

[00:00:00] START VIDEO

ASHLEY ZANOLLI

Good morning, sorry about the delay. We had trouble getting the recording going, but I'm Ashley Zanolli and on behalf of EPA Region 10 I'd like to welcome you to today's webinar on the regional economics behind biofuels. This webinar is part of a larger series of webinars designed in collaboration with our Office of Research and Development as well as other EPA program offices. The overarching goal of this series is to broaden the dialogue among both internal and external stakeholders and to convey a regional perspective

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surrounding biofuels issues on a more national level. Past webinars have been recorded in case you miss them. This includes one on the new renewable fuel standard referred to as RFS2, and another on infrastructure issues related to biofuels like underground storage tank compatibility. You can access these recordings and transcripts by visiting the web links, which should be displayed on your screen. It's also in the chat box. You can also find this link by Googling EPA Region 10 webinars.

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I'd also like to give you a heads up that our next webinar will focus on second-generation renewable energy feed stocks, facility design and permitting. It's tentatively scheduled for May 18th, so stay tuned. Today's webinar on the economics behind biofuels was developed in response to stakeholder feedback and will provide various perspectives on how to survive in the biofuels industry. Our engaging presenters will focus on sustainable models for biodiesel and bioaviation fuel production using canola,

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camelina and waste-grade feed stocks. Other topics for discussion include the value of public/private research ventures. Our panelists today include Allen Mitchell, Deanna Carveth and Ryan Hembree from Snohomish County; Ray Benavides from GenX Energy Group; Margaret McCormick from Targeted Growth and Dr. John Gardner from Washington State University. Please be aware that the presentations today are part of an EPA webinar, but do not constitute EPA policy. Mention of trade names or commercial products does not constitute endorsement

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or recommendation for use. We really appreciate you taking the time out of your busy schedules to join us today, and encourage you to ask questions to our experienced and knowledgeable panelists. Furthermore, your feedback is valuable to us and we're listening, so don't forget to fill out the evaluation at the end of the today's event. A link to the presentations you see today will be sent out on Friday. I'm

now going to turn this over to Tommie Jean Valmassy who will be facilitating today's event. She'll tell you more about the logistics.

TOMMIE JEAN VALMASSY

Great, thank you Ashley.

[00:02:30]

Welcome everyone, we're glad to have you here today. As Ashley said, we do record these webinars so that we can post them for you later. So this webinar is being recorded, however your lines are muted. We do want to involve you and answer your questions today, so in order to ask questions you can just type them into the Q and A box. We have some time set aside after each presentation and then at the very end to take your questions, so feel free to type them in at any time. Like I said,

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you are muted and the slides are being moved for you. Ashley mentioned that later this week we'll send you an email with a location where you can download the slides, so you'll have this information to refer to later. There's a raise-your-hand feature on this webinar, but those are really hard for us to respond to so whatever question you have, be it about the content or technical just go ahead and type it there in the box. So with that I want to go ahead and introduce our speakers. First up, we have Allen Mitchell. He's the

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Fleet Manager of the Snohomish County Public Works Department, Fleet Management Division in Washington State. Mitchell has served in this capacity for over 17 years. In 2009, the Snohomish County Fleet received the National NAFA Green Fleet Award and was ranked nationally as the Number Four Government Fleet by 100 Best Fleets. They received the Government Fleet Magazine Environmental Leadership Award and received three-star certification from the Evergreen Fleets Program. Also presenting with Allen is Ryan Hembree. Ryan was appointed as

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Snohomish County's Agricultural Coordinator in 2007 and has since worked to tackle the challenges facing their local agriculture industry. He previously worked in the County's Planning and Development Services Department where he focused on agriculture viability, farm policy and public involvement. He has served the Agricultural Advisory Board for nine years and is currently leading a collaborative effort to develop policy and guidelines that will focus on the preservation of prime farmlands and how to carry out Chinook Salmon restoration plans.

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And also presenting with Allen and Ryan we have Deanna Carveth.

Deanna is a 20-year solid waste professional. Currently, she is the Water Quality Chemist for the Snohomish County Solid Waste Division managing the ground and storm water programs. She is also setting up the Solid Waste Response to the new mandatory reporting for greenhouse gases. Under other duties as assigned Deanna designed, organized and built with lots of help and collaborators, the current crop to market, canola biodiesel infrastructure at Snohomish County's closed

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Cathcart Landfill. So welcome Allen, Ryan and Deanna, let me pull up your presentation here and then the floor will be yours.

ALLEN MITCHELL

Well, welcome everyone. And I'm just going to give a little bit of a brief background on to how all of this got started and if you want to advance a slide

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there one more Tommie Jean, I'd appreciate that. Okay, you see there a picture of our County Executive, Aaron Reardon, and it was really one of his initial initiatives that caused us to go down this path, because he met with stakeholders after he got elected. And in 2005 we set up something called "Priorities of Government" and one of those was sustainable agriculture. And

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so along about that time we in Fleet began experimenting with the idea of, "Well how do we green our fleet and how do we become sustainable and wean ourself off of foreign oil," and all those other good goals to have. And so we began meeting with stakeholders around the state and that's people from the elected officials at federal, state and local levels and entrepreneurs and fuel providers and

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farmers and a whole host of people. We started having meetings with stakeholders and finding out, "Well how do we put all this together starting from scratch?" So we had an initial goal of our Green Fleet, we wanted to be able to use sustainable fuel and be able to have our own fuel, so we wouldn't be held hostage to anybody else. While we're at it, we had this landfill at our Cathcart facility and we needed to find a decent use for that,

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we were just flaring it off into the atmosphere and we thought there must be a better use to that. And so Deanna and her folks started thinking about that and contributing to us, and then we got some other folks involved and she'll talk about the infrastructure. And Ryan will talk about the economics of all of this and how farmers were

involved, but mainly my perspective was to get a sustainable fuel supply for the

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fleet. Next slide please, this is a picture of the county and we're located in the county north of King County in Washington State. And you can see on the little map there the relationship of where we are and where the Anacortes Refinery and other key

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pieces of this operation are. So if you would advance the slide to the next one, please? So we wanted to do several things with our biodiesel initiative. We wanted a home-grown biodiesel product as I said, and Executive Reardon was really behind that and without his support we wouldn't be able to get any of this done and so we appreciate that very much. The fleet conversion to

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biodiesel was just the start; we began actually using it in early 2006 to pilot using biofuels. And we wanted to encourage the local agricultural to grow nontraditional crops with oil-bearing seeds was one of the main agricultural components. And we wanted to be able to dry and crush the seeds locally and to use this feed stock for biodiesel at refineries in neighboring counties.

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And we wanted to create some community resiliency by shortening fuel supply lines. In the event of a disaster such as an earthquake local fuel processing could mean that the county was less dependent on railroads or ports to ship petroleum fuel or their biodiesel fuel feed stocks. We can begin recovery efforts right away with this program. So one of our goals is we use about 600,000 gallons and change of diesel a year, so we wanted to be able

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to use biodiesel to supplant that fuel. Next slide, please. So why biodiesel, and that's a big question for everybody. And among the reasons are reducing emissions from the county diesel fleet. B20, just as a factoid for you, reduces about 3.5 to pounds per gallon of co2

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from the atmosphere. And so it's a significant amount, diesel itself produces about 22 pounds of pollutant give or take. So you can see by reducing that much it makes a big difference. The primary driver was in 2005 we committed to using greener burning fuel in our diesel trucks, which again is about 600,000 gallons a year. We

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did use--switch with everybody else to ultra-low sulfur diesel, which helped quite a bit. It went down to about 15 parts per million from 3 to 500 parts per million in the previous diesel fuel. So about 275 of

our fleet vehicles began using biodiesel in 2006 and we started with a blend of 20 percent biodiesel and 80 percent petroleum diesel. The goal was to have

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100 percent of our fleet using B40, a 40 percent blend, by 2012. And we wanted some assurance of the availability of biodiesel since there wasn't a huge market for it at the point we started. Senate Bill 6508, in early 2006, mandated fuel dealers to sell 2 percent biodiesel out of their total diesel sales, and 2 percent ethanol out of total gasoline sales. At the same

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time we were embarking on this effort there was a House Bill 1303 was passed in the 2007 legislative session, which mandated that fleets would have to be run 100 percent on biofuels and/or electricity by 2012 or by 2015 to the extent practicable, and that's by 2015. So far we've been able to use about--we used--

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actually have modified our program to begin using 10 percent in the cold months, 20 percent in the peripheral months and 40 percent biodiesel in the warmer months. Next slide, please. So here's some of the economics of the local fuel or the current wholesale of diesel is around \$2.09 a gallon. That fluctuates weekly, but that's a rough

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cost. Wholesale price of B20 is about \$2.44; B99 is \$3.99 a gallon, so the desired price of local canola seed is about 18 cents a pound, which works out to be about \$1.41 per gallon of oil. Market price to crush the seed is about \$80 a ton and the cost of methanol transesterification process is about 79 cents a

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gallon. So Deanna, will you take it from here please.

DEANNA CARVETH

Okay, so next slide. Why would we use landfill gas in this whole process? The landfill gas was actually the nexus that allowed the Solid Waste Division to be involved in this process, because we had an essential government purpose--we need to use our landfill gas for something other than just flaring it to the atmosphere. So that was really the--one of our drivers for being involved.

