TRANSCRIPT OF PROCEEDINGS OF

ORANGE COUNTY CLEANTECH SYMPOSIUM SERIES

Date:	November 5, 2008
Time:	8:00 a.m. - 11:55 a.m.
Location:	UCF Executive Development Center 36 West Pine street Orlando, Florida
Reported by:	Leslie Richmond, RPR

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Symposium # 1: Defining and Attracting Cleantech in Central Florida

November 5, 2008
University of Central Florida
Downtown Executive Development Center
Orlando, Florida

8:20 – 8:30am – Opening Remarks

Orange County Mayor Richard Crotty

8:30 -8:40am – Overview and Definition of Cleantech

John Lewis, Orange County Economic Development Administrator

8:40 – 9:00am – Announcement of Cleantech Study & Symposium Series

- UCF Venture Lab – Kirstie Chadwick
- UCF Institute for Economic Competitiveness – Dr. Sean Snaith

Acknowledgement of Symposium Series Supporters & Partners

- AEA – Maryann Fiala
- Metro Orlando EDC – Amy Dinsmore

9:00- 9:50am – Presentations by UCF Centers & Institutes Involved in Cleantech Development

- UCF Florida Solar Energy Center (FSEC) – Philip Fairey
- UCF Incubation Program – Carol Ann Dykes
- UCF Nanoscience Technology Center – Jeff Anderson
- UCF Advanced Materials Processing and Analysis Center (AMPAC) – Louis Chow
- UCF Center for Advanced Turbines & Energy Research – Jay Kapat

9:50 – 10:00am – Networking Break

10:00 – 11:00am – Cleantech Company Presentations

- Planar Energy Devices, Inc. – Scott Faris
- AquaFiber – Tom Bland
- STE, Inc. (Stormwater Treatment Environments) Marty Wanielista & Mike Hardin
- Petra Solar – Khalid Rustom

11:00 – 11:45am – Keynote Address

Sena Black, Vice President for Marketing and Strategic Planning, Enterprise Florida
"What Enterprise Florida is Doing to Grow the Cleantech Sector"

11:45 – 11:55am – Closing Comments

Agenda outline for the next three meetings – Sean Snaith & Kirstie Chadwick

P R O C E E D I N G S

MS. CHADWICK: Good morning everybody, and welcome to the first of Cleantech Symposiums. We welcome all of you and we're glad you came this morning. This is the first of a series of symposium events that are being put together by Orange County to focus on the Cleantech sector and with a particular focus on economic development efforts therein. As we'll see this morning, there's a broad range of topics and an array of technologies that all funnel under the broad definition of Cleantech, and we'll talk this morning a little bit about what Cleantech means, and I'm sure it means a little bit different things to all of you here in the audience. But today you'll hear from folks in the solar industry, the battery industry, green roots and some other water retention type technologies, all of which fall under this umbrella. But the broader mission of these particular events is to bring all of the stakeholders together that would potentially be interested in helping define the Cleantech sector here in Central Florida and participate in the definition and creation of policies and programs and what not that will promote economic development efforts in this particular sector.

My name is Kirstie Chadwick. I'm the director of

the UCF Venture Lab. I have been asked by Orange County to have my team charter these events. The main reason that is the case is because the venture lab focuses on very early stage technology companies, and we'll talk more about what the venture lab is later on, but so much of the economic development around the country, around Cleantech, involves early stage companies, and that is why the venture lab and incubator and some of the other agencies at UCF are involved as well.

Closely related to this series of events is another initiative being chartered by Orange County, and that is a Cleantech study. For those of you who were around and involved with our community back in the late '90's, there was a comparable study done by Angela Angeloos focusing on technology in general and clusters therein. This is something somewhat comparable to that but with a specific focus on Cleantech. That particular study is being spearheaded by the UCF Institute for Economic Competitiveness, which is led by Sean Snaith here in the audience, and he'll be talking about that study a little bit as well. The key point I'd like to make is both of these efforts, both the series and the studies, are being spearheaded by Mayor Crotty here in Orange County, and today Mayor Crotty is here to share with us a few words on why he feels so strongly about the Cleantech

sector and why it's important to our community. And to introduce the Mayor, I'd like to bring on George Radon who is the Mayor's chief of staff and also leads the Center for Economic Trade and Tourism here in Orange County.

George?

MR. RADON: Thank you, Kirstie. Thank you very much. It's always easy for me to introduce my boss, the Mayor. I have to do it right. If not, it may be the last introduction I make. But many of you know Mayor Crotty. He's been in office now eight years as the Mayor. We've got two years left in the term. And I had some notes prepared, but let me just talk from the heart to you this morning. I remember when the Mayor was first appointed by Governor Bush to replace then Secretary of HUD, Mel Martinez, who went on to Washington, and then now became, of course, Senator Martinez. By the way, the Mayor has run twice since then gaining over 70 percent of the votes, so it's safe to say he's a popular mayor, but at the time he had been appointed by the Governor and I went to see him, my job as Director of Economic Development was an appointment by Mel Martinez, and I told him, I said, this is a job that Mel Martinez created. So I hinted about leaving and going with the Senator or then Secretary Martinez to

Washington. And he said, no, no. You stay here and you do what you've been doing but you do more of it. And I had no idea that he really meant it. And now I am honored to serve as his chief of staff. But a day doesn't go by that Mayor Crotty doesn't come into my office and say to me, what are we doing for economic development, economic diversification. What are we doing to help our local economy do better in these trying times. I'm very lucky to have with me in my office John Lewis who is really responsible for putting this together, and for that, I thank you, John. But we are lucky to have a mayor that really gets it in regards to economic development. He talks about economic diversification and he talks about his long tenure in the Florida legislature when he was involved with the early programs at UCF having to do with laser and photonics and then the institute of modeling and simulation. He goes that far back. He really is a lot younger than the years suggest that he's been around. But he has been involved in economic development a long, long time. He's a graduate of the University of Central Florida, a proud graduate of UCF. And I have probably talked too much already, but it is my honor and pleasure to introduce one of your biggest supporters in the area of economic development, Mayor Rich Crotty.

Mayor?

MAYOR CROTTY: Well, thank you very much, George, for that very kind introduction. I too have some very nice notes here that I think that I will, like George did, set aside and greet you by saying, good morning to you. I have to admit, I'm a little tired this morning, and you all probably are going to think that's because I was up worried about or celebrating last night's election results as the case may be, but that's not really true. What I was celebrating last night was my anniversary of being a public official for 30 years. It was 30 years ago yesterday. And what a great run it has been. So when I come here this morning in the spirit of collaboration, in the spirit of partnership and working together, I kind of have to think back to some of those days of when I arrived in the state legislature. Of the 120 house members that were there, 28 were Republicans, my party, so you had to collaborate, you had to be bipartisan, and you had to reach across the aisle to work with others. And that's what we have done as a community, in my mind. So we thought that it was fitting to put this group together, this partnership together, to have a series of symposiums to talk about where this community's going in the days ahead, building on those great successes that we've had.

