

**Workforce<sup>3</sup>One**

**Transcript of Webinar**

**AACC SEED WEBINAR:**

**Alternative Fuel Vehicles: New Technology, Refined Workforce Programs**

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*Transcript by  
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TODD COHEN: (In progress) – everybody. My name is Todd Cohen. I'm with the American Association of Community Colleges, the SEED Initiative. Welcome to you all. We're really excited about the opportunity to touch on this particular topic today, alternative fuel vehicles and the community college workforce response.

I think of all the talk and questions about the green economy and green jobs, from solar and wind to energy efficiency, this one sector has perhaps the greatest potential for training needs. But there's just so many variables, from fluctuating gas prices to public policy to consumers' interest in actually purchasing the vehicles that are uncertain right now. And it's probably the most difficult green sector to ascertain what kind of training – and frankly, how much – will be there.

Alternative fuel vehicles is admittedly a broad segment. I think today we're going to be a little bit liberal in how we define it. But we're going to focus primarily on the emerging market opportunities for electrified vehicles, hybrid electric, battery electric and then alternative fuels like natural gas and so on. And if it enters, we'll touch on a few other technologies, like fuel cells and other things as well. But that's our world today.

The larger point, though, is that this is right in the sweet spot for our community colleges. And we know as we travel around the country talking to different workforce folks and presidents and others that they're really looking for some clarification on where the initiative's going and how this movement will ultimately impact curriculum partnerships, new course opportunities and things like that.

And so the idea behind this webinar, like all of our webinars, is really sort of for you folks to walk away with some good best practices and really tangible ideas on how to advance the things that you're already doing on your campus.

I'd like to thank the National Council for Workforce Education for their sponsorship of this webinar in particular. And I'm going to turn it over now just for some logistics info to Brian.

Brian?

BRIAN KEATING: All right. Thanks so much, Todd.

Again, my name is Brian Keating. I'll be here throughout the webinar today in case you need any support with the logistics.

I'm going to go ahead and minimize those windows that you were just looking at, overlaying the PowerPoint, and go through some brief logistics. As you can see here, the main portion of your screen right now is being taken up by the presentation slide area. That's the majority of your screen. And if you look to the top right-hand side of that window, you'll see a full-screen button. Feel free to use that full-screen option if you'd like to make the slide take up your entire screen.



Also at the top left-hand side of your screen, you'll see there's an attendee list just showing us who's joining us today. So it looks like there are 46 people who've joined us so far.

And right below that, there's a chat window, where many of you have already let us know that you've joined the webinar. So thanks for that.

Also, just about submitting questions. Once we get started here in a moment, we're going to go ahead and replace that chat window with a question-and-answers box. But it functions much the same way. So to submit a question or comment at any point throughout the webinar, you're just going to type that question or comment into that text field at the bottom of that window and then hit the arrow button or the little chat icon. Or you can also hit Enter on your keyboard to submit your question or comment.

Once we get started, those questions and comments will be private. But you can submit questions and comments at any point throughout the webinar, and our presenters will field as many of them as we can throughout the webinar today. So I want to encourage you to do that at any point throughout this hour.

Also, many of you, like I said, have already done this, but if you're just joining us, go ahead and in that chat room please type the name of your organization or your name, your location where you're dialing in from from the country today and also the number of people who are attending with today if you're in a group.

And again, if you need anything else technically speaking, I'll be here throughout the webinar. Feel free to let me through that chat or questions-and-comments box if you need something.

So without any further ado, I'll go ahead and turn things back over to Todd.

Todd, back to you.

MR. COHEN: Thanks, Brian.

Just for those that don't know, SEED is a national initiative coming out of the American Association of Community Colleges, funded through the Kregse Foundation and with our partnership with Eco-America. And it really aims to advance sustainability and green workforce development practices at community colleges by disseminating vast and promising practices and facilitating the sharing of information from state to state.

I think at this point we start talking about the green economy and workforce opportunities, that there are enough really good programs out there at colleges that there's really no need to start things from scratch at ground zero. And we hope SEED sort of becomes that conduit for which colleges share peer-to-peer. So that's what we're aiming for.



And it's not just faculty. We're really aiming to have an impact on staff, sustainability officers, and presence with trustees; really trying to make college campuses as green as they can be. And the two end goals for us really are just college preparing workers for what we still anticipate to be real, growing careers; and ministry that just so happens to have a very positive impact on the climate, things we know our colleges care deeply about.

Today, we've got three dynamic speakers with very different perspectives of this particular sector, and we're really glad to have them. First, Dr. Mark Quarto from Automotive Research & Design. Automotive Research & Design is a technology company specializing in the development of electric vehicle and hybrid electric vehicle propulsion systems. They were one of the first private training and consulting companies to offer this kind of education and training to the automotive aftermarket educational industries.

Dr. Quarto himself began his career by working as an automotive technician at both dealership and aftermarket facilities. In total, he's been engineering, managing and teaching electric vehicle systems for 27 years now. So obviously, Dr. Quarto's here to provide that industry perspective. And I think what's great is that he can do that and translate sort of where the industry's going into what that means for occupations and training.

Automotive Research & Design worked closely with Madison Area Technical College. For those who don't know, MATC has been a real national leader on renewable energy and energy efficiency programming; but in particular, advanced hybrid electric vehicle training that they've developed with AR&D to make advanced hybrid vehicle training available to automotive instructors from across the country.

Jeff Minter himself is a full-time automotive technology instructor. He is an ASE-certified master technician, L-1, advanced engine performance specialist. And Jeff's main area of instruction has been automotive electricity, electronics – power train management in hybrid electric vehicles.