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It's an underutilized resource, we have fewer than two megawatts of power being produced by our very old landfill and we probably have about ten years of gas remaining in that landfill before it declines to its senior years. Then we also thought it might be a way to really counteract the volatile natural gas prices we were encountering in 2007 and '08 when we first built this project. So in 2008 the value of

- [00:14:00] the landfill gas to this project and the dryer was \$65 an hour, so that seemed like a match. It was also very easy to convert the commercial dryer from Matthew's company to run natural gas and landfill gas, which is a slightly less dense fuel energy-wise. So the upside is the piping and that worked out pretty well. And then our local area agency was just really excited and they were very quickly on board with us to get this permitted so we could run this dryer, because they were excited to see landfill gas actually used for something and official. It is a
- [00:14:30] small use of our landfill gas. It only uses about 25 percent of the total stream available and that's been okay. We get the same destruction rate necessary and we're only using this thing for about 45 days a year, so we have a lot of dryer capacity remaining. Okay, next slide. We had a lot of fun trying to figure out which kind of dryer worked best. In 2007 when we realized we actually
- [00:15:00] needed a dryer for this crop, we couldn't field dry it like they do in Eastern Washington, because we're very wet over here. In fact, many 4th of July barbecues have been ruined by our beautiful weather. So we were casting around for a dryer and in 2007 it was boom year for biodiesel and the only dryer currently screened for canola happened to be in Saskatchewan Canada in a little town called Lipton where if that's not the end of the world, you can certainly see it from there.
- [00:15:30] So we brought down this dryer and we hooked it up to landfill gas. It was an eight-ton batch dryer, so you load it up, cycle the seed and then pump it out. And that worked out pretty great. We had thought, "Well, it might make sense for perception issues to do an air-to-air heat exchanger on this process, so that the seed didn't come into direct contact with the landfill gas destruction." But that turned out to be too expensive, so that was the end of that. And then finally we realized that we needed a continuous flow conventional seed
- [00:16:00] dryer, so this batch system really wouldn't work to manage, you know, hundreds of acres of seed. So we worked with the Matthews company and got that beautiful shiny red dryer in place, and it works pretty great. In 2008 we were really up against trying to get all the equipment ordered and installed before May of 2008 when steel prices took a 20 percent jump. So that was pretty crazy.
- [00:16:30] Okay, next slide please. So for the specifics on the landfill gas in case anyone is curious, we tested it in 2007 for contaminants--

specifically dioxin and dioxin precursors. Those are really expensive and hard to test for, but we went ahead and did the full scale testing on it in 2007. We did learn that we can use methylene chloride and toluene as the canary volatile organic compounds. Typically, if you find those

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two compounds you probably will find dioxin, so if we didn't find methylene chloride and toluene then we knew we wouldn't see dioxin. So in 2007 we were clean, we tested again in the 2008 growing both the spring and fall harvest as well as in 2009 and we didn't find any of the dioxins or their precursors. The GC/MS, gas chromatograph-mass spectrometer fingerprint showed identical scans for both the pre-

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and post-exposed seed. And as you might actually expect the volatile compounds that are naturally inherent in the canola seed were lower in the post-dryer seeds, because they'd been exposed to heat and that drives off the volatile organics. Okay, next slide. The project did need an air permit and this is when we found out how excited the air district was about this project. The new burners in the Matthews dryer are actually a little bit more efficient than our exiting flare

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burners, so the best available control technology for the non-methane organic compounds is nine parts per million and we met that. So our permit conditions boiled down to, "Would you look at the dust emissions and make sure you're not getting too dusty?" We're allowed to dry about 4,300 tons of the product per year, after that we need to add a baghouse to capture the dust emissions. So that's about 2,500 of oil seed crop. We could hit the ceiling in about three years, we haven't yet but we continue to keep our logs just to make sure that our dust emissions don't exceed

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our permit. Next slide, please? Oh thanks, so the project development was pretty fast. In 2008 we got a Department of Energy earmark via Patty Murray's office to \$344,000 and then we had some money from the Solid Waste Division and we ran with ordering a conventional seed dryer, the conveying equipment and cap locks and the u trough augers,

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putting in a concrete pad and access roads and fencing; and then accelerating our scale project out here, so that we would have certified scales to weigh trucks. The crusher actually did not come in until 2009, next slide please. So the basic timeline, Allen talked to the Fleet Management Commitment, in 2006 we had small plot trials,

we

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had 52 acres of canola in the ground and we also had two hybrids of mustard just trying to see which produced the greatest amount of seed per acre, which produced the greatest amount of oil per seed per acre, all that good stuff. And WSU was absolutely phenomenal in the field. Dr. Tim Miller was out there with us and we were studying the disease cycle as well as the bugs and whatnot that could be a problem with this crop. And we landed on canola hyola variety. We'd also, this year

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tried to field dry the stuff and it's such a strong germinator that if it's not dry to about eight percent, it will germinate and it did. So we didn't get any oil in 2006. So in 2007 we went ahead and we brought in that batch dryer from the Saskatchewan, we harvested 150 acres and we shipped it all to Eastern Washington for crushing. Anytime you put product on a truck you really evaporate an awful lot of your profit so it was about 900 buck a load, which

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was 30 tons to get it over to Outlook, Washington to Natural Selection Farms. And then in Spring 2008 we committed to having all of our infrastructure up and we made it. We turned the equipment on September 19th, 2008 just as the first truck arrived. Actually, I think Peter had to wait about 15 minutes for us to get the last of the metal out of the unloading auger, but we did get it up just in time. And we harvested that year about 286

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tons. In 2009 we had about 350 tons, but we saw a conversion over to mustard which we can talk about later or offline if you wish. Next slide, so in 2008 we really focused on just that infrastructure. We knew we had to get the seed dry fast to stabilize it. Based on transportation costs we knew we needed a local crushing unit, commodity prices were skyrocketing, our field prices as I mentioned

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before were on May 1st, going to increase 20 percent. So we just really had to throw this thing on the ground fast and I really burned a lot of people out trying to get a design of the facility fast enough to get everything ordered before the price increase. And then get everything on the ground and assembled before the fall harvest. We did actually, in this process try to get an air-to-air heat exchanger in there, but that turned out to be \$750,000 which was about \$500,000

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bigger than our overall budget. So that was a big no-go, so we also chose to manage some of our costs by utilizing our internal workforce. So you see the guys in orange shirts and that's our

award-winning bridge group and they assembled the dryer and got that all hooked up as well as put in the concrete and asphalt and just did a really great job. So, next slide is our budget that we had to get this project going. So we had our Solid Waste budget

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and I've broken it down and that'll be up available later this week, so we probably don't need to spend a ton of time on that. But we did spend about \$1.4 million on this whole thing; about \$844,000 was grants via Department of Energy and then our local Department of Commerce now. They used to be Community Trade and Economic Development and they changed last year to the Department of Commerce. So next slide, tah-dah!

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Actually Ryan Hembree, our next speaker, took that picture one beautiful day. And it shows the facility as it was in October of 2008, since then we have added an extra elevator, which helps feed the crusher system and we've added the entire crusher system itself. So this has been a pretty successful project, we proved the government can actually be pretty nimble and get stuff on the ground and up and

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operational to meet grower and agricultural deadlines. So we were pretty happy with that and I think that's pretty much all I have to say. And so Ryan, with that beautiful picture we'll segue over to you.

RYAN HEMBREE

Sounds good, okay on the next slide here is kind of a snapshot, if you will of some of the economics related to the growing of the canola. And this information was gained from, as Deanna mentioned earlier, some of that partnership with WSU the farmers had in developing

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some of the spreadsheets and inputs as well as in the harvest data. And this was essentially about \$280 per acre including the harvest. As it says here we do tend to have smaller farm sizes according to the 2007; I believe it was about 44 acres is the average farm. So very different compared to Eastern Washington where, you know, it could be hundreds of acres. We've got a price per pound for the crush at about 4 cents per pound and as it says here

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in the other markets, mustard which has come on in just the last two years I believe, looking at about what the buyer is offering is about 39 cents per pound and that's for food crop. And so that's competing essentially with other uses of the land, and canola where the farmer would love to be able to get 18 cents per pound. That's essentially so that they can break even and make a small profit. And given the,

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high amount of canola that's grown in the United States and Canada that's kind of inputs on the price trying to bring additional value to that locally-grown canola, it's kind of similar I guess. And a lot of other products that are being grown, try to value local--the higher price, but it definitely is a struggle at times given commodity pricing and such. So it's kind of a snapshot here and,

[00:25:30] you know if you get 100 acres, 3,500 pounds yielded per acre the farmer potentially got almost \$11,000. So that's not too bad of a return, but we do--or one of the things here is that canola oil also starting about 2006 started contracting and having a direct relationship with petro fuel prices. And so when we started this the canola prices, the oil prices were high because our

[00:26:00] fuel prices were high. And they had that relationship and then the last two years or so it has dropped and luckily for the farmers there was the mustard to be able to kind of come in and provide a bit of a substitute if you will. Next slide, this sensitivity analysis was prepared by one of our equipment operators for the crusher and dryer equipment. So it's based on their knowledge and which is a bit more intimate of this material than I have, but you

[00:26:30] can see here where there's a very direct relationship between an increase in seed price for the farmers and the final output as well as the meal price. And the meal, just to make sure it is known does go into the livestock market and so that becomes a food crop as well as a fuel. And so there's the benefit to both in that regard, next slide.

[00:27:00] Next slide? Looks like we've got a delay here okay, oops if we can go back one slide?

