GLADSTEIN: I agree with everything that folks have said up until this point. I think that the biggest challenge that we face, well, we can't allow the perfect to be the enemy of the good, to use an old bromide, and that's what I fear is happening. I think we need to focus on expanding our pallet, not contracting it and/or our toolbox, whatever metaphor you'd like to use. And we really, really do need to prioritize near-term emission reduction benefits.

We need to prioritize co-benefits, greenhouse gas reductions, NOx reductions, and diesel PM reductions. Let's not forget the real enemy here. And we need to prioritize cost effectiveness to maximize the bang for every buck that we spend now.

MR. OLSON: Okay. So I think we are very close to the end of our moderated panel. I want to thank the panel members for the time and the effort and all the background work you've done in this area. And thank you very much for joining the panel.

And I'd like to turn it back over to Heather and the Commissioners.

MS. RAITT: Great. Yeah, thank you everybody. And if the panelists could stay on, we have a couple of questions from the Q&A, from attendees on Zoom.

And, Michael Comiter, if you can go ahead and read some of those?

And I'll just remind people first, if I could just take a moment, that I see some hands are getting raised. So, please, also, if you are hoping to make or would like to make comments during the public comment period, just go ahead

and click raise hand and -- because during the public comment period, we won't have time to respond to questions but this is an opportunity now. We'll address a couple of questions that have come in from attendees.

So go ahead, Michael.

MR. COMITER: Thank you, Heather.

So let's start off with a question from Meredith Roberts. And this is directed towards Cliff. And I believe it's in regards to your comments on fleet procurement based on cost effectiveness. And they ask,

> "Won't those retired fleets just be passed to other users that cannot afford the newest technology? And in this case, is it still better not to upgrade these and focus only on sunsetting the old tech?"

MR. GLADSTEIN: No, it's actually, precisely, because this tech will be passed on to, say, the drayage market or the farm market or other markets where you want clean technology, new clean technology that you deploy now, to be -- to go into the secondary market later, because it's still going to be 90 percent cleaner than what's available now. And what you do not want

to encourage is more diesel deployed now.

MR. COMITER: All right. Thank you.

And then the next comment is from Lyle Slier (phonetic). And this is also directed to Cliff.

"Your report indicates a fair amount of state biomethane will soon come online. Does the state need to do anything to assure that biomethane is available for the highest and best use within the state?"

MR. GLADSTEIN: I'm not sure I understand Lyle's question. But I do want to make a shoutout to Lyle because a large portion of the current RNG that's produced in the state of California is coming from Lyle and Lyle's company, Calgrant (phonetic). And the CI value of Lyle's fleet of digesters is way lower than the average of the sector. And so he is delivering a high-quality product to transportation fleets here in California.

You could try repeating the question and I'll try to answer, I'll see if I understand it, but I do want to give a shoutout to Lyle because he's a true pioneer in this sector.

MR. COMITER: All right. Well, I think

that does it for questions.

I can turn it over back to Heather.

MS. RAITT: Okay. Thank you, Michael.

And thank you, panelists, Doug and Tom and Phoebe, Matt and Cliff. I really appreciate your time and your expertise today.

And thank you, Tim, for moderating.

So with that, we'll move on to the public comment period. And if the public -- if you're an attendee and you'd like to make a comment, you can click that raise-hand icon in Zoom if you're online, and to do that to let us know that you want to comment. And then if you're on the phone, just press star nine.

And RoseMary Avalos from the Public Advisors Office is with us today, I believe, to help us with the public comment.

So go ahead, RoseMary.

MS. AVALOS: Thank you, Heather.

I will first call on attendees using the raised-hand feature on Zoom. Please state your name and affiliation and spell out your first and last name. Also, do not use the speaker phone feature because we may not be able to hear you clearly.

Ryan Kenny, your line is open. You may need to un-mute on your end.

MR. KENNY: Thank you for --

MS. AVALOS: Go ahead.

MR. KENNY: -- recognizing me. Thank you for recognizing me. This is Ryan Kenny with Clean Energy. I actually had my comments answered in the previous panel so I'm good. Thank you for checking though.

MS. AVALOS: Oh, okay. Thank you.

The next commenter is Kevin Maggay.

Your line is open.

MR. MAGGAY: Hi. Can you guys hear me okay?

MS. AVALOS: Yes.