He's going to really kind of talk about the nuts and bolts of a quality workforce program in this sector, not just for auto technicians, but how that training then is getting integrated into other disciplines in other technical areas, like first responders. So really, some unique things that they're doing there.

And then finally, Greg Newhouse, associate dean at San Diego Miramar College. He's also a director of statewide – the program, Advanced Transportation Technology & Energy Center. Greg, prior to working at San Diego Miramar College, worked on a variety of energy programs and projects with the California Energy Commission; then – (inaudible) – and researching renewable energy, alternative fuels, transportation programs for 30-plus years now.

And I think it would probably make sense for Greg to offer his perspective on the broader industry partnerships, program design, how they've gone regional. And really, their training just goes beyond the campus and across Southern California.



So really happy to have all three of them here today. And before I kick it over to them, let me just say a couple things to set the stage for this conversation.

The industry itself, certainly there's a number of interesting things that are happening. We've seen some major policy shifts in the last two to four years or so that are driving industry growth. Most of you probably know the administration has issued national emission standards policy, increasing fuel economy and reducing greenhouse gas pollution for all new cars and trucks sold, which is already having a major impact on car company production.

And then states are enacting additional requirements. A majority, I think at this point, for example, have mandates for state-owned or other types of fleets to acquire plug-in electric vehicles, for examples. And of course, a number of states with their tax credits, rebates, et cetera to incentivize consumers to purchase these vehicles.

And of course, this policy, then, is really driving industry to invest heavily in battery and clean vehicle technology. So there's going to be continued innovation in the years to come, which means of course for the colleges that we've got here today, that their programs are really flexible and nimble to be able to adapt to the shifts that are happening in this particular industry.

And we've got roughly 250 to 275 colleges across the U.S. that offer an OEM auto service technician program. So there's critical mass here, that if they're not already, need to be dealing with this kind of technology.

And so today it's really about looking at sort of what it looks like when a college does this really well, from integrating natural gas technology curriculum to effectively engaging employers to placing students into internships and jobs. The folks here are really doing this in an effective way and they've got a lot of share.

So with that, I'm going to turn it over to Mark. Again, we're going to have about 15 minutes at the end for Q&A. As Brian mentioned, you can post your questions at any time and we'll take that and we'll offer it back.

But Mark, let me turn it over to you.

MARK QUARTO: OK. Thank you, Todd.

Hello, everyone. My name is Mark Quarto. I'm a consultant with Automotive Research & Design. But in the interest of disclosure, I would like to tell you that my primary employment is with General Motors Corporation and I do work with the hybrid electric and fuel cell programs here in electric propulsion. So I'm going to provide you maybe a wider view of how the OEMs would look at the advanced propulsion area, and then some of my own comments from experiences as a consultant.



If you take a look at where we're heading near-term, mid-term and long-term with automotive technologies – if you take a look at the portfolios of the major automotive companies, you'll find that we are quickly moving into hybrid vehicles and even quicker into the electric car and hydrogen fuel cell area.

And if I were to phrase this, I guess we would look at it like two titans that are on a collision course. You have the technology that's moving very rapidly and the technical education that is trying to keep up. So it's moving very quickly and glad to hear that the colleges that are a part of SEED are addressing that.

If you take a look at the hybrid system, it primarily consists of battery pack, a power inverter module, an accessory power module, a transmission with one or two electric machines or motors – generators in them; and then you have also some other high-voltage components, either air conditioning compressors. Power steering will also be going that way.

But also, there's the control system behind it, which is really the crux of the complexity of the system. It's far more complex than a traditional vehicle. And this is probably the major area of concern, at least for me, with technicians, is trying to assemble not only the traditional automotive systems, but then trying to integrate all the hybrid systems and the control systems for both of those systems on top of that. It is a major undertaking for anyone to actually learn that.

If you take a look at what's driving this, the EPA and the DOT right now today are requiring about a 54.5 mile per gallon CAFE level by 2025. And of course, that is really driving all companies to advance their technology. So electric, because it is highly efficient, is being looked at as the major driver for propulsion systems.

If you take a look at Toyota and GM and how we are looking at the advanced technology propulsion, you can see that Toyota and Lexus are scheduling 100 percent hybrid, electric or fuel cell by the years 2018. And then from the GM side, it 80 percent hybrid, electric or fuel cell by 2020. And most other manufacturers are following similar plans. So it is a very aggressive timeline, and the tech ed is going to be tasked with trying to keep up with that schedule.

If you take a look at supplier – Toyota and GM – investment, Toyota has invested an awful lot of money in Panasonic electric vehicle energy systems for battery packs. And I think they have major stakes in other companies. From the GM side, if you look at traditional domestic OEMs, GM has actually built a plant and started it in 2009 for battery production. And then we're also producing or will be producing our own electric motor. So the OEMs are getting back into the production of subsystem components.

If you take a look at suppliers – and I'm not going to name them off here, but you can read them – these are just a few of the suppliers that are involved in significant financial investment into the hybrid electric area. Suppliers have invested hundreds of billions of dollars in this infrastructure and they continue to do so.



So this technology's not going away. It is – actually, this is our next step into propulsion with a vehicle. And everyone is tooling for it now.

If you look at what drives the philosophies and methods for how the OEMs look at servicing the vehicles and then developing diagnostics, my primary job here at General Motors is to develop diagnostic systems for the vehicles. And I can tell you they are very complex; way more complex than the traditional vehicle.