[00:27:30] All right, so a possible--this is other possible crops that are out there and that includes, you know, a variety of crops that potentially could have viability going through the dryer as potentially through the crusher as well. Oil seed radish is one, these other brassicaceae and even going through the dryer is crops like barley, wheat, things like that, triticale. There are being trials conducted by

[00:28:00] WSU and some of those field trials. Next? Okay, trying to ensure that that local market is available, you know, that the local crops can get into local--you know, if the process is locally used is definitely what we are looking for

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and trying to make sure happens. We do have a nice marine-time climate, which for canola actually can do quite well. Other crops like camelina that is being used for oil seed production definitely is not available or does not grow well here given the cooler growing seasons. So the canola is what will yield the best results. There's been concerns regarding cross pollination as well as disease contaminant with other brassicaceae crops

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if they're grown in the Northwest region within Snohomish County as well as up in Skagit County, so definitely a real concern there. There's been state legislation that has helped separate the growing regions for canola and the brassicaceae, so there's been some ways that has been addressed but definitely still a concern among growers as well as the processors. And then as I said earlier that there is the oil

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production as well as the animal feed, and so--and that is it for the next slide.

ALLEN MITCHELL

This is Allen once again and I just want to summarize a few of the key points that you can take away from this. First of all, biodiesel is definitely viable within Snohomish County. And we

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found that the local production of fuel promotes local jobs in the economy, preserves acres for farming not houses, ensures that we have fuel when we need it should supply lines be disrupted. The approach was not done as a technical project, the landfill gas's energy was probably the most technically difficult aspect and that worked out pretty well. We're working on a solution that will not put landfill gas in contact with the seed

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to cure perception issues about contamination. Technically, landfill gas can be a decent fuel source even in a small landfill with a low volume of methane. We found a dryer and a good burner technology that achieves the same destruction of methane and MNOCs as our flares and we appear to get the necessary time, temperature and turbulence to prevent dioxin formation. Some success and challenges, success is

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reflected in the acres of canola grown for biodiesel. We started out with 11-acre plots of various types and are now seeing 100-acre plots in canola production. We anticipate about 400 acres of canola going in this April, it's a great rotational crop and we anticipate about a

1,000 acres of production each season. So what is the technology transfer in future work? We offer tours, plans and time to interested parties. The biggest challenge will be installing a hot-air system that separates

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the landfill gas from the seed. This is a ten-year installation and then the equipment can be moved to a manure biogas facility to retain the sustainability aspect. And there are several of those in the region, so it's very interesting. But we do think it may be applicable to other jurisdictions and next slide, and Deanna will you take it from there?

DEANNA CARVETH

Okay, so for questions and follow-up this is a slide listing all of

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our contact information. I will point out Wolfkill Feed and Fertilizer was instrumental in helping us get the facility designed. And I really kept them on a tight schedule and kept bugging them until we got our design firmed up. The Whole Energy Field Corporation has been also instrumental in getting the crushing facility operational and Dale Reiner has really been sort of our agricultural Jacob. He's been out there talking up about canola, really pushing it forward and talking about its sustainability. And the picture down here on the right-hand side is actually his bio digester

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out at what we call the Honor Farm, which was a piece of prison property where they used to grow food for the prison. So it's now turned into an exemplary sustainable farm including this manure digester. So that's pretty cool. The next slide shows all of our contributors and we have to recognize, of course, Executive Reardon for allowing us to do this, our Public Works Director, all those people in Snohomish County Economic Development, our growers--Snow Valley Farms, which is Dan Bartelheimer

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and Peter Bartelheimer as well as Dale Reiner. WSU Extension was fabulous, of course. Wolfkill Feed and Fertilizer put a lot of heart and soul into this project and really helped us get the design down, so it could function and finally, Whole Energy Fuel Corporation. The final slide of this presentation is required by the Department of Energy to acknowledge their contribution, the \$344,000 grant. There is their standard disclaimer, those of you have worked with them understand how that works. It looks an awful lot like the EPA disclaimer

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slide at the beginning of this presentation and then, of course, our Washington Department of Commerce via the Energy Freedom Fund to help us get the crusher on the ground. And I believe at this point

that concludes our piece of this webinar.

TOMMIE JEAN VALMASSY

Great, thanks Deanna. So we were just hearing from Allen Mitchell, Ryan Hembree and Deanna Carveth. And we have time for a question or two before we move on to our next presenter. So one person asks, "Do you have grease haulers come to the landfill to bring feed

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stock in the form of trap grease for biodiesel?

DEANNA CARVETH

Deanna will take that one and basically we are an agricultural products facility only, so we handle the seed coming directly out of the fields. So as it's harvested in June and then again in September we receive that material, scale it, put it through the dryer, store it against crushing it on-site where we turn it into oil, which we then ship off-site to a whole energy or general biodiesel for

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production into fuel. And then we ship the mash to Wolfkill's Feed Mill up in Stanwood for animal fuel, so we do not make fuel on this property. We simply are taking the agricultural commodity and getting it ready to go into the fuel and the animal feed market.

TOMMIE JEAN VALMASSY

Okay, great. So well someone else asks, "Will you be producing enough to sell to other agencies?"

DEANNA CARVETH

That's

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probably--all of us can certainly speak to that.

ALLEN MITCHELL

It's the \$60 million question, this is Allen. Well, so far we don't have enough to totally sustain our fleet, so I guess first that's the major milestone to get there. And secondly if there is an excess we'll see, I mean it's really not up to us because we don't own the fuel seed per se. So we do have a supplier contract where we buy the end product, but we

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only need to buy as much as we need internally. So it's kind of up to others to determine what happens if there's an excess crop.

TOMMIE JEAN VALMASSY

All right, one--

DEANNA CARVETH

[OVERLAPPING] Ryan, I don't--oh I'm sorry, I was going to say Ryan, I don't know if you want to speak to what the farmers need, but right now we have excess crusher capacity. We can crush up to 8,000 tons of material a year and we're nowhere close to that, so we are constantly looking for more material. That is what we need to make this facility profitable and we're really hoping our

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growers will help us out here.

RYAN HEMBREE

Yeah, I'd love to chime in on that one. I think as I stated earlier with retail, basically the retail fuel prices going down as the relationship to the canola oil. The price hasn't been there. You know, the farmers' needs for per pound of seed grain produced, it's by 10 cents per pound but yet the market they can--biofuel producers can buy on the

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market anywhere from 9 to 15 cents on the commodity market for a pound of canola. So it's that local price is tough to reach, if prices go up there's additional opportunities for local farmers to be able to grow and sell it and then make it a profit.

ALLEN MITCHELL

Take heart Ryan, the EIA is saying that prices are going up this summer.

RYAN HEMBREE

I watched it on the news this morning; basically get used to \$3 a gallon

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for fuel for the next, at least until probably through summer. And actually that could yield some good results for our local canola growers, absolutely.

TOMMIE JEAN VALMASSY

Okay, great. So let's take just one more quick question before we move on to our next presenter. Someone asks, "Why did the county decide to develop and build and manage the entire process when independent canola growers, processors and oil producers are present in the region?"

DEANNA CARVETH

I'll

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take the middle section, why did we choose to get in because it was a \$1.2 million investment. And agriculture runs on pretty tight margins, so our goal because it was important to Allen and our Executive to--our goal was to run a cleaner fuel. The only way to get a local market for that cleaner was to help kick the industry forward with a little incentive. So the intent for us was to build the equipment and as a government agency we can receive grant funds

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that aren't necessarily available to private parties. So our goal was to just be the pass-through, we don't actually operate that facility. We have an RFP out on the street right now, we are looking for an operator to go ahead and operate this facility, working with the growers to incentivize further acres of crops in the fields. We are looking for somebody to just really turnkey this facility. We will supply the gas and make sure it's an uninterrupted flow while the dryer is operating and then somebody else just operates it and runs with it. And then the goal is, as our landfill

[00:38:30]

gas supply goes down to not even being able to run the dryer that that equipment can be surplused and moved off-site and becomes the basis for a whole industry here in Snohomish County.

TOMMIE JEAN VALMASSY

Okay, anything to add Allen or Ryan?

RYAN HEMBREE

I think Deanna summed it up well. I mean it's, the farmers are growing the crops essentially in cooperation. Ideally it's in cooperation with

[00:39:00]

the operator of the equipment, you know, that RFP that she mentioned. And so that the operator of the equipment, in the ideal role would be that they are coordinating field contracts, the purchase, harvests, those kind of things along with the farmers.

ALLEN MITCHELL

And just one other piece of information, I'm very thankful. Some of you may know that at the end of 2009 the Alternative Fuel Energy Tax Credit went away. And

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that would have meant a dollar a gallon increase to the cost of biofuels to the end users, and obviously that was a large problem. So thankfully to our congressional delegation, especially Senator

Cantwell and others, they managed to get a bill passed again reinstating that for another year. And we're hoping there will be a longer-term commitment to that, but at least we have that dollar a

gallon credit back

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in vogue so we can afford to keep using the fuel.

TOMMIE JEAN VALMASSY

Okay, great. Well if you have--I'm sorry, go ahead.

RYAN HEMBREE

[OVERLAPPING] As well as--oh just real quick, is I think I didn't mention it earlier but I think Allen did is that this really did stem from the farmers as well as the processors looking for additional opportunities. And so coming to Snohomish County and looking, and Executive Reardon looking for additional opportunities and knowing that there was potentially some infrastructure in place, so that's kind of where

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it really did start.

TOMMIE JEAN VALMASSY

Great, and so if you still have questions for Allen, Ryan and Deanna you can go ahead and keep typing those in and hopefully we'll have a little bit of time for questions at the end. And I'm going to move on to our next presenter--Ray Benavides. Let me pull up your presentation here, Ray. So Ramon Ray Benavides is responsible for the business development aspect of GenX. He became

[00:41:00]

involved with GenX in the initial planning stages and formation in the fall of 2006 and was instrumental in the development of the Corporate Formation Preferred Shareholder Investor Program, initial code compliance and plant construction. Ray has held the position of Chief Financial Officer, he also has experience in resource logistics, planning, construction, safety, project management, environmental compliance, process hazard analysis, root cause analysis, emergency management, and

[00:41:30]

code enforcement. So with that Ray, the floor is yours.