MR. MAGGAY: Hi. My name is Kevin Maggay with SoCalGas, K-E-V-I-N M-A-G-G-A-Y.

First off, thank you to the CEC for holding this workshop. We think that this is one of the most important workshops we can have in this IEPR cycle to really benefit the health of Californians. But we definitely support the long-term vision of zero-emission vehicles. But as Dr. Miyasato mentioned, we're at a precipice of making policy decisions that could,

potentially, encourage the purchase, the continued purchase of trucks, which are ten times dirtier than commercial natural gas trucks.

We also support -- we strongly support a portfolio approach to balance near-term reductions and long-term goals. And we do also agree with Dr. Miyasato that there's almost a false narrative, a false choice, that you have to focus on near-term goals of the long-term goals, and we can achieve both. And the reality is that we have you achieve both but there just needs to be well thought out balanced portfolio approach portfolio. And, unfortunately, the market signals are, obviously, leaning towards the future's air emission goals rather than having that balance. And without that balance, without market signals for near-term reductions, I agree with people said, people are just going to continue to buy diesel.

And as Dr. Miyasato mentioned, as well, if all the zero-emission demonstration projects came online within the next few years, that that would only amount to about 1,000 trucks which is, you know, in this world, it's a drop in the bucket. They're still being developed,

especially in the heavier classes. Near-zero trucks running on renewable natural gas are available today. And as shown in the presentation, the supply of renewable natural gas will increase significantly in the upcoming years.

Something that Dr. Martin said at the beginning, he said that biomethane doesn't show promise for trucking, which I think the industry shows that statement isn't necessarily correct. As Cliff showed, biomethane is the most cost-effective solution for reducing greenhouse gases and air pollution to meet the goals, the near-term goals of 2023 and 2030, respectively. And as Matt said, there have been multiple programs that were well or oversubscribed. And this shows that with the market, with the right signals and incentives, there is, actually, a lot of promise for this use.

Near-zero trucks and renewable natural gas are a very cost-effective way to get to these goals. And, again, we believe in a portfolio approach. CARB anticipates 30 percent of trucks will be zero emission by 2030, which would be fantastic, but that's still leads 70 percent of

the trucks out there being the status quo. Near-zero trucks and RNG can turn over some of that 70 percent. And we really need to stop looking at near zero and zero as competing technologies and start looking at them as complimentary technologies to get to our overall goals.

Thank you.

MS. AVALOS: Okay. Thank you.

A reminder, please state your first, and last name and spell your first and last name and announce your affiliation.

Julia Levin, your line is open.

MS. LEVIN: Hi. This is Julia Levin, J-U-L-I-A

L-E-V-I-N, from the Bioenergy Association of California. Can you hear me?

MR. COMITER: We can hear you, Julia.

MS. LEVIN: Okay. The clock's not moving so I wasn't sure.

So I wanted to raise an issue that hasn't really come up, but I think is very closely tied to the issue of biomethane and near-zero emission vehicles, and that is the need for statewide procurement of biomethane.

Dr. Martin mentioned, you know, various

end uses of biomethane and a preference for some over others. The 2017 IEPR and the Air Resources Board have been very clear that, for the near term, the highest and best use is going to be to replace diesel in heavy-duty trucks because of the significant air pollution and climate pollution reductions that biomethane and near-zero emission vehicles can provide.

Longer term, I agree with a lot of the comments that as more zero-emission vehicles enter the market there may be better uses of biomethane -- (clears throat) excuse me -- particularly as a form of long duration energy storage as a fuel to provide power for backup generators and in a way that replaces diesel.

But since the end uses of biomethane are -- you know, there are many, and what's the highest and best use today and tomorrow may be different than the highest or best use in 15 or 20 years, it seems like having a statewide procurement program is the best way to both procure the biomethane but also have flexibility about end uses to shift as other technologies and needs develop.

The Public Utilities Commission is

required by State Law, SB 1440, to consider a biomethane procurement requirement. And we're hoping that they will begin that consideration soon but that would be limited to the utilities. Something like a strategic biomethane reserve that's actually operated by the state could provide a statewide alternative and move with the needs of the market, so that biomethane can be put to the highest and best use, and we think that that would really help accelerate the development of sustainable biomethane production in state.