So the two -- there's two subjects I'd like to talk about just for a few moments this morning, and that is the area of collaboration, the partnership, and the other is to single out one partner and talk a little bit more about that and the role that that partner plays in this community partner with Orange County Government. First, we have had, it's safe to say, remarkable successes, particularly the first seven or so years of my administration, because that's when the real estate market was booming, times were good, local government was very dependent on property taxes and we just were able to knock them out of the park in terms of partnership. The life science cluster of the medical city at Lake Nona was a partnership between the state, the city, the county, the university, the Burnham Institute, the federal government in terms of the VA hospital. Not one partner could have done these things without that kind of collaboration and partnership that takes place. Same is true with the downtown venues and a lot of the work that's done at the University. So the list just goes on and on.

We are a region that is actually recognized across the country as having something very unique. We have a very fragmented structure here with two mayors, with convention visitors bureau separate from the chamber,

separate from the economic development commission. It's very fragmented. And yet we pull it together in that sense of cooperation, in that sense of partnership. And that's really what today's symposium is about is working together on future successes. And as we look at our community, we know that we have become internationally famous as the No. 1 tourist destination in the world. That is something that as mayor, I celebrate. In fact, there was a headline lately quoting me saying that tourism is king. And that remains true. But we are not to be the great community of tomorrow unless we diversify the economy. And we'll tell you that two weeks ago a delegation came here from San Diego where they have had some great successes in the high tech life sciences type industries, not so much of a focus on tourism, but they were truly amazed at the network partnership that we have here. There were members of the California assembly, a mayor, heads of their economic development commission. The end meeting of the trip was a benefit featuring the former governor, Jeb Bush, and over and over again what we heard was this thing about partnership that you've got going, we'd like to bottle it up and take it home with us. That's really what a symposium like this is about is how to explore those partnerships.

The second thing I want to talk about -- I'll be as brief as I can -- is that as you go through that list of successes in Orange County, you really have to look on this placard in front of me, the partnership with the University. So many great ideas start in the academic environment, and we have seen our university grow, although not as mature as a lot of older institutions with a lot of research grants and a lot of national merit scholars, and the list goes on, but we are on the road to becoming and emerging as one of the nation's great universities because of that partnership component that exists there. As you look at that medical city, it's the medical school that really was one of the key things to launch the partnership there. The economic impact is huge in terms of almost a billion and a half dollars just for the medical school alone, and its 6 billion dollar overall economic impact to the life sciences there. George mentioned my days in the legislature, and going back a long way, I worked for an organization that actually did a lot of visioning studies for the east side. That morphed into Innovation Way. I was involved, and it's -- sometimes it's better to be lucky than good, but I was very fortunate to be on the house appropriations committee. When the University approached me in the 1980's and said, we've got these

two little amendments we'd like to you slip into the budget, one created something called Creole and one created something called the Institute for Simulation of Training. Who would have known back in the middle 1980's that we would have such huge successes in those areas. Who would have known when I worked for STEP, Solutions To Effective Planning, and we were talking about east side high tech development and what amounts to new urbanism back then, that we would have actually now created a canvas on which to fill in the blanks or fill in the space, I think, between the University Activity Center with the Research Park and the Airport Lake Nona Activity Center with life sciences.

So what's the next big thing? Where do we go from here? Life sciences, simulation, laser research, aerospace and defense, aeronautics. The list goes on and on. I believe it is Cleantech. I believe that if we are to truly diversify our local economy further than we already have, and me -- what I called in my first day of the county speech, the statement that we needed to raise the average wage in Orange County to above the average wage in the national level, that we need to continue that push forward with economic diversification. I think that's what's going to make us the community of tomorrow. And Cleantech is right at

the top of the list. So as you all talk about the various sciences that are there from solar, wind, the list goes on and on, you know what it is, have a keen eye on the role that the University can play first. I would hope that just as the University led the way in simulation, led the way in photonics and laser research, that it would partner with us as we're going today. In terms of Cleantech, I really do think we're on to something here. I think that we can make our mark as a community to further diversify our local economy, further go down the road to greatness in the days ahead. We'll do that with you all's help. So think hard, work hard, collaborate, talk to each other. These are going to be, I think, exciting meetings that you are going to have and I personally want to thank you for the role that you are playing because I think this is very visionary of you all to be here today and talk about what our future is going to look like for our kids and grandkids.

Good to be with you today. God bless you.

MS. CHADWICK: At this time, we're going to do some logistical changing here, but while we're switching slides, I would like to recognize some folks that are with us. First of all, you may have noticed our camera men. We have Orange County TV videotaping all of these

series and, obviously, today as well. And then in addition, we have Leslie here in the front row who is a stenographer who's taking copious notes. I don't know how they do that. That is very impressive. Somehow they get every word in there. But all of the series of these events will be videotaped and dialogued and documented and what not. In addition, the ones -- the three that are coming up, they'll be fully facilitated and what not. We are proactively garnering input from all of you as well.

At this point, I'd like to introduce John Lewis. For those of you who don't know John, John is an incredible resource for us out at UCF. He has so much to do with the partnership between Orange County and UCF. I could probably spend the entire morning raving about John and all of his efforts therein behind the scenes at Orange County. John is going to come up this morning and chat with all of you about some of the details of Orange County's Cleantech efforts and talk a little bit about his definition of Cleantech, and, hopefully, we can work that out as part of our agenda today.

John?

MR. LEWIS: Thanks, Kirstie. It's wonderful to see so many people out for this first symposium. We are

launching two initiatives today. One is the Cleantech study that Shaun Snaith is going to be talking about. The other is the Cleantech symposium. A lot of cities -- I won't say a lot of them. At least 10 or 12 cities from San Diego and New York State and California have completed Cleantech studies looking at their assets and capabilities. One thing they didn't do, though, is begin round tables and discussions about how to implement some of the steps in the plans that they developed until the Cleantech study was done. We looked at those communities, we learned from them, and what we're doing is doing the Cleantech study and the symposium series simultaneously so that the study can benefit from the input from the symposium participants, and later on, the study can present some ideas for discussion in the symposiums. So this is done a little differently. I think it will be a lot more efficient and we'll have a lot more product.

I want to say one thing before I begin my formal remarks. I've been here 15 years, and 15 years ago, economic development meant the metro land of EDC, the Research Park at UCF. There was a Department of Commerce at the state. That was about it really, and we didn't have much support in terms of economic development from the Department of Commerce at the time.

Over the last 15 years, we've added a lot of organizations and entities as integral parts of the Orange County development strategy. This includes the venture lab, the institute, the technology incubator, the advisory board council that you might know about, the Disney entrepreneur center. The list goes on. The High Tech Corridor Council. As we move ahead to sort of the next stage of economic development, there is another whole list of organizations and entities that need to be brought in as an integral part of our efforts. They've been out at UCF for a long time, they just haven't been integrally involved in our economic development efforts. I'm talking about the Nanotechnology Center, the Center for Advanced Materials Processing and Analysis, the Stormwater Management Center, all those institutes and entities at UCF that are so important to us if we really want to grow Cleantech in this community. So we're expanding the involvement in our economic development efforts.