There's really two things that drive the OEMs. One is regulatory, or marketing warranty requirements; and then reducing or eliminating warranty part and labor investments. Now, from the OEM side on training, that's where the training is focused. It's not focused on providing a traditional education to dealer technicians. That's precisely what has me concerned from this perspective, is that the OEMs are not providing this type of training, and it's going to take a major push from the tech ed area to help get the technicians tooled for these vehicles.

If you take a look at some of the hurdles that we're up against, the hurdles that we're up against are one called legacy knowledge, and the other one is called technology transfer. Now, if you take a look at what legacy knowledge is, this is applying traditional vehicle knowledge to the advanced technology systems, and then technology transfer would be applying traditional vehicle system technologies to advanced technology systems.

And I will tell you that technicians cannot apply legacy knowledge, nor can they technology transfer anything that they know to an advanced technology vehicle because there is nothing that will permit them to make that transition.

So really, they start out from the jump right from ground zero, trying to learn these systems. There's really nothing they can pull forward that will help them out. So this is one of the biggest hurdles that we have with these systems, is that there's really nothing that we can use from the traditional vehicle to help them learn that. So we actually have to have those building blocks for them and help them.

If you look at the learning time horizon for how long it takes to really learn the advanced technologies, I really kind of associate this to the five stages of grief: denial, anger, bargaining, depression and acceptance.

If you take a look at – and I'm going to go through this very quickly here. You'll have this at your disposal anyway. But if you take a look at the number of months that it actually takes from the engineering side, how long it takes someone to learn the systems, the engineers that I have on my team actually will end up going through somewhere between 24 and 36 months just trying to figure out where they're at with the systems as far as learning it.



And these are kind of the steps that they go through. And it's kind of highs and lows. It's like a roller coaster for them when they first get involved. And technicians go through the same thing, except for their learning time horizon may be a little bit longer because they're not as intimate with it.

So engineers go through this and technicians are going to go through the same thing, and they're going to crash and burn a bunch of times trying to learn this stuff. So again, it's going to be incumbent upon the tech ed area to help that out.

So here's the time horizon here. This is what I just talked about. The time horizon is significant for whether it's engineers or whether it's automotive technicians. And the curriculum for technicians must permit significant hands-on implementation because there are new skills and new tools and new knowledge that has to be learned. And we can't just open up their head and pour it in. We're going to have to allow them time to have hands-on, to actually cement it in and learn it.

So if I were to make a comparison of the experience versus the need for technical training – I just got a very simple teeter-totter here that shows you that the traditional systems, there's a ton of experience on traditional systems up in the upper left-hand corner. But when you get over to hybrid and then fuel cell systems, the experience is very light, which means there has to be a lot of time spent on that. And it takes a lot of time to get the new knowledge and new tool sets engaged with the technicians.

If I were to look at the workforce development curriculum for opportunities, you can see in the center there are five boxes – I'm sorry, six boxes that are here. And those six boxes represent the systems that would be needed for a technician to learn. If you look over at the right, you can see that energy sources are variable. We can have a traditional internal combustion engine, a fuel cell engine or a diesel engine. Those are the energy sources. Those can be variable.

And then you've got the boxes in the center there, starting with A/C induction machines, going all the way down to propulsion system controls. Those are the ones that are going to be the steadfast items that need to be taught to the technicians that are going to take the longest period of time.

If you take a look at the opportunities that are related to this and are considered to be nonautomotive for workforce and education development – I've got them listed here – these are things, quite honestly, that are going to be used. And whether they're solar, wind, hydro, nuclear, it doesn't matter. All these things cross over.

So if you have commercial or industrial electrical, electronic or mechatronic programs at your school, a lot of those will port over to automotive, or automotive could port over to those. So there's a lot of cross-pollination between advanced technology automotive systems and the traditional commercial market.

OK. I'm winding up. What I want to tell you is that Automotive Research & Design, where I'm a technical consultant, is currently partnered with several colleges across the country. And we assist them



in developing their hybrid and electric vehicle programs. If you have a time and interest, you can go to our website and that'll provide you with more information on our courses, publications, tools, equipment and class schedules.

So I'll be hanging around after. I'll be more than happy to answer any questions that you have. Thank you. (Pause.)

MR. KEATING: All right. Thanks so much. Now, I think we're going to turn things over to Jeff Minter.

JEFF MINTER: All right. This is Jeff Minter. I'm an automotive instructor at Madison Area Technical College, as Todd mentioned. And we were kind of asked today to go over the basic requirements for a quality program; in particular, in the hybrid-related. But you'll find that there's a lot of things that apply over from our traditional programs into the hybrid as far as what makes a good program.

So when we look at the overall outline of what I'm planning on going through today, it'll be the traits of a high-quality automotive program in general with a little bit of tweak towards the hybrid end. And then, our implementation of the hybrid vehicle training at our schools; some of the challenges that we encountered. I can tell you from personal experience Mark's five stages of grief have definitely not been limited to technicians. It's also definitely an instructor trait that we have as we've gone through the learning curves for this, and continue our learning curves for this technology.

And then, some of the solutions that we've had to the challenges that we've faced, because there is a lot of changes that have to go on in the program to actually implement a really high-quality in-depth training.

So one of the big things when you look at an automotive program in general, which many of your schools probably already have – one of the big things that's really required to have a high-quality program is instructors that have some industry experience. You just can't teach the real-life experience that the people will get from having worked in the field.

All of our faculty members have been full-time technicians at some point during their career. We have a fairly young staff as far as the number of years here teaching. We went through a retirement not too long ago, so our guys all have a lot of relatively recent experience.