RAY BENAVIDES

Thank you very much, and I would like to take the opportunity to thank everybody for attending today. If we could go ahead and start the presentation, as the invitation to become a speaker for this

[00:42:00] presentation today was forwarded to our organization the perspective that we have is a little bit different than a regional perspective as far as EPA Region 10. Our organization is involved in the entire nation

and we're going to give a higher look and a hierarchy look of the practical approaches, how to hopefully put yourself in front of these centers and understand the different organizations that have that. And so in my case I have key bullet points and phrases here for the group, but important for everyone to understand is the candy is in the notes. And so with every

[00:42:30] organization I've been able to provide this presentation with key, critical elements that will help you shorten the timeframe or timeframes or the key points of contacts so you can get your organization started off and running and have a very good relationship with them. So if I could, my ultimate goal is to provide you the ability to ask the right questions regarding your participation in this industry successfully as a business. And as we know, that the biofuels industry as a whole,

[00:43:00] which is not just biodiesel is in severe distress. And our group has been instrumental in becoming stakeholders and help establishing RFS2 and working with different agencies. And we have very strong relationships with the Department of Treasury as well. So go ahead please.

TOMMIE JEAN VALMASSY

And Ray, if you could speak up just a little louder. A couple of folks are having a hard time hearing you.

RAY BENAVIDES

Thank you.

TOMMIE JEAN VALMASSY

That's great.

RAY BENAVIDES

[00:43:30] All right, thank you. The Department of Agriculture is our friend, and last they initiated the Section 905 program. This program compensates biofuels producers of all types as long as they're qualified. And in this program several key things must occur. And the first thing being that you have to be in a rural area with a population of less than 50,000. You also must be registered with the

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EPA as a fuels producer, you must be a legally registered business entity. You must also be registered
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with the Internal Revenue Service, recognized by them as being a biodiesel producer or biofuels producer. In this note and on

specifically this slide, in the notes I have placed all 50 state contacts. This program, even though it's a federal program is coordinated through the state coordinators through the Department of Agriculture. And for example, in the State of Washington we use Ms. Mary Traxler and she's supported by Ms. Tuana Jones. Every state has a key coordinator and it's important for you, wherever you're at in the country to

[00:44:30]

have that relationship with them if you meet that critical criteria. So those are some things that I think might be beneficial to you as the listener today, next slide please. There are several other programs that the Department of Agriculture has and sometimes they're overlooked. So I've just given you some key bullets, this comes right off of their Internet site. There are some things that you need to understand here and even though your

[00:45:00]

area may not be "rural" it could also be considered rural in nature. So on their website is a critical factor for determining whether or not your address is a qualifier. And you can actually put in the address of the facility or location that you're looking at to possibly determine either introduction of a biofuels unit or seeing if you actually do qualify. And you can screen that process there, the state coordinators will help you with that if you don't have that, but the

[00:45:30]

Internet site dose have that capacity there. And we are participating in--as our organization we are participating in this program heavily, next slide please. The Department of Energy, it's a multi-faceted organization and the more we present and the more that we travel this county the more we understand the

[00:46:00]

Clean Cities programs. And I want to highlight that for all renewable fuels producers, whether its biodiesel, liquid natural gas, CNG, whatever perspective that the renewable fuels producer would have the Clean Cities Program I'm finding is a very useful resource. And almost every major metropolitan area has a program that's well established. Some things that are nuances, especially biodiesel would be the ultimate fuel vehicle

[00:46:30]

by this credit. Now, this is a program that applies to fleets and it

applies to fleets that are in what they call designated metropolitan service areas, MFAs. And most fleets and fleet program managers already are in this program. It also applies to utilities and so what happens is these programs under the Environmental Protection Power Act, I believe it's EPPACT of 2005 is required to have

[00:47:00]

an alternate fuel vehicle program. And so every time they purchase an alternate fuel vehicle, which could be a flex fuel vehicle they would get a vehicle credit. Well, as a biodiesel, which is recognized by the Department of Energy as a technology, the organization can also develop a biodiesel credit. Now, the State of Missouri led the way in 2004 and they launched their program. And they

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used the excess credits that were derived from biodiesel use, got permission from the Department of Energy to convert them to the fuel vehicle credits at a standard formula. And they used that as a program to offset the higher costs associated with biodiesels for their fleets. And in fact, they went into partnership with their own state's biodiesel producers and they developed their own or enhanced their own economy

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as a result of that. So Missouri led the way and it's well documented, and I've given you the Internet site there that the Department of Energy uses which is the Ultimate Fuels, I believe it's Development Center. It's a great resource for people to use and you can learn more about those programs there, next slide please. Of course, the Department of Treasury and we heard earlier with regard to the ultimate fuel vehicle of fuel vehicle credits.

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Again, coming from a biofuels perspective of EPA Region 10 it's not just about biodiesel, so I put the different credits that may or may not be available currently. But I put them in place, because these are the things that as a biofuels producer you should be aware of. The designation of the NF means non-fungible. So in other words this is a business credit or a entity credit, because certainly public entities--

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I believe it has been determined that public entities can qualify in this program. So the F designates as fungible as this is where it can actually become a refund back to the entity that is either mixing, producing and/or using and depending upon how the person sets up their contracts for their fuel purchases depends on where that credit is filed for. Understanding that there is a formal process for registration with the Department of Treasury,

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there is now going to be some further things that are going to happen this year. For example, all biodiesel producers will have to go onto the XTAR System, which is a federal compliance system regarding what we call terminal transactions that are non-tax. So there's a compliance issue that all biofuels producers will now have to face that wasn't there before. The alternate fuel mixture credit, we affectionately call this the biomass credit, that's available at 50 cents per

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gallon for qualified biomasses and again the IRS has very clear direction on how to get there. And then for people that are renewable diesel producers and renewable diesel qualifies under two categories and that's ASTM-975 and ASTM-396. That is actually considered to be a non-ester diesel and the entities may be entitled to

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a low sulfur production credit at five cents per gallon. We're not participating in that program currently, so I cannot tell you if it's either a non-fungible or fungible and that's why I have my question mark there. But we are preparing to move into that program this year, so those are some of the things that are there. I would like to provide clarification for everybody, the Senate has passed the extension of the credit. However, because of this and the changes there in

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the Senate Bill or the House Bill 42, I believe it's 13, it's in reconciliation and it has not gone to the House yet for reconciliation. We have time frames on our side, but being involved at the national level as we are the extension of the credit we do not believe will come back until the middle second quarter. And just giving that as a heads up for people that are looking for that, it is affecting the industry adversely and not just the biodiesel industry, but all renewable fuels industries are

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right now at risk. All right, next slide please. EPA, I love the EPA because they actually created, they knew actually a commodity by the invocation of Renewable Fuel Center One and now Renewable Fuel Center Two. And without getting into a lot of detailed information the renewable identification number is actually a fungible commodity once critical criteria is

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met. The nuance here is that this is a new commodity market that has been created to ensure that both the renewable fuels, producers and what they call the obligated parties, so basically petroleum refineries and there's a clear definition of that in the code. Well, basically it allows or actually it's a method for tracking renewable

fuels being integrated into the fuels market and the obligated parties

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have a compliance criteria. It's all supported, it's a very good program but I do have to warn people that in either case these rules and regulations regarding the RIN and its transactions need to be clearly understood, especially with RFS2 coming to play in July 2010. There are significant penalties associated with noncompliance and our work with the Environmental Protection Agency at the national level gives us a better

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understanding of their focus and emphasis on these new programs. So there's a lot of information on Renewable Fuel Center Number Two, it's on their website. I've given the Internet link there, epa.gov@otaq. The best thing that I've found and the best thing for people who are in this program to move forward is to always, always consult with the Environmental Protection Agency if you're going to start into this program. Because you really want to know what you're getting into here, we don't want to have an

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industry black eye if you will. All right, next slide. This is an important piece, because now understanding that this was going to be a national presentation it would have been tedious for me to try to give you the state incentives and the regulations. So the website developed by the Department of Energy, which again the address is here for you, has the most recent data for all states. It's a very valuable resource.

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We use everywhere we go, and we have contracted operations throughout the country now and we find that this is a very informative site. Many states also have American Recovery Act funds, usually done through their equivalencies of Commerce and Trade or Community Economic and Development. And you can get more information from those state entities. I would also like to point out that not

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every state has a renewable fuel portfolio or standard or a carbon fuel standard, so they're in the process of developing. And that is actually being driven from the federal level down, just for the issues of compliance with the greenhouse gas emission profiling, renewable fuel standards. Some states are leading the way, for example California with their low carbon fuel standards. So the DOE site is very informative, it is being updated right now because almost every state is finished with its legislative session and so the new rules and regulations

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either regarding biofuels, renewable energy and climate change are all listed on this site and it's very valuable. Next slide please? So putting it all together, and I've left a quote there here for you. I think it's important as an industry that we develop and foster the relationships with the agencies that we work with. In the past

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performance of GenX it's been very successful in developing and

fostering these relationships, so when we do have issues that are of question we get reliable information, we get it very quickly and it does not impede our ability to conduct business throughout the nation. We approach our relationships with them with as a partnership, it has been a very successful strategy for our program. And hopefully you can learn vicariously from this, but if your organization is not

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developing these relationships with the key people in these governmental agencies at whatever level you're working with I would suggest that you go back and revisit that and develop those. Because it certainly has helped us in the past and in the next three slides you'll see why. Go ahead, please. So we were actually founded in 2005 as a company called WVO and we were a biodiesel producer. We are privately held, today we are not just about

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biodiesel, we are about the entire biomass based program as it relates to the definitions established by the Energy Independent Security Act. So we make biomass-based diesels, so we manufacture biodiesel, renewable diesel, biomass-based fuel oils and marine vessel fuels. We supply a lot of major industries, could be paper pulping mill, we're now looking at power generation, so

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the whole point of this is that understanding these relationships and these organizational structures has been able to provide us flexibility in the marketplace to where if I was just in biodiesel alone I would be hanging on the vine. Next slide, please. Recently, just recently--actually last week--we were awarded our first grant for our advanced biofuels refinery. We are unique, we are I think two or three years

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ahead of everyone in the industry regarding technologies. And so we were able to achieve with the European carbon intensity models a 98 percent reduction in our carbon footprint. This has to do only with our manufacturing processes and the amount of power that we use. We will not use process heat derived from any type of combustion source ever again. We do, as the caveat of our organization we do help other people with relationships to compliance at all levels. As a result of that we

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achieved a 1,700 percent increase in our revenues last year as compared to 2008. It has changed our position significantly, we are finalizing our formal audit and we're recognized by the industry as industry professionals and as leaders in this industry. And I believe that's going to end my part of the presentation.