This is a very important meeting for us today. When Mayor Crotty asked us to undertake these initiatives in February, I honestly never heard of the word Cleantech. I went looking around and was surprised that I saw a study from San Diego where they had done their study. New York, Boston, Austin, everybody seems

to be talking about Cleantech. We're a little bit behind actually in terms of getting on the bandwagon for this, but as you see from the technology incubator and other entities in Orange County, when they started, other cities also had those things. But our technology incubator, as an example, rose to become the No. 1 business incubator in the United States in 2004. So we may be starting a little bit late, but we, in doing that, have the benefit of looking at all the work in the other communities that have come before us and learning from that so that we can do better, and we will move ahead.

I want to start with the definition of Cleantech. There is an organization called the Cleantech Network. It's the premiere organization for Cleantech in the world. Most of the definitions of Cleantech are taken from the Cleantech group's definition, and there's a long description of that on their website. There is one sentence that stands out, and it's important to kind of read it and think about it because it is -- there is no SIC codes for Cleantech. It's kind of everywhere. It's kind of mercurical. It's across all economic sectors and up and down the ladder. The Cleantech group defines Cleantech as new technologies and related business models that offer competitive returns for investors and

customers while providing solutions for global challenges. That's fine. That was about the most concise definition of Cleantech that I saw, except that I wondered about things when I looked at this definition. Competitive returns. What does that mean? Providing solutions to global challenges. What does that mean? One other thing that you read about as you look through all the literature and studies on Cleantech is the word innovation. I really don't see that in this definition. So there is another definition by Ernst and Young that really is the same as this but I think is a little more explanatory. And that definition reads -- it is from Cleantech Matters Publication for Winter 2008. Cleantech encompasses a diverse range of innovative products and services -- keyword, innovation. And as I read through there, I underlined the keywords like innovation -- that optimize, that reduce negative environmental impact of their use, improving efficiency or providing superior performance. So I see green in there, optimizing our use of natural resources, reduce the negative impacts on the environment. I see innovation in there and I see value added. So I can start to remember that. You want to come up with a definition of Cleantech that you can kind of remember and say to people as you go along. So looking at the

keywords in this sentence, what I came up with is this definition of Cleantech, an easy to remember definition, a formula. Cleantech is equal to green plus innovation plus value added. Clean is more than green. So that's what I kind of carry around in my head, and that might be useful to you.

By the way, you don't have to write anything down from this. It's all on a resource guide that I think you all received when you came in. This has over 800 links to Cleantech related websites organized by topic and category with narratives at the beginning of each section sort of summarizing all of it. There's a list of Cleantech companies in Metro Orlando that we know about and the organizations that support them. There's a list of all the videos on Cleantech lectures and conferences and seminars on U-Tube. So there is quite a lot of information on here that I think you'll find useful as you participate in this seminar series. There are also 46 studies and reports in pdf files on this disk. So a lot of it is right here when you want to look at Cleantech a little further.

Going beyond the definition, you ask yourself, what is Cleantech economic development then? What's the definition of that? Well, I skipped a slide. These are the industry segments of Cleantech, and you can see

that, as I said, it covers every sector in the economy and it ranges from, looking just here at Metro Orlando, the latest solar technology that's being developed, green roots. I even ran across a company here the other day that manufactures conversion kits for dryers that reduces the energy use of dryers by 50 percent and speeds up the drying time by 41 percent. I thought that's a good example of Cleantech. Sort of a different kind of Cleantech company.

When I shared this with some people in our environmental protection department, they said, well, we ought to -- when we go to seminars, we hand out clothes pins. So we have a lot of different perspectives going into this area that we're talking about. But the definition of Cleantech that I propose as a starting place is for economic development purposes, attracting, creating and growing the innovative high value companies that produce the products and provide the services that will allow us and the rest of the world to go green. I think that says it. That's sort of our mission when it comes to economic development. You may have a different slant on that. If you do, even just a simple note, a comment, I think on the back of one of the forms you received this morning, there's a space for you to write that. Write down some comments as you go along this

morning and pass them to us. We'll incorporate that all into the study in the symposium series.

I added the words high value because when it comes to economic development, we are looking at companies that potentially will have a decent capital investment so that we can increase our tax base. We're looking at companies with high wages. Economic development is not everything, it's focused, and this is one way to focus our efforts. If you look at this definition, then probably retail and wholesale outlets that sell Cleantech products would not be considered Cleantech. And people who are PV installers, a PV installer company that goes out and installs them, they might not be considered as Cleantech according to this definition. The company that makes the solar panels actually would be considered Cleantech. When you want to see what's coming in the area of Cleantech, according to the experts at Cleantech.com and other places, you look at venture capital, because that, according to the experts, is a lead indicator of future flows of mainstream investments. It also predicts rapid growth and entirely new sectors and industries. Cleantech has been growing at the rate of 50 percent since 2001. A report just came out this month, this past month, with another record breaking quarter for investments in Cleantech.

Another indicator of the importance of Cleantech is something called the Cleantech index, which I didn't know existed up until several months ago. It's the index of the American Stock Exchange for Cleantech Industries. And this is a chart that I took off of -- or made, developed, out of my E*Trade account, and you can see the Cleantech index compared with the S&P 500 and the NASDAQ. I could have put the Dow Jones on there. It says the same thing. But looking at the starting place in 2004, zero, where would you have rather put your money along the way during the past year. I mean, all along the way, Cleantech is valued and is growing at a much higher rate than everywhere else.

Now, I went back and looked at a book I have called How To Lie With Statistics to see if I was really doing something that I should do here, and this is accurate, but it really doesn't tell the whole story because you notice I ended in March. As of today when you look at Cleantech, that's the whole story right there. But, I mean, looking at this chart, when things turn around and start to grow again and looking at the record investments that even quarter by quarter up until now are going to Cleantech, I mean, where would you put your money going forward coming out of the recession and the

downturn. I think Cleantech.

There's a lot of things we can do when it comes to Cleantech economic development. These are just a couple of quick ideas that in future seminars you'll be presented with some of these through the Institute for Economic Competitors at UCF, but here's a couple of things in the future as we get a handle on understanding what Cleantech is that we might do. In San Diego, for example, they have a fund, a Cleantech initiative fund, where they offer researchers at the university there to come up with some promising ideas in Cleantech. And it's -- the money can be used to develop a prototype or a proof of product study, and they just this month handed out three $50,000 grants to the researchers. This would not be something very expensive that we would have to do. 100, 200, $250,000 funds that would provide some start up assistance to our Cleantech companies. That's a possibility. Should we do that instead of some other things? But there's a lot of things we could do. This is one of them. Another one is the solar cities program. You'll hear more about this as the months progress here. Orlando was selected as one of only 25 cities in the United States as a solar city. And the purpose of the solar cities program is to encourage the early adoption of solar technologies. And there will be

a whole group led by Jennifer Zarro (ph.) at OUC that will be going down this path and responding to the grant money that they received to do this. And they're going to be coming out and looking at different policies that might be implemented that would encourage the growth of Cleantech and sometimes, in effect, determine a demand for Cleantech. That's one thing. That's another thing that we could do.