The problem is, is even with our relatively young staff, none of us have worked on hybrid electric vehicles prior to coming here, because they just weren't in large enough numbers or hadn't even been on the market before we came to begin teaching, which is where that lack of legacy knowledge that Mark talked about starts to fall into place; because it just isn't there for the instructors, just like it isn't there for the technicians.



Obviously you have to have some training on the theory behind the system operation. We are big on making sure that our technicians are not only prepared for the vehicles on the road right now, but have the tools that they'll need in the future to be able to adapt to the new technologies as they come out.

We can't simply teach them how the system on the current vehicle works and what the pattern failures are in that vehicle. If we do that, they're going to be more or less obsolete within a year or two, at the rate of technology change now.

We have to really provide them with the theory behind how these systems are actually designed, how they operate, how all the different pieces interact with each other, so that when they get out there and the vehicles start to have changes at the rate that we're seeing them, they can rapidly acquire the new knowledge that they need to be able to apply that new technology in the vehicle with other systems so that they can do their diagnostics and the repairs.

Big thing that Mark mentioned, the hands-on training. You have to have the hands-on training to support the theory. Our student body as a whole thinks that's all they need. They would prefer to have 100 percent hands-on. Obviously that can't happen. But without the hands-on training, the simple theory just doesn't work.

It needs to have some live lab work for the students. The simulations, as good as they look on paper from a financial and safety standpoint, just don't get the students what they actually needs. They need to have the actual experience of breaking something on a car when they take it apart because it was rusted together; and when they went to take it apart it just didn't come apart the way they expected. Not that we want to break a lot of pieces, but we'd rather have them break some stuff here while they're learning then when they're out working full-time.

The live lab work. We use a lot of actual customer vehicles. We don't use many vehicles that are owned by the school for our traditional automotive program. What I mean by that is we actually take in outside work from other faculty members, other students so there are vehicles that have actual problems with them. So the students aren't fixing the same problem over and over and over on the same car and the same brakes getting taken off and putting back on.

We found that without having the live work – the actual problems where they can see a wide variety of different vehicles, a wide variety of different problems, and also have customer contact where they have to deal with what the customer complaint is, call the customer with an estimate for the repair, really leans towards a higher-quality overall output from the program so the students have a better rounded experience.

The key with all of this is that's for our normal automotive program. But we have to carry all of that over the hybrid electric vehicle training as well. And that's been a real problem within the industry, from what I've seen personally, and I know we've struggled with it a lot because trying to get instructors experience is virtually impossible, because we just – unless you have somebody coming right out of a



Toyota or Honda dealer that's been there within the last couple years, they probably have not seen a large volume of hands-on experience with a hybrid vehicle. And that's going to be the case for the near future, at least.

And we're also having an issue where it seems like a lot of schools are building programs that do not get very deep into the theory. And to no fault of their own, it's just that the instructors don't have the theory behind the system of operation either. We were in that same boat. And like I said, I've been through Mark's five stages, where I went through a little bit of training and thought I was getting a pretty good handle on it until I went to a little deeper training and went, wow, I'm just barely scratching the surface; I have a long way to go.

So what did we do for our implementation? Well, we started out offering a more basic technical class for emergency responders, where we were teaching them how to deal with these hybrid and electric vehicles in the event of an emergency incident, whether it's a car accident, a vehicle fire, a house fire with a vehicle parked inside, whatever the case may be – a minor medical call where the paramedics may be on scene. So we went through that.

We developed that in January of 2008. We used some existing curriculum and slowly but surely modified it to what we felt fit the best. We did partner with our fire science department for that, which we felt was critical because that way it had some backing from the firefighter. So it wasn't an automotive instructor out trying to teach a firefighter what they needed to do. It was an automotive instructor and a fire instructor both out together explaining the technology of the vehicle and what they needed to do from the fire science end of it so that they were more comfortable with the technology and how to deal with it in the event of those emergencies.

We did our first class in March of 2008. We had a huge response. The community really wanted to get the training on these things because they've heard so many false statements that make them extremely afraid of these vehicles – that we've had well over 2,000 people in the last several years go through these classes. We've actually seen a slight decrease in our area of the number of classes we're running because we've run so many of them at the request of the area fire departments.

We also started some technician training. We have a class that was a introduction to hybrid electric course. We designed that in the spring of 2009; did our first offering in June of 2009 and rapidly found out as we took more training that we needed to significantly modify that within the first year, to get a lot more in-depth than what our first year was. So by 2010, that did not look anything like our 2009 class.

We started expanding those offerings in the spring of 2011. We actually were fortunate enough to receive a grant from the Economic Development Administration that allowed us to acquire more time and equipment, to be able to focus additional training. The training that we did on that grant was actually more focused on retraining experienced technicians.



Because, as Mark said, we do not have a legacy knowledge that we can transfer over to this. So the techs, even though they've been turning a wrench for 20 years, working on cars on a daily basis, are nowhere near equipped to work on these vehicles. So we almost have to go back to basic electrical 101 all over again with these experienced techs and start from the ground up with some more in-depth electrical knowledge than what they may have had when they went to school 20 years ago, and build them back up electrically so that then we can prepare them to attend the more advanced hybrid training classes.

We are also adding a hybrid-specific class to our program in the fall of 2012. It is something that's been debated within our industry. We have NATEF and ASE standards. ASE is the Automotive Service Excellence. They have decided, at least at this point, to not offer a certification specific hybrid electric vehicles. They instead chose to blend a little bit here and there into all the different eight core areas of our certifications. NATEF is the educational arm of ASE, so they are doing the same thing.