TOMMIE JEAN VALMASSY

Okay great, thanks Ray. So we'll just take a question or two here before we move on to our next presenter. So in addition to the information you provided on

[00:58:30]

incentives can you talk about the functional lifetime of the LFG production at your current site? Is it only 10 to 20 years and actually, I think--

TOMMIE JEAN VALMASSY

Actually, I think--I'm sorry, I think that might be--you know what? I'm sorry, that was for the previous presenter in Snohomish County, so let me hold on to that one. Here's another one for you, Ray. Someone writes, "Since 75 percent of the cost of biodiesel is for the feed stock

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what incentives exist for waste-to-fuel conversions, especially for municipalities and utilities?"

RAY BENAVIDES

Well, actually we're beginning to develop that model with our group, because MSW, Municipal Solid Waste Program, is something that's new that's been allowed into RFS Number 2. So if an organization has the ability to get their feed stocks qualified in accordance with the EPA's

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rules and regulations that will be finalized, I believe in July, there's an opportunity for a RIN generation event on the conversion of that waste to fuel. So that RIN in today's market is work about, just I'm going to say 20 cents per RIN. But because the fuel might have an energy content and it might have a relationship of 1.5--I would presume this to be 1.5--that that RIN value would be like 30

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cents per gallon. So that 30 cents per gallon can be leveraged if an organization, for example like Snohomish County is vertically integrated, they will actually be able to those RINs and they would

have a federally qualified separation event and then they would be able to trade that RIN on an open commodity and an open market. So they would be able to recover at 30 cents per gallon of their production that they could actually monetize. So as far as

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incentive for converting I don't see there's going to be any of that. Now, depending on the size of the municipality or other entity if in a

rural area of less than 50,000 they might be able to qualify for the Department of Agriculture's Program, so where they can receive an incentive from the USDA regarding the BTU value of that commodity. So they might be able to capture that as well, so those are two possibilities from a waste to solid--

[01:01:00]

or waste to fuel program that a municipality may be able to participate in.

TOMMIE JEAN VALMASSY

Okay, great. So that US Department of Agriculture, that was on the fourth slide. A couple of people are asking if you can get copies of these slides and you can get copies. What we'll do is later this week send you an email with the link where you can download all of this information. One more quick question for you Ray, what feed stocks do you plan to use for your advanced biofuels

[01:01:30]

refinery?

RAY BENAVIDES

To date the only feed stocks we have not converted into a fuel would be jatropha and algae to date. Our program for the last three years has focused on qualification of every oil feedstock in the United States and abroad. We have manufactured pollock, which is a fish, basa which is a fish, every known oil in the United States whether it's sunflower, safflower, camelina.

[01:02:00]

We've pretty much done them all and we have a very good program that's in place with regard to our fuel technologies. And so there's nothing that we have not been able to do successfully do currently.

TOMMIE JEAN VALMASSY

Wow great, okay thank you. Well, if you still have questions for Ray please do go ahead and type those in and we're going to move on to our next presenter, Margaret McCormack. And Margaret, let me pull

up your presentation here.

MARGARET MCCORMICK

Okay.

[01:02:30]

TOMMIE JEAN VALMASSY

And so Dr. Margaret McCormick is the General Manager for Bio-based Materials at Targeted Growth Incorporated or TGI. She is also a partner in Integra Ventures, a life science venture capital firm. She was formerly with BCM Technologies, which is the Venture

subsidiary of Baylor College of Medicine and with McKinsey and Company. Dr. McCormick is a member of the Washington State Clean Energy Leadership Council, Director on the Board of the

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The Biomass Organization and the Treasurer-Executive Committee member of the Washington Bio-Technology and Bio-Medical Association. Dr. McCormick earned a Ph.D. in biology from the Massachusetts Institute of Technology and a BS degree from the University of Wisconsin Madison. So Dr. McCormick, the floor is yours.

MARGARET MCCORMICK

Great thank you, and thank you for the invitation to speak today. I'd like to touch on the activities of three companies that are serving as snobs in the supply

[01:03:30]

chain for an oil seed to jet fuel chain here in the Pacific Northwest. But then also end the discussion with some comments about how the story is much broader than these companies, and that to truly have a successful biofuels industry it will take a concerted effort across academia, government, farmers, technology developers and contributors, and the market. So if you go to the next slide, the first company I'd like to talk about is Targeted Growth itself which is a technology developer.

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And Targeted, TGI, was formed in 1998 and we are based here in Seattle. We have about 60 employees both across the United States as well as Canada, and we're still private. We have raised considerable private financing, and if you go to the next slide our technology is around increasing yields in both food and energy crops. So listed on this slide are

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different crops that we are currently working on. The two crops I'd

like to focus on today are camelina and algae. And we believe that yield is really important, you know, obviously if food but also in

energy because this is what was stated earlier in a question--the feed stock itself accounts for about 75 to 85 percent of the cost of the resulting fuel. So to have cheaper feed stocks will definitely help us as we try to build a sustainable industry.

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If you go to the next slide, to start talking about camelina. So we think of camelina as an industrial canola, it thrives--or if you've ever seen a camelina field or a canola field they look very much the same in terms of the pretty yellow flowers. The difference is with camelina

is that it actually thrives on marginal soils. It does like cool weather, but it doesn't like wet weather. And so the types of land that you typically would grow camelina

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on would be in rotation with dry land cereal crops such as some of the wheat acreage in Western Montana or some of the wheat acreage in the Yakima Valley and that type of thing. Usually these are areas where the farmers will rotate their wheat acres with cam fallow as opposed to putting another crop on. So camelina doesn't compete with food in that sense, since it's not taking away the food

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acreage. It's taking away cam fallow acres, and helps to in essence be a cover crop in terms of helping to protect the soil from wind and soil erosion. And help mitigate pest issues with the weed acres. It has reduced input cost, doesn't need the irrigation and has fairly low nitrogen inputs. And as a result is, you know, much less per gallon in terms of the inputs and things such as soybeans and palm oil.

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TGI started working on camelina to improve the germ plasim about six years ago and since we're really a technology provider we didn't have the resources to try to put forth this crop into the market. And so we developed this subsidiary along with another company called Green Earth Fuels to--actually we formed a joint venture with Green Earth Fuels called Sustainable Oils. And that's the second company I'd like to talk about, so Sustainable Oils

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is a company that is actually taking the germ plasim and getting it into the marketplace. And so it does breeding of the leaves, germ plasim it's developing the crops from an economic point of view, and then does the distribution and sales to the farmers themselves as well as contracting those acres. And getting the harvest and then getting the crops to the crushing and

[01:07:30]

eventually to a refinery. You can see on slide four, some of the areas that we've been testing the camelina in fuel trials primarily in the

Northwest and here we are at the next slide. So in terms of camelina as the next generation feedstock; they have a lot of really good attributes.

[01:08:00]

along with UOP and Sustainable Oils products. It's a technology developed for conversion technologies and Michigan Technology University, we did a study to look at the life cycle analysis of camelina to Jet A, and that paper will actually be published soon. And we basically show that there's an 84 percent

greenhouse reduction versus petroleum-based Jet A. Another attribute of camelina, but which is also true of any oil seed

[01:08:30]

is that you can use technology such as UOPs hydro training technology to develop 100 percent drop in replacement fuel. What this means is that the fuel itself is molecularly the same as the fuel that you would get from a petroleum process. So you can produce both a Jet A or JP-A, which is the military fuel, or a green diesel that you can use the same petroleum infrastructure to

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transport the fuel and also use it in the same engines for those types of fuels. And as I stated earlier camelina does not compete with food. It's not poisonous, so if you ate it you wouldn't die. It doesn't taste very good, there's no food market of it. And because of the way that we've been positioning the crop in the market we're really focused on

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those cam fallow acres as opposed to the prime growing acres. And also in the way that camelina is priced the farmers would usually go for the food acres if it's beneficial versus camelina. If you go to the next slide, please? In the last year or so camelina has really taken off as a jet fuel. We participated with Boeing and Japan Airlines last

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January in the first flight using camelina as a bio jet fuel; and since then there's been numerous instances where camelina fuel has been used. For those of you in the Pacific Northwest, the Sea Fair is a big event here in August. And camelina fuel was used in the

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hydroplane that had the fastest time. Granted it wasn't during a race but was just during an exhibition, but it was pretty exciting. Sustainable Oils received contracts with the Navy and the Air Force

last fall to supply them with thousands of gallons of jet fuel. And the Navy did its first testing of that fuel last October, and two weeks ago the Air Force actually demonstrated using an A-10C Thunderbolt,