Finally, we could build a Cleantech city down in Research Park South. I mean, I've heard people at UCF talk about the need for a dedicated incubator building for years. They're building Cleantech business incubators now. Some of them are incubators with (unintelligible), like in Austin, some of them are actually Cleantech business parks as in Finland and Singapore. This is actually a 1.8 million square foot building. So we need to think big, I guess. And actually this building is Infomark in Dallas, which is really sort of a technology oriented environment if you've ever been there. A lot of telecom and technology on display. And one of the things we hear from Cleantech companies is that, in addition to everything else we can do, what they want and what we hear is a place to showcase their technologies. Why can't we build actually a showroom facility to display

technologies in a new Cleantech city in Innovation Way at Research Park South. That's just an idea.

The first idea that's from San Diego is a little less expensive. This maybe is a little long term, but, you know, this is something that makes sense. We need to think about it, start talking about it now. The idea from San Diego just didn't pop out of anywhere, the idea for this Cleantech initiative challenge grant program, it came from their Cleantech study, and that's the cover of the study to your left. But other cities in place also have done Cleantech studies creating the California Cleantech cluster. It's a statewide study. It's been updated twice since it was first published in 2004. San Jose's green vision. Some other ones. In case you can't read it, the one in the middle is capitalizing on green. Fostering Canada's Cleantech entrepreneurs. That actually was an effort that resulted in a whole set of recommendations to promote Cleantech in Canada. So there's a lot of ideas that can come out of all these studies, and Shaun and the Institute will be presenting some of them to you as we move forward. But looking at the promise of Cleantech and looking at what we can accomplish, it would be a new economic cluster. We have entertainment in a convention cluster, simulation in training, we're developing a biomedical cluster. This

could be the next new economic cluster. This certainly advances our goal of economic diversification. If you look at Cleantech jobs and green jobs, anything you read, look through the resource CD, it's going to create thousands of jobs, and the important thing about those jobs is that they are jobs at all levels of the economy and all geographic areas throughout Orange County and Metro Orlando. So this has a great potential for the future economic development of our area.

So, in closing, just remind you that the buzz word, the wash word, is Cleantech. It could be our next new economic cluster. We have a lot of partners involved with this. Others that we just didn't have room on the slide to put everyone's logo on it, but I think you get the idea. So I hope that gives you a capsule of just kind of what Cleantech is, how important it is, how do you look and see what the potential of it is by looking at what is happening in the venture capital area and looking at some of the ideas that we might be talking about in the coming weeks and months. So it's very exciting for us in Orange County to be able to do this and it's exciting for us to have a lot of you involved in this. And we are listening to what you say. It's all being recorded by Orange TV. There will be a written transcript of every word of this symposium that

will be provided to Shaun for input into the Cleantech study. So we're trying to do things right, and with the venture lab and the institute at the center of things, I know it's going to work.

Thanks.

MS. CHADWICK: All right. Next up would be Shaun Snaith who is spearheading the study that we've been chattering about now here for the last half hour or so. Shaun's going to come on up and provide some further details of what the study's all about and then also share with all of you some of the things he potentially needs from all of you as we go through these series of symposiums here over the next few months as well. So with that, Shaun Snaith.

MR. SNAITH: Thank you. Good morning. While the economy's slipped into recession most certainly and I think that makes the mission of what we've all gathered here to do today that much more urgent, the importance of diversifying the economy to continue to grow various sectors will allow us to endure not only the current downturn but future downturns, and I think that's one of the great things about being part of this Cleantech initiative is it is the next big thing, I think, for Orlando. We've seen wonderful things that have transpired with the biomedical cluster, and the notion

of partnerships, you know, just to reiterate what the Mayor said, I speak all over the state and in different parts of the country, and people are singularly amazed at what's gone on here in Orlando and how the university and the county and the private sector have combined and catalyzed one another to lead to just really some amazing progress on the economic development front, which typically you might think of as glacial or very slow moving, decades-in-the-making type process. You know, what people see here in Orlando is really more cataclysmic than it is glacial, so we're happy to be part of this.

John's provided you with the disk. He said there was 800 links or documents. If anyone has a chance to go through those and happens to be looking for work, see me after.

The Cleantech study is basically a primer, a starting point, a benchmark document that all of us are going to collaborate on and produce, and it will be something of a starting point to launch us into this economic development initiative. And there are a variety of components to this study, and as we go along, we'll present, you know, this work in progress, get your feedback to it, your input, your suggestions, and it'll be something that I think we will both collectively

shape into something that hopefully will be quite useful when it's complete.

About the institute, this is our mission statement. We're kind of always forward looking, trying to figure out what's around the horizon, which has become exceedingly difficult as of late, but we're pleased to be part of this effort in trying to shape and understand what's next for the region's economy.

I have a couple of students here, Amanda and Laura, who have been working very diligently on Cleantech and trying to educate me as to what Cleantech is and what's going on in other parts of the country, and we've broken down the study into phases. These are not necessarily temporally sequential, I think some of them are going on at the same time, but to give you some sense of what the components of the study are at this point, at the point of conception. And that certainly could change. And we might find as we go through the symposium that we do need something else in there, another section. And the definition is a starting point, and John pointed to it. We pulled this one here from the Cleantech group that John alluded to. And it's not in the dictionary. The definition of Cleantech does vary, and it is a work in progress, and we need to decide on what exactly it might be, but, you know, this diagram, I think, solidified

some of these notions that, at least for me, were a bit fuzzy in terms of what is the relationship between green and Cleantech. And you can see, and the print's pretty small, there is an intersection in the two, and both have to do with the environment and ecological concerns. But clean technology, as opposed to just green technology, clean technology is market driven, profit motive, the thing that I know as an economist I can always count on being there; whereas, you know, green efforts might be driven by regulatory issues, and we know those can change from one administration to the next.

So Cleantech has that market component to it that I think this time around -- and some of us were chatting earlier on, you know, unlike the '70's when, you know, there was the first talk of all these alternative energies and ways to wean ourselves off of foreign oil, kind of crumbled away. I think there's a real market motivation this time around that's going to make -- despite what's happened recently to oil prices, that we'll see some permanent affects from the recent spike in energy prices. And I don't think this is going to be a passing fancy. Cleantech investments, venture capitalists, John mentioned, is an indicator of -- a predictive measure of what's to come. Globally, 6

billion in the U.S., 3 billion in venture capital investments in Cleantech industries in 2007. John mentioned several of the Cleantech clusters that exist around the U.S. You know, various programs and policies which we will jointly hope to form and suggest and take the best of what's going on in other areas and make it our own. The California million solar roofs initiative, 3,000 megawatts of electricity by 2017 is an example of one of these Cleantech initiatives.