We don't personally feel that that is adequate, because blending a little bit here and there does not give the students the depth of knowledge that's going to be required to adequately diagnose these vehicles; and to make sure that when they diagnose them, they diagnose them accurately, because the cost of components in these vehicles are very high. Putting in an incorrect component is no longer a \$50 mistake. It can be a \$7,000 to \$8,000 mistake.

So we feel that the class has to be a standalone to get the depth of knowledge. And what we're adding in is actually going to be a two-credit class, and that one will be a lab and lecture combination, so they will have a significant amount of hands-on time to get more familiar with the high-voltage systems, the new advanced test equipment that'll be used, and they'll be scratching the surface with that.

And then we'll be running more advanced classes again, where they can come back – most likely as continuing ed type classes where they can come in and get more advanced training after they go out and get some experience on them.

We have had a little bit of difficulty in getting the experienced technicians to really buy into this. I think a lot of it is fear of going back to school, and some of it is denial that the industry is actually heading in that direction. The denial will obviously end up going away as the industry continues to turn that direction, whether they like it or not. The only concern is by that time some of them may be so far behind that it will be really hard to catch up.

So what did we have for challenges to implementing this training? Well, one of the big ones that we found when we started was the depth and accuracy of training available for our instructors. I personally attended numerous hybrid classes all across the country and very quickly found out that for \$14.95 from GoDaddy or one of the other web hosting sites, you can instantly become an expert on hybrid vehicle technology and become a train-the-trainer.



It is not anything that really has much backing to it because there aren't really many people out with a lot of experience to realize that some of the things that are being taught are not only not accurate, but they could actually be dangerous. So we had to do a lot of research to find some what we considered high-quality, very in-depth instruction. And nothing against the OEM training, but they do not get down as deep as what we feel the technicians really need to have.

As Mark mentioned, they have a couple things that drive their training levels, and they are not designed to train a technician from the ground up for the most part. We feel that we need to get in with a more in-depth base knowledge on the hybrid systems than what the OEMs are offering.

We also ran into the problem of availability of the hybrid vehicles and components for training because the vehicles are still relatively new. Donations from the OEM, the manufacturers of the vehicles, really have dried up in the last four to eight years; have virtually become nonexistent unless you are a training site for one of the manufacturers. So we had a hard time getting those vehicles.

And then we also had the need for some additional test equipment. Because as Mark mentioned, this is not our traditional vehicle anymore. These things have completely morphed and the test equipment has had to go along with it.

So what our solutions were for the instructor training – we researched and attended numerous hybrid vehicle training classes, looking primarily for ones with hands-on training. We had to find something with a hands-on training because we did not have the industry experience already ourselves to be able to offer what we consider a high quality class.

So if you have instructors that you're thinking about adding hybrid training, that's a key thing, is getting the hands-on training so they can truly be comfortable with the vehicles when they start offering a class and actually have touched and felt the components and have done some of the diagnostics on the vehicle, not just in a book.

We ended up partnering with Automotive Research & Design, and that was mainly because that was the training that we found that we felt was the most adequate for what we needed. It goes way more in-depth than anything else that we've found and we trust that it is actually all accurate; where a lot of other stuff, we have significant concerns about.

We did become a host location for Automotive Research & Design train-the-trainer events. I have a photo coming up in the next slide that will kind of show you what that looks like. We had our first one last year and we have another one scheduled for this June coming up. We'll actually have two weeks of instructor training here. The goal with that was to try to make it easier for other colleges to get their instructors trained, because to have a high-quality hands-on training event you have to have vehicles and equipment.



And when we were first getting our instructors trained, we found out that we had to travel all over the country to try to get that because there aren't that many places that have enough vehicles and enough equipment to be able to host a trainer event. So when we were fortunate enough to acquire some more equipment, we decided that it made sense for use to try to help spread the knowledge to other schools.

And then a big thing is continual update training. You have to invest a significant amount of time and also financial investments to be able to actually get your instructors update training every year to stay current with what's out there.

That's just a quick photo of our train-the-trainer event that we had last year. You can see one of our labs with all the vehicles in the picture that are hybrid vehicles that our school owns, actually, that we open up and use for the train-the-trainer event as well as our technician classes.

The hybrid vehicle components. We purchased our first vehicle in 2008 by getting a repairable vehicle. We have received a few from private donations. Those were vehicles with significant problems, which is actually good for us because it lets us have some diagnostic problems, not only for our students but also for our instructors to get experienced with.

We've purchased some additional new and used vehicles. Part of that came through the grant that we received and part of it came through our capital equipment funds. We have mainly gotten components sourced from salvage yards. We've been fortunate enough to have some donated and others we've just been able to purchase at a fairly decent discounted rate from some of the area salvage yards.

We purchased some new test equipment that's required to work on these vehicles. There's definitely educational discounts available from most suppliers. You have to get stuff that's capable of working on the high-voltage systems, which is different than what we're used to on our 12-volt automotive systems.

And then if you're going to get into the more advanced training, you have to get things like what's displayed in the picture here on the left, is a battery discharge unit, which can be used to test and recharge high-voltage hybrid batteries. And then on the right there's a motor tester, to be able to test the electric machines inside the hybrid vehicle drive systems.

So quick summary here and I'll wrap things up; I'm running a little bit over. We've basically, from our summary of what really needs to happen to get a successful implementation of this training within an existing program, you have to have support from the administration, because there is going to be a time and financial investment that's going to be fairly significant.