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the first biofuel military flight. So that was very exciting and the Navy, not to be outdone is going to follow that up on Earthday in a couple of weeks to run an FA-18 Green Hornet on camelina. So, you know, we see these things; it's great things helping to show that you can have a viable energy and fuel program based on a biofuel. Camelina, we think is fabulous near-term

[01:11:30]

opportunity crop. We can grow it now, we can process it now, but it's still limited acreage. And probably in the United States there is five

million acres potential for camelina, which isn't enough to really make a significant dent in our transportation needs. So if you go to the next slide, TGI also has a program in developing technology around algae as a

[01:12:00]

feed stock. We view this as a next generation feed stock that will be available, you know, hopefully within a decade. Once again, it does not compete for food or farmland, but because if you look at that little bar graph the potential gallons per acre of algae crop is so much greater than for a terrestrial oil seed that we think it holds a lot of promise. And our technology is based on genetically engineering,

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and so we're engineering organisms that we will then have partners with to help bring that to market later on. If you go to the next slide, the third company I'd like to talk to you about is actually a bio refinery. All this technology development is great and the feed stock development is great, but aside from the biodiesel refineries there are no commercial scale refineries that are creating the

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drop in replacement fuels, the jet fuels and the green diesels from a oil seed crop. And so there's a project afoot here in the Pacific Northwest called AltAir Fuels, which is actually working with Sustainable Oils and Targeted Growth and a number of the companies around here to build a bio refinery up in Anacortes up at Tesoro refinery site. And that particular refinery

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would get feed stock such as camelina and convert it most likely into a 50-50 ratio of a Jet A fuel and a green diesel. And in December of last year, Alta Air signed a memorial or MOU with 14 different airlines for an off-take agreement, so that if we build this refinery we will have

customers that will want

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to take the fuel, which is a huge need. Without that type of agreement in place it would be very difficult to get the financing for this type of refinery. And I'm pleased to announce and thankful to the

State of Washington that Alta Air Fuels was the recipient of, or was one of the SEP awards that I believe the governor announced last week. Just to finish up on the next

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slide I'd like to talk a little bit about, you know, while these three companies are, I believe, doing a great job of helping to or participate in the biofuels industry it really, you know, to quote Hillary Clinton, takes a village let alone to raise a child, but to launch a biofuel. And I believe some of the other speakers have talked about this before, but

this is just a list of some of the different areas that need to be

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focused on from R&D and the feed stock and conversion technologies, but you need the universities and national labs, companies that specialize in that type of thing. And DOE and DARPA have been instrumental in financing a lot of these technology developments in the feed stock production and the farmers themselves in growing the feed stocks. So companies like Sustainable Oils, but especially the area's university extensions

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helping to teach the farmers what it means to be in this business as well as having the retailers and distributors around. The conversion processes and refining, the biodiesel, the same technologies and also the hydrogen treating technologies, but also the engineering firms that support those types of technologies, the construction companies that--you know, you can go on and on.

[01:16:00]

But especially as Ray spoke about before, the policy support and the regulatory support are definitely needed. And finally the funding. You know, we're trying to create a industry, the biofuels industry that is competing with a really entrenched petroleum market that has over a century in development and trillions of dollars investment. So we need that type of funding and the incentives to help get this thing launched. So that,

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you know, at the end of the day we create an industry that is providing a lot of jobs, reduces emissions and also helps the United States with energy independence. And I just have to say that the Pacific Northwest I believe is a fantastic region for all this to occur,

because there is so much of the support that's needed. And so much of the technical expertise from the universities such as WSU, from the National Lab and from the various state.

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agencies. So with that, that's my presentation.

TOMMIE JEAN VALMASSY

Great, thank you. So let's take a question or two here before we move on to our last presenter. So Margaret, someone asks, "Is TGI involved in GMO technologies?"

MARGARET MCCORMICK

So yes, we do Genetically Engineering Technologies for those crops primarily where it is already accepted. So

[01:17:30]

on the food side, for corn and soybean and canola where like, 75 to 85 percent of the U.S. acres already have GMO or GM traits. We've developed GM technologies for something like wheat where genetically is not used. We do not use the GM approach. In camelina, the

[01:18:00]

current seeds are not genetically modified. It's using traditional breeding practices and something called Margaret Assisted reading, which is not a genetic engineering tool. In algae we are developing genetic engineering, genetically-engineered strains, but I guess all of that is still at the lab and we're carefully following any type of permitting and regulatory requirements that would be needed as we would bring

[01:18:30]

that to any type of pilot or demonstration skill.

TOMMIE JEAN VALMASSY

Okay, great thank you. So we do have more questions coming in, you can go ahead and type in your questions for all of our presenters, but let's move on to our fourth presenter here, just so we don't run out of time. So we have John Gardner and John, I'm going to pull up your presentation here. So John Gardner is

[01:19:00]

Vice President for Economic Development and Global Engagement at Washington State University. He directs the programs related to commercialization and small business assistance, both in Washington and around the world. The objectives are to maximize return on the state's investment in WSU for the benefit of the state and its citizens. Gardner is a native of the Kansas City area and has

degrees in agriculture and plant science from Kansas State University and the University of Nebraska. He worked for 20 years in North Dakota for both

[01:19:30]

NDSU and the oil seed industry. Prior to his move to WSU he was the Vice President for Research and Economic Development at the University of Missouri. So welcome John, the floor is yours.

JOHN GARDNER

Well, thank you and I'm batting cleanup here. And my message is one of summary, of the previous three sections of speakers before we open it up to the general Q and A. And my message is simple, it's really two-fold,

[01:20:00]

and if you can have the next slide. The first message is, as Margaret talked about a village, is that moving these new technologies to

market particularly the U.S. biofuels industry where we're trying to create a new era, an era of sustainable feed stocks, sustainable economics and really sustainable whole environmental systems around this new next generation of the biofuel industry. And this is difficult, you know, because we're talking about

[01:20:30]

the intersection of an industrial sector like Margaret mentioned, that being of petroleum and mine products to one of agriculture and food. One that lives on annual cycles of weather and rainfall and so forth. So this first, moving these technologies into that market is a challenge. And it's not a linear process, as Margaret mentioned it's a very cyclical process and I just in summary suggest, and you've heard these from the previous three speakers, there's universities

[01:21:00]

and labs and community colleges and land grant universities both in Washington and Oregon and Idaho, that Pacific Northwest but across the country that are involved in this as well as the small firms, the emerging firms, as well as the large firms. Think of Margaret talking not only about the startup TGI and their affiliates, but also Boeing for example, a large multi-national as well as government. I mean, you heard Ray talk about things like policy, things about standards, things about incentives

[01:21:30]

and so forth. So I guess my first message is keep in mind the challenge and all the players in this process, and lean on them, you know? From my perspective being a member of a land grant university, that's our job, that's our mission. Learn how to approach these kinds of institutions whatever they are, learn how to approach

them, how to be effective in communicating your needs and then recognize the link between all of the players

[01:22:00]

as Margaret suggested, in the village. So that's the first real message, the second message and that's the last slide here, is really a summary of all the kinds of public places where there is funding or in-kind help for just the kinds of things you're talking about. So in summary and these are again what you heard from the previous three speakers, don't forget local jurisdictions. You heard of Snohomish County, for example and how highly

[01:22:30]

motivated they were to make this work. In my estimation all economic development is local and so your local entities be it a city, a county in the state of Washington for example, port districts, other kinds of local jurisdictions will usually be your most highly motivated champions and partners. And don't overlook their kind of help, whatever it may be. And you heard about a fantastic story in

[01:23:00]

Snohomish County for example. Secondly, state agencies and again depending on the state it could be commerce, it could be agriculture, it could be ecology, natural resources, a whole host of different kinds of state agencies. They could be sources of funding and sources of policy help, but also sources of support for both local and federal resources. The State of Washington, for example did set aside some \$40 million, which has been awarded in two rounds for the Clean Tech Industry and Margaret mentioned

[01:23:30]

that TGI was a recipient of one of those grants for Alta Air--their affiliate that's working on the bio refinery up in Anacortes. So state agencies could be a source of funding, but they're also resource from expertise and an advisory perspective and policy perspective. Third, federal agencies and I thought Ray did a great job of summarizing some of the federal agencies, particularly for example like USDA. It's

[01:24:00]

interesting, in this next generation of biofuels there is actually an interagency working group. In other words, representatives from DOE, EPA, USDA, Defense all working together meeting almost weekly to try to blend their various programs, which essentially were established and operate in silos to build bridges between those silos to deliver, you know,

[01:24:30]

both the technology and the policy that's going to be necessary for this gen biofuel industry. So these federal agencies are really aligning themselves. Defense, for example, is at the very front end of

the chain with DARPA funding for the most, probably risky kind of NextGen research. Defense is also at the user end at the far other

end, becoming a primary first market for biofuels for both Naval applications as well as air applications.

[01:25:00]

energy funds the basic research, which then gets past the USDA and you saw the rule development, USDA rural development programs, both grants and loans that Ray listed. And finally, the Small Business Innovation Research Program, that's being the SBIR or STTR programs, which 11 federal agencies have. These are grant programs that are public-private partnerships. The State of Washington for example this SBIR, our program, is vastly underutilized.

[01:25:30]

The State of Washington could have easily have doubled to triple the number of SBIR grants that are awarded to emerging firms in the link between a marketplace, a technology from a university and emerging business. So in that I'll summarize that again, I appreciate to being invited, listening to the previous speakers and we all stand ready for questions.

TOMMIE JEAN VALMASSY

Okay, great thanks.

[01:26:00]

So let's see, John one specific for you. "What synergies exist for projects such as using flu gas from power plants to feed algae in waste water treatment works for biofuel?"