But I do want to echo the comments from Matt Miyasato and the other panelists and several of the other commenters that we really need to do this quickly to meet near-term air quality and climate goals. We also need to do it to meet the state's short-lived climate pollutant strategy, which is critical to our overall climate goals. By far the biggest sources of short-lived climate pollutants are organic waste. And all of those different feedstocks could be converted to biomethane instead.

So thank you for this important panel. And I hope one of the IEPR recommendations will

be some sort of statewide procurement mechanism or a strategic biomethane reserve.

Thank you.

MS. AVALOS: Thank you.

The next commenter, Jim, your line is open. You may need to un-mute on your end. And please state your first and last name and spell.

MR. BOYD: This is Jim Boyd, J-I-M B-O-Y-D. I'm representing myself today, although I'm a founding member of the Tahoe Fund, whose highest priority is forest health. And for those who don't know me, I spent over ten years as Energy Commissioner, over 20 years as the CEO of the Air Resources Board, and multiple years in the Resources Agency, et cetera, et cetera. I'm familiar with every one of these topics.

I'm addressing you as kind of a frustrated retired individual now who follows these subjects very closely. There are answers to every question I heard today produced in the past decade or two. And I don't understand why more reference hasn't been made to past efforts. The biomass and bioenergy reports laid out exquisite plans for where we should be going. Two reports to the legislature at the

legislatures request to the executive branch on what our future should be laid out futures of diversified portfolios for transportation fuels and for the production of electricity. And, to me, little to no attention has been paid to those as we've dedicated ourselves to a single policy.

I want to commend my friends Cliff and Matt. If you could see me, you'd see the white hair. They have shades of gray now. We've lived through these issues before. Opportunities have been lost before given benefits to health benefits and health and to greenhouse gas reductions. They've said it already, we've been the value -- in effect, debating the value of the wheel all over again. And this statement about perfect and the way of the good, so to speak, has been made.

The number one problem that I have reported in many forms is the total lack of state support or state policy embracing any of these alternative approaches in deference to a single solution that, in my opinion, has cost the people of the state of California in terms of their public health and their contribution to greenhouse gas emissions benefits out of the fear

that I've heard stated today of embracing any other technology that might get in the way of the one desired technology. And it was desired by all of us.

I did the zero-emission vehicle mandate on my watch at the Air Resources Board. But we had a stepping-stone approach to the future that would deliver this future and I think we've cost the people of the state dearly in the fires we've done in the forest, with the water pollution that we've not abated through dairy digesters with the line sumps and so on and so forth.

So I urge the Energy Commission to take a long, deep look at where we should be going in the future. The future has changed. The future will change, and it needs to be changed. But we have ignored decades of work by dedicated staff and policymakers.

Thank you.

MS. AVALOS: Thank you, Mr. Boyd.

Next commenter is Tom Fulks.

Your line is open.

MR. FULKS: Hi there. This is Tom Fulks. The last name's spelling is F-U-L-K-S, it's F, as in Frank. I am with a company called Mightycomm.

We represent a variety of stakeholders, including makers of renewable diesel fuel, renewable jet fuel, renewable DME, and direct air capture production of carbon-neutral renewable gasoline. It was great to hear from my old friend Jim Boyd speaking right before me.

Ms. Monahan, thank you very much for hosting this discussion.

Panelists, thank you for your participation.

Matt, good to see you, at least via Zoom.

I wanted to call your attention to a document that we have submitted to the docket. It's, presumptuously, called a Draft Chapter for Low-Carbon Fuels. All the stakeholders that we represent got together and put this together based on our experience at Mightycomm in having dealt with IEPRs of prior iteration over the years. We would encourage the Commissioners and Staff, too, and interested stakeholders, to consider it.

We do believe inclusion of this chapter or a variation of it generated by CEC staff, in consultation with these stakeholders, would provide a balanced and practical outlook for

California's transportation energy landscape. The chapter would help California implement it's often stated all-of-the-above strategy that has been discussed today to meet its greenhouse gas and criteria pollution reduction goals.

Non battery-electric vehicles will continue to plight California roadways for many decades. It's been stated today. It's been stated in some of your previous workshops. And this is especially the case in the heavy-duty freight sector. We believe, including the all-of-the-above fuels, including the ones we've been talking about today, in the IEPR it recognizes the end use transportation fuels outlook as the state's electric drive policies are being implemented and the state transitions to the ubiquitous zero-emission vehicle use that it desires.