Other big one, you have to have instructor buy-in. The instructors have to want to do this because it is going to be a very significant time investment. And if they aren't really buying into it, they're going to fight tooth and nail the whole time.



Instructor training has to happen because we don't have the legacy knowledge to transfer in. We have to have a lot of hands-on training for the instructors. The additional equipment vehicles, you can't run a class using simulations and books. It just isn't enough for a technical class.

And then because of all that, obviously you need the financial and time investment. And a big one that Mark mentioned, too, is the potential for collaboration for various departments; whether it's something simple like ours, where we just did fire science with the automotive, or getting more in-depth where you have potentially an electrical engineering department or electronics department on campus that could be a really good source for instructor development or even potential guest lectures in classes for different topics.

So I'll wrap up with that and turn it back over to Todd. And if you have any questions I'll be around afterwards as well.

MR. COHEN: Great. Thanks, Jeff. Hey, Jeff. I'm going to ask you one real quick question that you can answer because it's a specific question, even though we'll do Q&A later, but if you can answer it real quick.

Somebody had wanted – you had talked about students working on vehicles from actual faculty and staff of the college. Somebody had asked the question here about liability and voiding manufacturers' warranties by having students do that. Is that an issue? How do you get around that? Can you answer that in about 30 seconds?

MR. MINTER: It is a huge liability issue from a potential injury standpoint as well as from, you know, if a tire falls off of the vehicle when it leaves, just like any other shop. So it is a liability that the school assumes when our students work on them.

As far as voiding a warranty, generally when we see the vehicles, they're well out of warranty, even if they're relatively new. We usually don't see brand-new vehicles coming in. We usually have vehicles that are out of the OEM warranties already.

MR. COHEN: Great point, great point. OK. Thanks, Jeff.

Greg?

GREG NEWHOUSE: Yes. OK. Welcome. This is Greg Newhouse from San Diego Miramar College.

And what I want to do, kind of given the presentations you've already had, is really focus on the faculty professional development, the partnerships that you need to implement these types of programs. Obviously from a California perspective, why we look at alternative fuel vehicles is because of the air we get to breathe, so to speak. So that's all that is intended to show.



In California, our community college system recognized the need to have regional colleges that would have specific programs – in this case, advanced transportation technology and energy program – that not only would be involved in developing programs on their own specific campus, but would work with other campuses nearby and throughout the state to enhance technical training and workforce training as well.

What we've done in that approach is basically tried to integrate both a campus community college program and our workforce training program. So for us at Miramar College, we have an automotive program that has partnerships with Honda and Toyota. So we're going to teach from that perspective. In our heavy-duty program, the partnerships are more open. It's been anywhere from transit to Caterpillar, machinery companies and the like; other trucking companies within the region also.

What we tried to do when we looked at being able to provide faculty professional development to acquire equipment was to look for what we thought of as unique partners, because these things are expensive and they're ongoing. When we did that in terms of looking at unique partners it wasn't always, say, a trucking company or an automotive dealership that could provide us with the dollars to support these programs. Rather, we looked towards people who had a vested interest in seeing the programs succeed; in this case, working with the South Coast Air Quality Management District and the Southern California Regional Transit Training Consortium. And I'll focus briefly on those two.

The South Coast Air Quality Management District is essentially the largest air quality management district in the nation. It also has to deal with some of the greatest air pollution control and air quality issues in the nation. For many years they've implemented programs, policies, regulations, et cetera to address this. And what they've found in the transportation area is that even though as a consequence of their regulations, policies, or even incentives, a number of fleets would switch to using alternative fuels, be it hybrid vehicles, electric vehicles, or natural gas.

In many instances, these vehicles did not stay on the road for a long period of time because the very same organizations did not have technicians skilled to maintain the vehicles. So the downtime was substantial. As a result also, many of these organizations wouldn't use the alternative fuel vehicles because of that downtime.

Oops. Sorry.

So what we did with the South Coast Air Quality Management District was to sit down and figure out what was needed for an array of community colleges within the region to develop or augment their existing programs to provide technical training on alternative fuels. We partnered with five other community colleges, and two of those – and with those five community colleges, we're not only developing alternative fuel technical training and curricula, but we're even looking at solar and other technologies. But I won't go into those.



In specific on alternative fuels, we're having one developed curricula for hybrid systems, one developed curricula for natural gas systems, and one developed curricula for basically an array of emission control systems or even evaluating or assessing smog emissions from light-duty vehicles, essentially.

As that curriculum is developed, we will sit down with industry experts to make sure that it is of an acceptable quality. For example, on the heavy-duty side, we are developing natural gas engine curricula. We will sit down with Cummins, who is a primary manufacturer of natural gas engine technology, and literally they will review page by page our curricula, our documents, our presentation to make sure we have captured everything appropriately in terms of providing technical training.

When we've completed with the curricula development, we will then, at no cost to community colleges who have existing programs, provide faculty professional development. So the end result of that is the faculty and the schools will not only have curricula, but they will also have the technical training necessary for their faculty to provide a technical training program.

One of the key issues that still sits out there for us – and we're working with the South Coast Air Quality Management District to address – is how, in turn, to make sure that those community colleges can receive the necessary diagnostic equipment, tools, vehicles, et cetera, to do and implement the lab training, as Jeff mentioned in his previous presentation.

The second program that we have developed is – there's a partnership in Southern California which is – it varies a little bit, but it's essentially 11 transit organizations and 10 community colleges have worked together to partner in a nonprofit organization. The function of that organization is to develop curricula and to provide workforce training programs for transit technicians.