What are the constraints that we see upon our initial examination in existing Cleantech hot spots? Well, one has to do with financing, and I guess that's probably not a constraint that's unique to the Cleantech industry, but because of the nature of some of these technologies and the long time horizons that might need to be played out, there may be some unique needs here for Cleantech when it comes to acquiring venture capital that might typically seek a more faster return on investment. And that may be one of the areas that we want to focus on to try to ameliorate that problem for Cleantech start ups.

You know, what are the Cleantech jobs? What -- you know, what are the current ones, what are future occupations that will be created hopefully under this initiative. And as John said, it doesn't map very

neatly to a list of industrial codes. So it's something we're going to have to work with and think about and come up with on our own. And here's just an example of some Cleantech jobs there. You know, the guy picking up vegetable oil that's going to be converted into biodiesel, or a green building manager. Whereas, you know, in the past, a hammer and a ladder might be all that person needed, well, they're going to have to have some more sophisticated skills in the future to handle the systems that might be involved in green buildings. Green collar jobs. This was a notion of maybe traditionally blue or white collar jobs, but that are tied in somehow to the Cleantech industry. And, you know, the trucks that are driving around installing direct TV satellites now that you see everywhere in the future, you know, we would expect to see similar type fleets but they're installing solar panels on homes.

In the study, we're going to kind of analyze the market, see what's here, talk -- you know, figure out the companies that are involved in the Cleantech industry, whether they're located here, basic companies that are exporting product and creating jobs, or if they're just working here from outside of our region and doing business and could be classified as non basic.

We want to look at what the potential growth is for

Cleantech, look at the resources and the environment, what it is about the region that can help this industry flourish, what it is about the region that might be a potential constraint. And that, too, will be part of the study.

We also want to have a listing of the Cleantech companies that are working in the region and provide a database that will continue to update as it evolves, and this is, again, one of those areas where we'll need to get some feedback from the community to make sure that we -- you know, no Cleantech company is left behind and is not on this list. And the institute will maintain that and update it as we go through this process. We also want to provide a list of resources for current and future Cleantech companies. Banks that might have specific missions that are amendable to the Cleantech industry. Organizations like the EDC, of course, or the high tech council corridor that provide other resources and support for these industries going forward. So we'll want to have that in this reference guide as well.

And just in conclusion, we do look forward to working with the county as always, but also with you in the community in making this study something that's going to be a very valuable resource going forward.

Thank you.

MS. CHADWICK: Thank you, Shaun. I'm actually next, so while my slides are getting queued up, we'll take this moment to recognize two of our sponsors. I would like to say that I was greatly helped more than you can possibly imagine by several folks that are here in the audience and also running around here, but I would like to start off by thanking Maryanne Della with the AeA. AeA was founded in 1943 by the founders of HP.

It's a trade association that protects the interests of the technology industry of the government, at all levels of the government. For the purpose of time because I've got this nice big old long dissertation of what they do here in front of me, but with respect to Cleantech in particular, they do quite a bit of public policy and lobbying in three key areas. First of all, they focus on technologies that are in the -- related to efficiency. So in particular, technologies that support the improvement of the use of natural resources while maintaining and improving performance of cost of those resources. This includes things that we all probably use everyday but don't think about. Things like teleworking, broadband deployment, energy efficient semiconductor chips, all of these -- save gas because people aren't driving, they're working from home and things like that. So those sorts of technologies.

Second area of focus for AeA is energy, which is an obvious given here with the Cleantech sector. In particular, they focus on R&D tax credits and those sorts of programs and policies going on, again at all levels of the government. They focus on technologies that -- for later stage of energy efficiency and exploration of alternative and renewable energy technologies. That includes, of course, battery, solar, wind, water, fuel cell technologies. And, lastly, the AeA focuses on policies that focus on our environment, and specifically the AeA supports industry and government initiatives and responses that increase responsible environmental recycling and offer proactive environmental design initiatives on behalf of the high technology industry throughout our country.

I don't believe Maryanne was able to make it today, unfortunately. I do want to articulate that she was an incredible resource. All the registrations that you guys went through online, all the website support, all of the e-mail blasts, those were coming from her team. So thank you to her. I'm sure she'll be at the next one.

The next organization I'd like to recognize would be the Metro Orlando Economic Development Commission. I believe here I see Amy. Hello, Amy. Thank you. Amy

worked very closely with Christa Santos who's over here who I am graciously thankful for. Really all of this came to be because of Amy and Christa and Maryanne's efforts.

Also here, I believe, is Mike Bobroff, he's back there, the executive vice president and COO of the Metro Orlando EDC. The Metro Orlando EDC is a not-for-profit public private partnership that serves Orange, Seminole, Lake and Osceola counties, as well as the City of Orlando. EDC is dedicated to meet the needs of today's industries in creating a competitive and economic climate where businesses like all of ours here in the audience today can thrive. To meet this goal, the EDC provides key services and support, which range from relocation and expansion expertise, to export counsel in long term planning with community partners. Again, thanks, Amy, thanks, Bob, for providing your resources and your team, and we're really glad you guys are helping us out here.

So with that, I'm going to kind of flip over into my other role, which is now the director of the venture lab instead of the MC of this event. And I will try to blow through my slides because we're a little behind, obviously. For those of you who don't know who we are, you can catch up with me here on the back end to learn

more about us.

The venture lab is a joint effort. Again, partnership is a founding value of the University of Central Florida and it's been brought up many times.

We are a great case study of partnerships coming together. It was a joint initiative, we're four years old this year, between the UCF office of research and commercialization, the college of business, Orange County Government, of course, and the Florida high tech corridor council. These agencies came together and felt there was a need for some supplemental support for early stage, the earliest, earliest stages of companies. We finally call it the primordial soup stage of start ups. And our mission is to provide early stage entrepreneurs with access to experienced business coaches that have been there, done that, that have been in the shoes of start up entrepreneurs, and we're here to assist these folks in the early stages of their businesses and walk them through the steps that are critical for the success of their firms.

Our team consists of two separate -- well, not separate, they're obviously a team, but they're two types of folks. First of all, we have a group of what we call been there, done that, start up executives. We have -- the number that we have ranges. We call it the

Hotel California model because coaches come and go as they leave to go run companies and they come back for their next adventure. But right now we currently have a team of seven coaches. Between us, we've founded or been in the earliest stages of executive teams of 15 technology companies. We've raised over 200 million dollars of venture capital collectively. Between us, our companies have done IPOs, we've done MNAs, and we've all failed at least once, which is pretty much required to carry the wounds, if you will. All of us have engineering degrees. That seems to be the norm for technology start up executives. And we also have in the venture lab, and we'll talk more about that in a minute, specific expertise in fuel cells, hydrogen energy and Cleantech.