To that end, we believe that continuing to use a portion of funding from the CEC's AB 118 Program would be important to dedicate investments into these low carbon -- into low-carbon fuel innovation, development, and deployment.

We understand the desire to move more

aggressively toward an all-electric drive future. That said, we strongly encourage the state in general, and the CEC in particular, to recognize the transition time inherent in fulfilling these policy goals while internal combustion engine technology is phased out.

So with that, again, thank you very much for your time. It was great to hear from Jim Boyd again. And it's good to see you all.

Thank you very much.

MS. AVALOS: Thank you, Mr. Fulks.

I'll move on to Rebecca Boudreaux.

Your line is open.

MS. BOUDREAUX: Thank you. My name is Rebecca Boudreaux, R-E-B-E-C-C-A B-O-U-D-R-E-A-U-X, and I'm the President of Oberon Fuels. Thank you to Commissioner Monahan and Commissioner Douglas for hosting this conversation today.

As the CEC considers the future of the state's transportation landscape, we believe it is important to consider the role of innovative fuels in decarbonizing existing transportation and include innovative fuels in the IEPR Update. Dimethyl ether, or DME, can be made from biogas and wood waste. Oregon and EPA estimate DME can

be made from renewable sources and offer 68 to 101 percent reduction in greenhouse gases.

In addition to its ability to be made from local instate feedstocks, DME can decarbonize existing transportation in three ways: one, as a diesel replacement; two, blending DME with propane; and three, using DME as a renewable hydrogen carrier to power hydrogen fuel cell electric vehicles. One molecule can decarbonize existing transportation in three different ways.

But the most important feature of this molecule is the ability to create opportunity, opportunity for feedstock providers, like dairy farmers, to generate additional revenue, opportunity for communities in which DME is produced to benefit from reduced emissions and improved air quality, and opportunity for job creation.

Just two days ago, we welcomed five new plant operators at our site in Imperial Valley who came from the local talent pool and began the virtual training process. We're in the process of hiring four more plant operators. These positions offer head-of-household wages and full

benefits in a California region hardest hit by COVID and is experiencing unemployment north of 27 percent.

In 2019, Oberon was awarded a $2.9 million CEC grant to upgrade its pilot DME production facility to demonstration scale. Located in Imperial Valley, this facility first came online in 2013 and provided field-grade DME for global vehicle demonstrations for Volvo Trucks, Mack Trucks, and Ford. This grant will facilitate the first production of renewable DME in the U.S. and is slated to come online in early 2021.

Thank you to Commissioner Monahan and the CEC team for investing in instate renewable fuel production that can also serve as a source of instate renewable hydrogen production.

As the CEC updates the IEPR, we urge you to include innovative fuels, like DME, in the update as they can play a key role in decarbonizing existing transportation while creating opportunity for the communities in which its produced.

Thank you.

MS. AVALOS: Thank you.

I will call on an attendee that is on the phone line. And I'll read the last three digits of your phone number to let you know it is your turn.

081, your line is open.

MR. COATES: Hello. This is Michael Coates. Can you hear me?

MS. AVALOS: Yes.

MR. COATES: Okay. Thank you. Thank you, Commissioners Monahan and Douglas. I really appreciate you holding this session to recognize some of the needs that the state has in addressing its diverse fuels. I'm Michael Coates, M-I-C-H-A-E-L C-O-A-T-E-S, also with the consulting company, Mightycomm, M-I-G-H-T-Y-C-O-M-M.

Along with my colleague Tom Fulks, we have submitted proposed additions to this year's IEPR, looking at some of the low-carbon gaseous and liquid fuels which need to be addressed. We're concerned about California meeting its climate goals. And we want -- we think that addressing the decarbonization of all liquid and gaseous fuels is a very important part of this process.

As Dr. Martin mentioned, even with the accelerated adoption of zero-emission vehicles, we need to focus on near-term and mid-term decarbonization of existing fuels. And Dr. Martin also addressed the fact that sometimes change can happen quickly. And the Energy Commission, I think, has tried to incorporate this in some of their investments, investing in innovative fuels, like Oberon's fuel that Rebecca just mentioned. I think there's a historic chance for California and the Energy Commission to support fuels like this and continue to provide a space for all fuels that reduce greenhouse gases and improve air quality.

I appreciate your consideration of our submission and would be glad to answer any questions that they might raise.