In Southern California, the drive to use natural gas technology in buses, the drive to use hybrid systems in these buses as well and even to have all-electric bus technology is exceptionally strong. And again, what we've found is the transits would purchase vehicles but have a difficult job keeping those vehicles on the road.

So in a similar fashion, the transit organizations will take a senior tech from a transit organization, one of our faculty will develop the curricula; we'll make sure that it is developed in a way that provides the necessary training. We'll do a train-the-trainer so that we have faculty from many of the community colleges who can then implement the training within the region.

Now, the benefit of that for everybody is the faculty are being trained, but we're also having the faculty present those courses to the transit organizations. Even with the courses we've developed with the South Coast Air Quality Management District, we have the faculty present the courses as workforce development programs initially.

So the faculty have their skills honed because they're having to train people who are already in the workforce. They bring those skills; they bring that information and that technical training back to the



students on campus. So the students that we're having come out of our programs are much more adept than what we had historically been able to train.

One other thing I'll say in terms of the technical training. We are continuing to work so that this is not something that we only provide or partner with within the state of California. We are very desirous and very willing to work with community colleges outside of the state as we can be helpful for them.

For example, the Southern California Regional Transit Training Consortium technically is no longer Southern California. Within this last week, we had the Colorado transit association and Colorado Mountain Community College join as well. So we will be working with them to provide that technical training in those other locations.

I won't go through all these points. What is really critical is to understand the partners that you work with. Jeff mentioned before in his presentation, how do we develop an in-depth program in terms of hybrid or electric? For Miramar College, for our initial partners being Toyota and Honda, they did not want an in-depth program.

They wanted an integrated program so that the entry-level students who graduate from Miramar will go work in the dealerships and then they will be trained through dealer education programs on the more advanced components of hybrid and electric vehicle technology. But for them, it was because – you would have to be about five years in a dealership before you were going to be a master tech who worked on those programs.

However, other partners that we have – meaning those we work in independent garages – needed the more in-depth training. So as Jeff mentioned, we are now working on developing a program that will meet those needs as well.

The last thing I'll say about partnerships is as you're going from any existing partnership to new partnerships, be careful you don't leave old partners in the dust. We had that trial and difficulty in a number of our programs, and fortunately we worked all the way through that. But be considerate of those partners you have in working and bringing them along.

And I think with that, I'll stop so we have a little bit of time for questions and answers. Thank you very much.

MR. COHEN: Thanks, Greg.

I'll ask again. Folks, if you've got questions, don't be shy; plug them in there on your screen. And while we're doing that, let me just make one announcement here.

So what SEED is – of course, as I mentioned it's disseminating best practices models. But it's really about consolidating – there's a lot of information out there. And so part of what we're doing at



theseedcenter.org, our website in particular, is trying to consolidate the best of the best information and make it available to colleges so you're not running everywhere to find it.

And so our announcement is – folks who have been on the site – we've broken it out into different green sectors – solar, wind, green building, energy efficiency, and two new sectors, sustainable ag, food and land and transportation and fuels. Those are the sectors you see there on top. And then within those, different topics of curricular materials, employment projections, skill sets.

And those are – there's other reports that have been done or great websites or great presentations that have been made. And you'll see just an example of information from advanced biofuels that we've got there; a number of Department of Energy analyses that would be useful to faculty and staff.

So I urge you to go on there and check that out. And we are always building – I think what's critical, of course, is building the actual college – and building a network of actual curricula. So we've got a number of colleges that are willing and are sharing their information, equipment with, and learning outcomes, things like that that would be helpful. So we urge you to go check that out.

All right. I'm going to get to questions. And I'm going to start just with this one. "You all sort of talked about buy-in, because it seems like this industry's growing. Jeff in particular, you talked a lot of about some skepticism or just the need for that buy-in from the administration, from your present CEOs, from instructors as well as existing technicians that may not be convinced that this is a worthwhile additional skill set to get."

So let me ask each of you. Where should colleges go to get great data that can support this at a national level, and then even better, at a regional level? Are there places – a website, organizations elsewhere that you rely upon to show that, that in fact this is a growing industry and that maybe investment is merited? Anyone want to take a stab at that?

MR. NEWHOUSE: This is Greg. I'll take a stab at that, but I'm probably going to be more negative.

So the huge trial with this is in many instances the data that are available only talk about automotive technicians and do not necessarily focus on alternative fuels and the skills required that are related to those. So what we've done in many instances is literally end up talking with dealers, independent garages, with transit organizations and others within our region to try to determine the need for this.

It was one of the reasons that we initially developed – had a workforce training focus to get the whole program off the ground and then began integrating things into our regular community college program.

MR. COHEN: Got it. And Jeff, I'd be curious about how you kind of made the case as well.

MR. MINTER: This is Jeff. One of the things that we just did recently – I mean, we can get national data and everything but national data doesn't mean much to a local shop.



So what actually ended up doing is we went to the state department of transportation and found that based on vehicle registrations, they can actually provide us with a report by zip code of which vehicles are registered where, based on the fuel type that they use, and hybrid vehicles being one of the fuel types that they define out. So we can actually do a by-zip-code registration of the vehicles across the state so we can give them an idea of how many vehicles are actually in their area that they are not currently servicing, if they aren't working on the hybrid vehicles.

MR. COHEN: Wow. That's fantastic. Mark, you don't have to respond, but just wanted to give you an opportunity.

MR. QUARTO: Yeah. I guess from the OEM side, the product portfolios are driving aggressively toward these vehicles. So whether some tech ed want to buy into this or not, it's coming. It's not like it may be or kind of; it's going that way.