In addition to our coaches, we have a group of student interns and we do carry the banner of UCF because that was our founding organization, of course, but I would like everybody to understand that we have students from Barry University and Rollins now on our team as well. These students are the workhorses of the venture lab. They do all the market research, they do competitive analysis, they do patent searches, they do all kinds of stuff to help new entrepreneurs make sure that their business plans and, you know, their

strategies and what not are the best they can be.

Basically what we do, we spend an awful lot of time rolling up our sleeves with entrepreneurs. We help them write their business plans, we help them, you know, vet their financial statements. We teach them how to do this stuff, we teach them how to pitch investors. We do focus only on technology companies, and we specifically focus on companies that are going after angel or venture capital. Those are those high growth companies. If they can attract that sort of capital by definition, they're a high tech company that can create jobs in the region. On the side note, we also put on workshops. SBIR is a big source of dollars from the federal government. We put on workshops twice a year and we also put on educational seminars for angel investors in our community through the Kaufman Foundation as well.

Our profile is pretty much any early stage technology entrepreneur. We spend a lot of time with the faculty, of course. Not just at UCF, but anywhere in the high tech corridor, so that would be the University of South Florida, Gainesville, what not. Obviously, students are a key focus for us as well. The backs of many -- most of the major playing start ups that you guys have heard of, Google and Deck and what not, those all came off the backs of students from

university and innovative economies throughout the country.

And, of course, we focus on entrepreneurs that have nothing to do with UCF. I don't think people realize that. Actually, the majority of the folks have nothing to do with UCF. They are just entrepreneurs out there starting companies.

In addition to our team -- I'm sorry, the -- yeah, the services that we provide with our team, we have been very fortunate to have garnered a relationship with the Winter Park Angels, which is a relatively new investment angel group here in Central Florida. The venture lab -- I am now also the executive director of the Winter Park Angels on behalf of the venture lab, because we basically do all of the screening of companies, we vet those companies, we do market research, we do competitive analysis, we select which companies go in front of the group. We do not make the decision to invest in them, that's what the group does, but should they be interested, then we'll run all the due diligence and negotiate term sheets and run the transactions through on behalf of the group. So a lot of work therein. And all the interns spend quite a bit of their time also helping in that capacity.

Since we started this relationship in January,

we've already brought 15 technology companies in front of them, in front of the group. We focus all over Florida in this particular capacity, not just Central Florida. But the first investment happened just a few weeks ago. It was in the paper. And there's two or three other deals now going down the path as well. All of them, by the way, in Central Florida.

Okay. So our metrics, real quick. Since we started, we've assisted over a hundred technology companies. Remember, we're very, very early stage, so many of these are folks that are in the most earliest stages of their business planning. But four of the ones that we're currently helping today are established, doing around a million dollars in revenue. The majority of them are in the idea or contact stage, and seven of them are UCF faculty spin outs. We have assisted these faculties in winning over 3 million dollars in SBIR funding, and we now -- again, it takes 12 to 18 months for companies that come in with an idea to come out the back end with their first round of funding. We're proud to say that the first two finally came through in the last month or so with their first round of seed capital.

With respect to Cleantech, which is what we're all here for, the venture lab is specifically coaching and mentoring six very early stage Cleantech companies, all

of them, again, in the early stage and looking for the first round of capital.

Winter Park Angels also has a preference for Cleantech. They have clearly stated that. So when Cleantech companies do come through the venture lab, we put quite a bit of effort around them trying to get them ready and to be looked at by investors in the region.

I'd like to also introduce Dr. Shaun Christianson. He's here in the audience. He's my partner in crime in the venture lab as well as several of the other folks here in the audience. Shaun joined the venture lab team, what, a couple months ago now. He has specific expertise in fuel cells and hydrogen energy. He was helping Governor Bush a few years back in his hydrogen policy initiatives, and he was part of the Florida Energy Commission Advisory Group as well. In addition, Shaun is a member of the Winter Park Angels, so he's always looking at things with a glass is half empty mentality. I'm going, go, go, go. So it's always good to have that sanity check.

The venture lab is also the agency that is the member of the Cleantech network that you have been hearing about. It does cost money to participate. We put on some great events and what not and we attend all of those, as well as get access to all their data and

research which we're providing Shaun's group with.

With respect to the series, there are four events scheduled, this one being the first one, for the next four months. Please mark your calendars. December 10, January 21, and February 18 are the next three. I realize this is a time consuming process and all of you are very busy, but we really, really need you to come and we need you to invite your friends. You have a form in front of you where we're asking you to jot down any other folks that are involved with the Cleantech sectors here in Central Florida so we can get them on the invitation list, because these are for you. We are gathering here to set up interactive dialogues and interactions with all of you so that we can hear from you what needs to be done to create and grow this sector in our economy. So without your input, we're running in the dark. So please, please, please, we encourage you to show up and we encourage you to invite your friends.

And with that, I'll hush and let the other folks have their time. And we are a little behind, so if folks could pay attention for those of you who are up next on the queue, that would be super.

Philip Fairey is here from the Florida Solar Energy Center, and Philip is going to not have slides, which is throwing me off right now, I apologize. But Mr. Fairey

has been the deputy director of the Florida Solar Energy Center since 1990. He also served as the interim director of the Center from 2002 through 2004, and prior to assuming his duties as deputy director, he spent 10 years at FSEC conducting research in buildings and energy efficiency. FSEC is one of our key centers, as you might imagine, out at UCF that is actively involved in research and commercialization of technologies in the Cleantech sector, so we're very glad that Philip came over from Brevard County to spend time with us this morning.

Thank you for coming.

MR. FAIREY: Thank you very much, Kirstie. I really appreciate that. It's a pleasure to be here. As Kirstie said, I'm with the Florida Solar Energy Center and I have the tie to prove it. This is a tie that was actually created for the Florida Solar Energy Center by the leader of the Solar Technologies Group at the National Renewable Energy Laboratory in celebration of our 30th anniversary as UCF's research institute for renewable energy and energy efficiency. So we've actually been around since the time Dr. Snaith was talking about when solar in the 70's was considered something that wasn't cost effective. But what has happened since then, much to our pleasure, is that we've

seen energy costs rise. That's not to our pleasure, but that was inevitable. And we've seen the cost of renewable and alternative energy resources decline as a result of that. And so now the field that I have been involved in for over 30 years is coming into the economic marketplace with much more realism than it has ever had a chance to do in the past.