Thank you very much.

MS. AVALOS: Thank you. And a reminder, one public comment per organization.

And we'll move on to Sasan Saadat.

Your line is open.

MR. SAADAT: Hi. Thanks. Yeah, this is Sasan Saadat, S-A-S-A-N S-A-A-D-A-T, from Earthjustice.

Yeah, I want to point out, you know, I think there's a lot of focus on all the technologies at zero-emission that heavy-duty trucks aren't available yet for. But, somehow, I feel that framing gives too much deference to the like few applications that are hard to reach. The CARB zero-emission market assessment shows that zero emissions are already suitable for more than like a quarter of the truck market. That assessments from 2018. And since then we've seen a huge advancement, even in applications which it considered, you know, less suitable.

So the other thing is that the view of incentivizing renewable natural gas trucks in the near term, isn't that cross purpose? Because, you know, we can just dump the technology later. As an advocate, that gives me pause because technology lock-in isn't just about the vehicles themselves, it's also about mobilizing political and market actors and policy frameworks that extend the status quo, and we see that all the time at these workshops. And it would be great if we could say that these technologies weren't at cross purpose. They both, you know, complement each other.

But if -- I think Dr. Martin's presentation very persuasively shows that there is a finite and scarce amount of renewable gas and liquid fuels from genuine waste. And beyond that, you have to intentionally produce methane by gasifying which, frankly, is far less proven technology than zero emissions. I think Cliff's presentation showed there's only one gasification project in the pipeline. And intentionally producing methane is GHG positive because of methane leakage.

So squandering the like truly renewable fuel and incrementally lowering our carbon intensity, that seems, to me, myopic and shortsighted because it diverts this fuel away from segments where we really need it. We don't need to increase gas use in transportation. We need to use that truly sustainable gas to displace existing gas demand.

And I also think we need to question how cost effectiveness entrenches environmental injustice. And I really appreciate what Phoebe said. You know, assuming these emissions from dairies are inevitable or an ordinarily occurring source of pollution, it sort of puts a lampshade

over the multiple problems of exploitation and extraction, and air and water pollution that happened at the CAFOs. And the EPA's ag inventory shows that the rise of methane from dairies is a recent phenomenon. And it's directly tied to increased consolidation and liquid-based management which doesn't occur under more sustainable models of agriculture.

So the Commission needs to ask, when we ignore the other problems with CAFOs and then just pay them to capture their methane, what does that say for the communities living near them? What is California's plan for those communities?

And you know, Commissioner Monahan asked whether the regulations are enough? The Dairy Monitoring Report shows that the answer is, clearly, no. Every dairy in the value was found to violate nitrate contamination levels.

So I think we need to question, what policies are entrenching these systems of environmental injustice?

Thank you.

MS. AVALOS: Thank you, Mr. Saadat.

The includes comments and I turn to Commissioner Monahan.

COMMISSIONER MONAHAN: Great. Well, thanks, everybody, for joining us. I hope you interested folks will come back for our afternoon session when we'll talk about liquid low-carbon fuels. So we'll be back here at two o'clock.

So thanks everybody. Have a good lunch.

(The workshop concluded at 12:29 p.m.)

CERTIFICATE OF REPORTER

I do hereby certify that the testimony in the foregoing hearing was taken at the time and place therein stated; that the testimony of said witnesses were reported by me, a certified electronic court reporter and a disinterested person, and was under my supervision thereafter transcribed into typewriting.

And I further certify that I am not of counsel or attorney for either or any of the parties to said hearing nor in any way interested in the outcome of the cause named in said caption.

IN WITNESS WHEREOF, I have hereunto set my hand this 29th day of September, 2020.

MARTHA L. NELSON, CERT**367

CERTIFICATE OF TRANSCRIBER

I do hereby certify that the testimony in the foregoing hearing was taken at the time and place therein stated; that the testimony of said witnesses were transcribed by me, a certified transcriber and a disinterested person, and was under my supervision thereafter transcribed into typewriting.

And I further certify that I am not of counsel or attorney for either or any of the parties to said hearing nor in any way interested in the outcome of the cause named in said caption.

I certify that the foregoing is a correct transcript, to the best of my ability, from the electronic sound recording of the proceedings in the above-entitled matter.

MARTHA L. NELSON, CERT**367

September 29, 2020