And if I could disclose the product portfolios to you – which I can't – but if I could, you would be aghast at how fast the electric propulsion systems are going to be placed in the vehicles. And quite honestly, at some point in time you won't be able to purchase a car without it. So it's not that if it's coming; it's how fast it's coming. And it's coming very fast.

MR. COHEN: Great, great.

MR. NEWHOUSE: Todd, this is Greg. Let me just add to that, because what was really critical for some of our administrators was – kind of to pick up on what Mark just said – is when they heard kind of that same storyline from dealerships, from dealer representatives, it became very clear to them that they needed to support this type of program.

MR. COHEN: Got it. Yeah, great point, that employer voice.

Somebody has asked about – for you, Jeff and Greg – about program demand and how you're managing that. Are your programs at capacity? Where does that stand at this point?

MR. MINTER: This is Jeff. For our hybrid vehicle classes, the ones that we've marketed specifically to experienced technicians we've been struggling with getting those full, to say the least, because of the resistance, I guess, of the technicians to adapt to the new technology or the fear of adapting or trying to adapt to it.

But we were actually really surprised that this spring we actually had our second-year associate degree students in our automotive program come to us and ask us if we would schedule a hybrid class so they could take it fourth quarter.



MR. NEWHOUSE: And this is Greg. For our area, basically the Southern California area, on the workforce training, every time we've offered a class it's been more than full. And in the community college classes – there's actually some variability in attendance in the community college classes.

MR. COHEN: Got it. Guys, we have time for about one more. But let me also say this. The speakers have agreed to stick around for about five or even 10 minutes or so, and we've got a really cool feature here at the end where you can chat with them. And that's just sort of rapid fire questions, and they're going to be there to answer them as well. So I would urge you folks, if you're not getting your questions answered, to stick around and post and you'll get your questions answered, most likely.

I'd also ask you – after this is over you get an opportunity to evaluate this particular webinar. That information is very useful and helpful for us as well. So please do that.

Let me just end on this question. Both of the colleges here, you do a great job working regionally, working with other community colleges. And that kind of collaboration isn't always the case in a lot of places. But I think when it's starting to come to the green economy, we're starting to see that happening, where a college in one particular region will focus on solar; another will focus on wind.

You both actually mentioned this – Greg in particular – that at a 30,000-foot level, how did you get that going? Any particular challenges or advice you have for other colleges that maybe should be doing that same kind of sort of leveraging and collaboration college-to-college?

MR. NEWHOUSE: Be patient. (Chuckles.)

The collaborations have been highly variable. I mean, obviously there's some folks who have done their due diligence. And if you go through the checklist that Jeff had up earlier, they had faculty buy-in; they had administrative buy-in; they had partnerships. They had the financial wherewithal to either purchase equipment, et cetera. And they were very easy to partner with.

There have been, at other times, very difficult communications, either with college presidents or faculty, and basically trying to let them know that they were not ready to do this. And some people still move forward and some don't.

The other great challenge that we in our partnerships was trying to explain the community college system and differences to, like, the South Coast Air Quality Management District and to the Southern California Regional Transit Training Consortium. Many times they thought, well, if you just develop a class, then everybody implements it and does it, right, because you're all the same. So working with partners and explaining that we're not all the same was also a huge challenge. And it just took time.

MR. COHEN: Right. Great. Thanks. So let me do this, because we are actually getting to the time here.



Couple final things for folks that – things that we're offering through SEED. AACC's workforce development institute, which is an annual workshop, takes place in Miami this year, end of January. We have a small number of scholarships for colleges that are SEED members that will essentially pay your way to the conference. If that's something that interests you, then email – you see Katya Nekrasova's email address right there. Please email her.

And then we actually have another webinar coming up next week, focused on – it's for all colleges, but this one is really showcasing a couple of rural-based colleges around the country that have done not just great workforce programs but are actually working with their economic development teams and others to drive the jobs there themselves and the economy there themselves. So it should be another great one and we hope to see you there.

With that, I want to thank all three presenters. Thank you so much for your time and effort. And again, for folks who want to stick around to join the chat, now's the time. So thanks again for participating.

MR. KEATING: All right. Very good. Thanks, Todd.

And again as we mentioned, we're going to go ahead and move over to that collaborative format. So as you can see – and some of you are already starting to vote there – please go ahead and give us your feedback to the bottom left-hand side of your screen. Let us know what the audio quality was for today's webinar.

The poll at the top of your window is the overall quality; excellent, fair or poor. Below that, there is a feedback chat so you can let us know any specific feedback that you have about today's webinar. And also up to the right, there's a chat where we'd love to know what new topics you'd like to see covered in an upcoming webinar.

And as mentioned previously, our presenters are going to stay logged in. So if there's anything you'd like to discuss or maybe a question that you'd like to ask them, please feel free to use either of those chats to ask them a question directly and we'll have them chat with you over the next several minutes.

Also, it was mentioned – asked earlier, if you didn't get a chance to download the slides previously, you see that file share window at the bottom of your screen. Please feel free to go ahead and download the PDF version of those slides now.

So with that, we'll end the audio portion of today's webinar. Again, we'll leave this webinar room open for several minutes so that you can go ahead and ask any questions that you have about anything outstanding that you'd like to ask our presenters.

But again, we look forward to seeing you on the webinar for next week. I'll go ahead and post that link as well so you can register for that if you haven't already done so.



And thanks as always for participating and we look forward to seeing you hopefully on the webinar next week. Have a great day, everybody.

(END)



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