JOHN GARDNER

Well, you know, and theoretically that's--in other words a source and a use combined, that being taking carbon that's being emitted to the air and contributing to the carbon problem in the atmosphere and then trapping

[01:26:30]

that. And algae is a logical one from that perspective and it will have to be a public-private partnership that happens. I only know of a couple of places in this country that have actually done that, or are trying and attempting to do that. Will that be common place in the future? I would guess so, it only makes sense, but involves a partnership of some unusual people in the village. And it sounds great on paper, but I haven't seen a lot of places where it's actually happening yet but it's definitely on the

[01:27:00]

drawing board in lots of places in the country.

TOMMIE JEAN VALMASSY

Okay, great. So I just want to let you know, you can go ahead and type in your questions for any of our presenters. If you have your hand raised that's something that we are not really able to respond to, so feel free to just go ahead and type in your question. So we have a few more that came in here. I wanted to go back to our first presenters, we had a few questions about landfill gas. It sounds like you were saying within 10 to 20 years,

[01:27:30]

that's the lifetime of production for landfill gas there. And people want to know what does the county plan to do after that time?

DEANNA CARVETH

See, this is Deanna Carveth with Snohomish County Solid Waste and our landfill was closed in 1992 and has its peak year is in 1994 for gas production. Since then we've been steadily declining, which is really what you'd like to see a landfill do so it doesn't continue to be an environmental issue going into the future. We anticipate based on

[01:28:00]

our current gas curves and our measurements out on the landfill that we will probably be down to a point of very little gas in about ten more years. So we looked at a number of different proposals to sustain the project at this site, one of which was there's a dairy about 7,000 feet directly north of us where they could put in a bio-digester for the manure. And we would take their bio gas and run it through our

[01:28:30]

dryer here as well as putting in a small energy plant. We didn't get funding for that, as many of you know the ARRA funds were very competitive. So Plan B is to surplus the equipment hopefully to another biogas facility in the region, there are four of them that we know of in Washington State, so that the system can continue being operated sustainability. Our obvious preference is something in Snohomish County, so that we keep that whole local focus which has been

[01:29:00]

the touchstone of our project.

TOMMIE JEAN VALMASSY

Okay, great. So here's a question about vehicles. Someone wants to know, "Is anything being done to ensure that vehicle manufactures will allow the use of biofuel in newer models?"

ALLEN MITCHELL

Yes, this is Allen Mitchell, I can take that one. Across the board

almost every major engine manufacturer at this point is accepting a level of

[01:29:30]

biodiesel B20, so it's mostly happened. Those that don't have allow lesser blends, but in our experience and in talking with people all over the country there has never been a warranty claim that we know of that's ever been denied, because of use of biodiesel. And it would take something catastrophic in the fuel system of the engines to cause that, and that just has not happened

[01:30:00]

and we don't anticipate that it will happen, because we have quality controls on the fuel that we use. And so as long as those quality controls are enforced and you don't just brew it up in your backyard and decide to use it I don't expect anything like that to happen.

TOMMIE JEAN VALMASSY

Okay, thank you. So Margaret, I think this question is for you. "How is sustainable oil, developing oil seed crushing and handling infrastructure for

[01:30:30]

camelina?" And kind of a second part, "Are you asking EPA for compliance review to use camelina renewable feed stock for renewable fuels production?"

MARGARET MCCORMICK

Okay. So for the first question, we don't have our own crushers and so we work with a number of crushers in Montana State for our primary camelina acreage, is to crush the oil. We've also, I believe have

[01:31:00]

at least been in discussion and have maybe crushed maybe some of our camelina in Snohomish at that crusher. We were very happy to hear that that crusher was available for external use as well as has done some crushing in Canada. So, you know, crushing is actually a huge component and as the acreage of camelina increases to set the demand, getting access to quality crushing becomes critically important to the business model,

[01:31:30]

but it's not something that we can invest in ourselves. The second question was about how we're approaching EPA, so that's an ongoing discussion both internally and with the EPA. Currently as RFS2 is written camelina itself is not identified in the currently approved feed stocks unless it's included in an annual cover crop, which we believe

[01:32:00]

it does fit that definition. So we're going to be working with EPA on both whether its camelina would be included in the annual cover crop or whether we need to file a petition and go through the petition process to have EPA do a LCA on camelina itself. And so on that, of course, camelina is critical to our success and so we will be working on it quite diligently.

TOMMIE JEAN VALMASSY

Okay.

[01:32:30]

So I have some follow-up questions about camelina specifically. It's kind of a multiple-part question. "So on the camelina acreage what is the five million acres? Is that existing crop acreage where camelina would become a rotation crop? And do you envision CRP acres coming out and being used for camelina or canola as an annual crop or as a rotational crop?"

MARGARET MCCORMICK

Sure. So basically the five million

[01:33:00]

is, you know, what we think is the maximum number of acres that could be available to camelina farming in that space. And it's more of a math exercise than anything, currently there about 50 to 60 million wheat acres in the U.S. Of that about 20 million might be considered dry land cereal acres, which is really our target. And if you assume that they will be in rotation, you know, three

[01:33:30]

years on crop and one year off that's where the five million is coming from. So it is basically a math game at that point. In terms of the CRP, you know, we think that there is potential for that, but it's not part of our model at this point.

TOMMIE JEAN VALMASSY

Okay, great. So Ray, we had a question for use specifically. Have you converted brown grease or track grease with the high water content?

[01:34:00]

RAY BENAVIDES

Well, actually water is a problem for any type of diesel manufacturing process, because in the tradition--

TOMMIE JEAN VALMASSY

Oh I'm sorry, you what? We can barely hear you.

RAY BENAVIDES

I'm sorry, hang on just one second. There we go; I'm sorry ladies and gentleman. Actually with regard--

TOMMIE JEAN VALMASSY

[OVERLAPPING] Excellent on that point.

RAY BENAVIDES

Thank you, with regard to the question of brown grease to fuel and the water content specifically, in the traditional biodiesel production that would be very problematic.

[01:34:30]

in case this would create soaps, which can become an environmental nightmare handling. Now, we do have a new technology that we'll be releasing and actually we're working with right now that eliminates that issue completely. And in fact, without further distillation or without further advance processes we can now also, on the biodiesel process we can create a glycerin product that is at 98.0 percent

[01:35:00]

pure. So without the traditional cost of effect we believe that the model that Snohomish showed was 79 cents a gallon for production. We now know that we can eliminate 20 cents of production with this new technology, so we're very excited about what's about to happen. It's problematic for brown grease to be converted into fuel with the existing--they call it the transesterification process, because of the creation of soaps and because of the catalysts. And we have eliminated

[01:35:30]

that issue so we're looking forward to moving ahead in the future here within the next three months with our AVR system.

TOMMIE JEAN VALMASSY

Okay. So here's another question, someone wants to know are there sustainability labels for biofuels like the way there's LEED for green buildings; is there some kind of a green label?

RAY BENAVIDES

This is Ray again, and there is not currently a

[01:36:00]

system in place for a biofuels to be declared as sustainable. I think that's what the work with RFS Number 2 is going to do, because as a biofuels producer we will have to actually vet our suppliers. And they will have to show that they can comply with the requirements of a renewable biomass feed stock. In that standard there is a new ASTM test method called 6866, which is radio carbon testing. And in

[01:36:30]

that, it's the only standard that's recognized by the federal government as being an indicator or use to declare a product as a renewable product. And so our agency is looking at using that to qualify all of our end products as being recognized by federal standards as a declared renewable and/or sustainable type product.

TOMMIE JEAN VALMASSY

[01:37:00] Okay, I'm just seeing if anybody else wanted to jump in with anything there?

JOHN GARDNER

[01:37:30] This is John Gardner. I'll add one thing to Ray's and we've been working on the renewable diesel as well as the jet fuel into this to ASTM, just as Ray suggested. But I think the other thing that's out there that we should all be aware of is the understanding and support of these next gen. biofuels on behalf of both elected officials, in other words government, as well as the

[01:38:00] general population. And if you haven't tuned into or know of the work of the Round Table on Sustainable Biofuels I would urge you to Google it and become familiar with the dialogue that's happening. This is international dialogue around sustainability standards. And these go beyond the engineering specs for a fuel. These speak to environmental and social dimensions, it's sustainability as well. And I think we'd be foolish not to

[01:38:30] know that we will be held to those standards just as much as any kind of engineering standards or chemical standards to these new fuels. So again, if you haven't done that I urge you to do that. We've got a process underway under aviation fuels ongoing in Australia and we're going to launch the process in the Peugeot Sound in the U.S. where we're going to discuss those very sustainability standards. In other words, both the chemical and the physical as well as the social and the environmental and try to work those out amongst

[01:38:30] the key stakeholders in both of those regions of the world. And then hopefully from lessons learned there take it elsewhere.

TOMMIE JEAN VALMASSY

And so can you repeat one more time what you said people should Google, the Round Table, what would be the key words they would put in there?

JOHN GARDNER

I would Google Round Table on Sustainable Biofuels. It's headquartered--

TOMMIE JEAN VALMASSY
Round Table on Sustainable Biofuels.

JOHN GARDNER
--it's RSB, it's headquartered out of Switzerland, I think in the Lausanne or Geneva area.

[01:39:00]

TOMMIE JEAN VALMASSY
Okay, great. So Ray someone is asking, "Where has the technology that you are rebuilding with come from? Is it different than typical-- and I'm always going to butcher this word--transesterification and when do you expect the facility operating?" And if it's not--they want me to say this word multiple times-- transesterification what is the underlying chemistry?