The Florida Solar Energy Center -- and the name is a little bit misleading because we do much more than solar energy -- has been around for 32 years. We were created by the Florida state legislature as the Energy Institute of the State of Florida. We're currently the largest and most active state supported energy research institute in the nation. We have a little over 140 full time employees who spend 24 hours a day, 7 days a week, 365 days a year worried passionately about how we can improve the energy economy of both the state of Florida and the nation. We operate in a number of key research areas. We are roughly split into three different research divisions. The first one is one we call Advanced Energy Systems Technologies. This research division focuses on research activities that we consider to be fairly advanced research opportunities. The kind of things that we focus on in this division include production, storage and utilization of renewable

hydrogen technologies and systems and fuel cell technology, and, more recently, a lot more work in the area of gasification and pyrolysis of biofuels, potential biofuels. And this is critically important because, as we move towards different types of alternative fuels, the gasification and pyrolysis of biofeedstocks, I'm going to call them, contributes both to the petrochemical industry as well as the agricultural industry within the state of Florida, and particularly within the state of Florida. The fuel cell activities are also vitally important. We currently oversee the 19 million dollar DOE effort with U.S. cars to develop the proton exchange membrane that is likely to be used in the automotive industry and the transportation sector to power electric vehicles that are driven by -- that are powered by fuel cells. Now, there are a number of different fuel stocks that can go into the powering of these automobiles that range all the way from methanol to pure hydrogen.

The second research division that is very active at the Florida Solar Energy Center is our solar energy research division. And this division concentrates on two areas of renewable energy. What is called photovoltaics energy, where you have semiconductor cells which produce directly from sunlight electrical energy

in the form of direct current energy, and then that energy can be inverted into alternating current energy that can be used in conventional applications.

Now, what we've seen with photovoltaics over the last 30 years is a rather dramatic decrease in the cost. One way to look at the cost of photovoltaics is the equivalent cost per kilowatt hour out of the wall. You currently in the state of Florida pay about 12 cents per kilowatt hour of electricity when you plug into that outlet in the wall over there. The current cost of power which is produced by photovoltaic electricity, on the other hand, is higher than that. It's on the order of 24 to 28 cents per kilowatt hour. We are seeing many, many programs throughout the United States, not as many in Florida, but some in Florida, which are buying down that initial cost of photovoltaic systems by as much as half.

Dr. Snaith mentioned one program that is considered a Cleantech program in California, the million solar roofs program that is being sponsored by the State of California. When you buy down that cost, you can get the cost per kilowatt hour out of the wall to the actual consumer of the products down to where it is very competitive with power out of the wall.

The other kind of things that we're seeing in our

economy is that conventional power sources, the cost of conventional power sources, due to a number of things, are going up. There is an increase in the cost of fuels to produce the power, there's a general increase in the cost of doing business within the electric industry. We recently over the past year have seen proposals from two major utilities in Florida to construct two nuclear -- two new nuclear power facilities in the state of Florida, and the estimated cost of these new nuclear power facilities is on the order of $7,000 per kilowatt of power production capability. This is dramatically higher than the usual conventional cost of electricity production facilities in Florida. And so with those kind of costs going forward and with the serious historical decline, I will say, in the cost of photovoltaic power production, which we don't see stopping, we see the cost of photovoltaic power production modules continuing to decline in the future. We're clearly going to come to a point where the cost of conventional power and these solar power alternatives meets in the economic sector and the renewable energy alternatives become as inexpensive as the conventional alternatives, and at that time we will no longer call solar technologies alternatives, we will call them conventional because they will be cheaper in the

marketplace. And we see that happening. There's a number of reasons for that happening. The declining cost in the technology along with the increasing cost of conventional technologies, and the rather serious effort on a global basis to account for the cost of carbon with respect to global warming. Clearly, the types of solar renewable energy power production technologies that we work on don't produce any pollutants that need be accounted for within any kind of carbon trading programs that might go on internationally or nationally.

The third area that -- and don't let me short change the solar industry because we have countless uses for solar hot water in our industries, in our homes, and far and away the cheapest, easiest and cleanest way to make hot water, in this state, at least, is with the solar hot water system. The amortized cost of solar hot water systems compared to electricity out of the wall is between 8 and 9 cents per kilowatt hour, so it is already less expensive than production using electrical means, and so we should -- we should see more and more and greater and greater use of this technology within the state, and one of the other things that this research division, the solar energy research division at the Florida Solar Energy Center, is responsible for is the certification, the rating, the testing and the

certification of all solar systems which are manufactured or sold within the state of Florida, and that is a function of our original charter that was created by the legislature in 1976 as a way of protecting consumers from fraudulent solar systems and devices. And so we've seen that effort that just simply the testing and certification of solar systems improved the performance of these systems by over -- from about an average of 30 percent to more than 60 percent efficiency. That's doubling the efficiency of the systems that are in the marketplace compared to what was in the marketplace 30 years ago when this effort first started.

The third area of research that we have very active involvement in is buildings research. And we are very involved and that is our largest research division, the buildings research division. We're very involved with this, and the major reason for this is that in the state of Florida, many people don't know this, but 84 percent of the electricity consumption in the state of Florida goes to building energy use. That is a gigantic piece of the electricity pie. We know from the research that we've conducted over the years that we're fully capable of reducing the energy use very cost effectively in the building sector for all of the buildings that currently

exist by between 25 and 30 percent. And so if we could take 25 to 30 percent of the existing building energy use and convert it to efficiency, that would be 25 to 30 percent of 84 percent of the electricity that the state produces. And we can do this cost effectively. And so in terms of Cleantech technologies, this is the most cost effective place to go right off the bat. The center is involved not only in research in buildings energy efficiency but also in all of the allied stuff that is associated with that, including very significant involvement in both the state and national building energy code making processes. We have individuals that serve on these code making bodies, as well as we provide services on things like the governor's action team, the technical working groups that are associated with the action team, the committees of the Florida Energy Commission over the last couple of years. And so we are seen by many people as the expertise that can be counted on within the state to tell you what's actually happening rather than what people claim to be happening. And so that's one of the other services that we provide. And energy efficiency is, as I said, critically important and particularly in the building sector.

And so with that, I think I'll stop so that I don't eat too much of your time, and thank you very much, and

we are very excited to see this Cleantech initiative take off in the Metro Orlando area.

Thank you.

MS. CHADWICK: Thank you, Philip. Next up we have Carol Ann Dykes with the UCF Incubation Program. I wrote seven, but I actually think Carol Ann has been with us at least eight years.

How long have you been with us?

MS. DYKES: Six and a half.

MS. CHADWICK: Okay. I was close. Seven. Carol Ann's been the manager of the UCF Technology Incubator out at Research Park, which was named the 2004 incubator of the year by the National Business Incubation Association. Before she came to UCF, Carol Ann was a faculty member of the College of Engineering at the University of Florida where she also served as the associate director of the Southern Technology Applications Center. In this role, as well as several others that I know she's held over the course of her career, Carol Ann has supported many, many companies, federal laboratories and universities across the southern United States in a broad range of technology commercialization activities.

We're so glad you are here, Carol Ann.

MS. DYKES: Thank you, Kirstie.