[01:39:30]

JOHN GARDNER
Well, transesterification is a process for the biodiesel side that is the most prevalently used and most commonly used. Our technologies still use an aspect of that, but because we're changing the way we thought process--for example, our facility was 18,000 square feet, it had a production in Burbank, Washington and had a production capacity of 5 million gallons annually. We have now changed that perspective and we are into what they call continuous process. So we've now changed an 18,000 square foot facility for the production and finishing of

[01:40:00]

fuel to 72 square feet. And with that comes significant energy changes and it's just an evolution for our organization. We are also moving ahead of that and we would consider this second generation moving into third generation looking at processes that are advanced, even further advanced that would not use any type of catalyst and would be a thermal dynamic conversion versus a chemical conversion. So we continue to look at those

[01:40:30]

processes and move forward. With regard to the time frames these are available technologies that are currently in existence, they are used in the pharmaceutical industry rather widely. We've just adopted that model and we'll be able to transition very, very easily with that. And the cost of construction is significantly lower. Our original facility, which was bootstrapped was at seven cents per

[01:41:00] gallon cost to construct. This new type of system will be at 50 cents, a little bit higher,
but compared to other organizations that may have a dollar or anywhere from a dollar to three gallons--three dollars a gallon for cost of construction, we're significantly leveraged on that aspect.

TOMMIE JEAN VALMASSY

[01:41:30] Okay, thank you. So earlier we were talking about--well, so here is the question, it's a couple of parts here, a few people are asking
this. Basically, can you tell us more about the technology for converting sludge or grease from grease traps to biodiesel and are there successful technologies available?

JOHN GARDNER

[01:42:00] It's be premature to say, or premature to release that information, because that's a technology that's proprietary to our organization. Will it be readily available, very soon it will be available. We're going
through some trial runs right now with different organizations and we have selected manufacturing
sites in different areas of the country to help bring people back in line. For example, we outsource to the State of Georgia for manufacturing, to the State of Alabama. We also have qualified facilities in the State of Washington that are working on things for us right now. And we've just submitted those components to those different groups for several reasons. And I would like to be able to divulge the answer to that question, but we're going to consider this proprietary and we're going to maintain that.

[01:42:30]

TOMMIE JEAN VALMASSY

[01:43:00] Okay, that sounds fair enough. So we do have more questions coming in, we were scheduled to end at 11:00. And so what I would like to propose, I know a couple of our speakers have to go and a couple can stay. So I'm going to hand it over to Ashley Zanolli just to give a little bit of a wrap up and then if you would like to stay and ask a few more questions and hear answers then we'll extend it for about ten more minutes. For those of you who have to log off this is being recorded and we'll have a transcript, so you won't miss out. So Ashley, if you want to give a few words for those of us who have to
log off. And I'm not sure if you're muted.

TOMMIE JEAN VALMASSY

Okay, so I'm just going to say a few words. I know that EPA really wants to thank all of the speakers who were on today: Allen Mitchell, Ryan Hembree, Deanna Carveth, Ray Benavides, Margaret McCormick and John Gardner. Stay tuned for

[01:43:30]

an email coming out later this week where you can find out where you can get these presentations. You can download them and have a copy, and Ashley I also wanted you to stay tuned for an announcement of the next webinar on this topic. It should be tentatively scheduled for May 18th. Ashley, anything to add?

ASHLEY ZANOLLI

Thanks, I was needed. I was talking and no one could hear me, but I think you covered pretty much everything. I'd love to thank our speakers and also everyone else who attended. Hopefully, it was valuable and if

[01:44:00]

you have ideas for future webinar topics, please make sure you fill out the evaluation that should pop up as you log off. Otherwise, let's go back and try to take a few more questions.

TOMMIE JEAN VALMASSY

Okay, great. So we had another question now on genetically-modified materials. "Are there restrictions at the crushing and processing facilities for separating GM and non-GM canola and camelina feed stocks?" And I'm not sure if Margaret is still with us.

DEANNA CARVETH

This is Deanna and I can speak to

[01:44:30]

our facility. That was a conversation we had as to whether we would segregate out organic crop for which you can receive higher market value than you would the GMO product. And we chose not to discriminate against GMO, because the market there is bigger and our goal in Snohomish County is to ensure that we have the largest available pool to run through our equipment. Because again, volume is king and we really need the volume. So, you know, bring it all on, we're

[01:45:00]

here. And if there is a need for the material to be organic we can and know how to go through the cleaning process to ensure organic

product delivered at the end.

TOMMIE JEAN VALMASSY

Okay. Can anyone talk about the state of the economic viability of wood biomass conversion technology?

[01:45:30]

JOHN GARDNER

Ray, do you deal with cellulose at all?

TOMMIE JEAN VALMASSY

And so if there are questions that we're not able to get to please go ahead and type them in and we'll just make sure that our presenters get those and we can give you a call or send you an email later. We have all your information. And I think this might also for a presenter who had to step off, but wonder if anybody can talk about the marine fuels market? Are

[01:46:00]

there new fuels that have been supplied to power marine vessels, any specific examples with that?

JOHN GARDNER

This is John Gardner, can you hear me?

TOMMIE JEAN VALMASSY

Yes.

JOHN GARDNER

Okay, I can speak briefly to that. You know, in the State of Washington the ferry system, we're using mentholated biodiesel--in other words, the standard practice for producing biodiesel in their fleet. They are still using biodiesel, I think today in at least

[01:46:30]

maybe perhaps in up to six, maybe someone has better information or more up-to-date information on that. The initial problem with the fatty-acid menthol ester-produced biodiesel in the ferries was the interface with water and the moisture. And what was discovered was it was actually microglial growth and so a fungicide actually has been added, an anti-growth agent essentially to the fuel to help control that.

[01:47:00]

And the same produced biodiesel has been and is being successfully used. The renewable diesel that comes out of the kind of process that Margaret McCormick mentioned, that being of the hydrocracking procedure is produced in a different way. And it actually will have

fewer of the problems than the mentholated biodiesel might have in that market. But as you're aware the marine industry is radically changing, the biggest challenge from my perspective

[01:47:30]

where we've checked into it has been compatibility of these diesel, that the kinds of biodiesels that are produced by many of these processes for the engines and the applications and most of the large marine vessels, they use essentially bunker fuel which is a much lower quality fuel and those engines are actually and designed and are operated for those fuels. And so in other words the concept of a drop-in fuel is really not

[01:48:00]

immediately applicable to a lot of the marine environment, but we're very interested in that. You know, the Pacific Coast recently passed new regulations. I believe they start in 2012, which will require I believe up to 200 miles off the West Coast of the U.S. switching to higher quality fuels. And so there seems to be a market in place and willingness, but it's going to be at the compatibility of the fuels we might produce with the engines that are in place to ensure that they're compatible.

[01:48:30]

TOMMIE JEAN VALMASSY

Okay, great. So we've had a--someone wanted to make a comment about trap grease. They mentioned that the cities of Philadelphia and San Francisco have biodiesel facilities where trap grease is converted, so wanted to share that information with you there. Okay, so I think that we'll go ahead and wrap up. If you still have questions you're typing out go ahead and type those in and we'll make sure they

[01:49:00]

get to our presenters. But I just wanted to give you a chance to wrap up and end with any key messages, so Deanna maybe we'll start with you. Anything you wanted to add or a last take-home point for folks here?

DEANNA CARVETH

Bring us your crushed material, we will crush it for you. How about that? [BOTH LAUGH]

TOMMIE JEAN VALMASSY

Great, and I'll--

DEANNA CARVETH

I think the bottom line for Snohomish County is if you have a committed upper management structure and people willing to do it,

[01:49:30] you can get these projects done.

TOMMIE JEAN VALMASSY
Anything to add, Ryan?

RYAN HEMBREE
I would just--definitely the collaboration effort, you know, is definitely the key to success in getting the equipment up in place and functional. And that was between the farmers, the processors in Snohomish County as well as from the funding sources, state and federal. So I think it will be interesting to see how the markets develop and we'll see what the farmers are able to--to how they're able to be involved in their role in this.

[01:50:00] So that's it.

TOMMIE JEAN VALMASSY
Okay. John, one really important comment for you from someone is, "Go Cougars from the WSU Class of 2009," and did you have any last thoughts you wanted to share with us?

JOHN GARDNER
And we're the foundation of the PAC-10 in both football and basketball, I'll just remind folks. No, just one comment regarding the question on cellulose, there is a lot of effort ongoing right now

[01:50:30] on cellulose--municipal waste, forest waste, forest products into the biofuel stream as well. A lot of work and we are part of the large national advanced biofuel consortium that was funded by DOE to work on cellulose in part, particularly focused out of our campus that we share that we share with the Pacific Northwest National Lab in the Tri-cities together with the N-Rail in Colorado. So those are just two parties, but it's a large national effort and I would stay

[01:51:00] tuned. There is lots of exciting technologies, thermal conversion as well as biological conversion of cellulose materials that are going to be on the horizon, so thank you.

TOMMIE JEAN VALMASSY
Great, thank you so much. So we're going to go ahead and officially end the webinar. If you have more questions you're typing in you can go ahead and finish those and we will capture those. When you log off a little popup box is going to come and it's a quick survey for us

on the content and format of this webinar. If you could take a minute

[01:51:30]

to just answer it right then, it's your only chance to take the survey and it really helps us. So Ashley, I will hand it over to you to wrap this up.

ASHLEY ZANOLLI

Okay. Well, thanks again and to feed off of John's last comment, our next webinar actually will address some of the second-generation technology and you'll be hearing about pyrolysis and efforts going on, really with cellulosic as well as waste grease. So I encourage you to attend that, it's tentatively scheduled for May 18th so look out for an invite. And thanks again for your time and thanks to our wonderful speakers

[01:52:00]

for all their wonderful information.

DEANNA CARVETH

Thank you.

TOMMIE JEAN VALMASSY

Thank you, bye-bye. The webinar has officially ended.

[01:52:12] END VIDEO