Well, there are a lot of familiar faces in the audience, so for a few of you this will be some new information. For many of you it will be an update of the incubation program at UCF, which is a good thing probably. As many of you know, as Kirstie said quite eloquently, we don't do anything at UCF unless it's in a partnership with our local community, and the incubation program, just like the venture lab, is another example of that. We truly do represent an economic development collaboration with our local community, and you see the local government entities that are listed there that we would not be able to keep our doors open without their financial help, as well as many other forms of help that they give us. But I think what's important to understand about the incubation program at UCF is that we complete the economic development strategy for the community. Just as the venture lab contributes to growing companies here from the ground up, the incubation program is one of those next steps. We have companies coming out of venture lab programs into the incubator, and our job is to help grow those companies here. Economic gardening is a term that you may hear these days, so we work very closely in concert with groups like the Economic Development Commission, which is a incredible partner with us. They focus extensively

on recruiting and retaining companies that are here in the community, and we work hand in hand with them to help the entrepreneurial side.

The incubation program did open its doors in December of 1999 after Dr. Tom O'Neal, who is Associate VP for Research, spent a couple of years trying to convince a number of individuals at the University and the community that we needed an incubator and what an incubator really was. Some of you remember that. And it did start with the technology incubator, which is located in the Central Florida Research Park adjacent to UCF.

In recent years, we have been fortunate that our local government partners have stepped up to the table to enable us to expand the incubation program to multiple locations in Metro Orlando, and, therefore, expand our ability to serve a wider variety of companies in addition to those that are developing new technologies, and you can see where those locations currently are at this point. And I can tell you that location No. 6 will come online next year in the city of St. Cloud due to funding that the City of St. Cloud has already committed and Osceola County will also be contributing to that funding. So we're looking forward to being able to serve Osceola County.

I want to just put in perspective where we fit in the university arena. As Mayor Crotty indicated, much of the technology sector here in the community has started with the University and the research that goes on there, and across the country, universities are creating incubation programs and other entrepreneurial support programs because it is a key element of growing a local economy, particularly a technology based economy. So we have tremendous research at UCF, and you will hear from a number of our representatives, the Solar Energy Center, the Nano Technology Center, our Materials Processing Center, and that's just the tip of the iceberg at UCF, really. We have a very active technology transfer program and entrepreneurial education program that are not on the program here today. But all of that is designed to help create something useful out of that research and get it across the transom, if you will, into a company that can actually take it into the marketplace in products and services that can impact the economy. That happens through licenses that go to existing larger companies to commercialize. It happens through UCF spin off companies, and you will hear from one of those today. Khalid is here and will talk to you about Petra Solar and what that company is doing in commercializing some

UCF research. One of our clients in the incubator that's in the Cleantech space, Novasol, who is on this list of invited companies, they weren't able to be here today, they are commercializing some intellectual property developed by Dr. Sudipta Seal. So that is another UCF spin out company. And then just new companies from the community that are in a variety of technology sectors, one of which is Cleantech. Two of our clients are represented in the audience today that are in that space. Acudine. Darren, back of the room back there, raise your hand, developed being some incredibly innovative microturbin technology that I know he'd be happy to tell you about if you want to corner him, and Novasol, Haseeb, right there, who's in the solar energy space. So I invite you to talk to both of them if you have a moment. And one of our graduates, the facilitator who is in the environmental engineering field and does an extensive amount of work in water management and water reuse and water resources as well. And all of that and much more that we do is intended to fulfill our mission as the UCF incubation program, which is two things: Diversification of the local economy and high wage jobs. Everything that we do and every company that we helped is designed to fill that mission.

So what do we do? I'm not going to go through this

list in the interest of time. You can read that, and I don't think there will be anything there real surprising to you, but suffice it to say that what makes us an incubator, not a real estate operation, although we have a lot of real estate space that we manage and we sublease, is all the value added services that you see on here. You heard the venture lab story and what they do over there, and, as you might imagine, they're an incredible partner and resource to us in helping our companies in market research and getting ready to go in front of investors and reviewing of business plans and all those things they do so well.

The primary thing that we do for our clients that brings them to us actually brings some of them back. We have two CEOs that graduated from the incubator when their companies were acquired and are actually back with us. We have a number of serial entrepreneurs that are with us because they all have benefitted from and realized the value of the connectivity to the community and the university that we can provide in the incubation program. Some of you in the audience who have very valuable business expertise, entrepreneurial resources, a huge and growing pool of individuals from this community who donate an incalculable amount of time to come out and just help us mentor and advise and educate

and guide these entrepreneurs through the start up stage of their company because that's where we are focused. Our companies are with us one to three years for the most part and our job is to get them quickly and successfully through that start up stage and then move them on out into the community where they can diversify the economy and create high wage jobs.

This is all on our website. I encourage you to write that website down. You will find a lot of information about the incubation program and our clients there, all of our contact information. I purposely did not put my individual contact information in this presentation actually because our whole team is on the website for all the locations, so feel free to spend some time on there.

Our excellence in entrepreneurship course, I will point out, that is a unique element of the application process for the incubation program that we have not found exists in any other incubation program in the country. And there are specific reasons we do that, and it's proven to be quite extraordinary in educating our potential clients to be and also helping us sort out the number one thing that we look for in companies that we bring into the program, and that is, are they coachable, do they know they want help, are they going to be

willing to take help, because, otherwise, we can't add value.

Have we succeeded? Well, as you heard John and some other folks say, we were named top incubator in the country a few years ago and that was based on our success at that point. To date, we have 70 companies across the five locations in the Metro area. We have 41 companies that have graduated from the program, at this point mostly from the technology incubator location and Research Park. Six of those were acquired, which is going to happen a lot in the tech sector, and the majority of them are still here in Central Florida thriving and growing, many of them in Research Park, and you can see the rest of the data there that I think says, thanks to our community support and partnerships, we are successful.

That's it. Thank you.

MS. CHADWICK: Thank you, Carol. Next we have Dr. Jeff Anderson who is the associate director of our Nanoscience Technology Center out at UCF. Jeff's research involves -- oh, I can't even explain this, translational research utilizing engineered neuronal networks and neuroimaging. Holy smokes. However, in addition to being a brilliant scientist, I happen to know that Jeff is a very entrepreneurial person. We've

had many conversations. He shows up at the venture lab almost regularly at our weekly staff meetings to hear about what we're doing. With collaborators, Jeff helped create his own company. He was collaborating with Harvard Medical School up in Massachusetts, of course, and created a spin off company that secured over six million dollars of SBIR funding and a whole series of contracts to follow on with that. Today, Jeff continues to combine his interests in interdisciplinary research and commercialization of technologies towards the goal of creating innovative companies in Central Florida.

With that, you're on, Jeff.

MR. ANDERSON: Thanks. Hi, everybody.

AUDIENCE: Morning.

MR. ANDERSON: I'm going to try to be really succinct, but it's hard because we've got -- we have a lot going on. I'm going to talk about nanoscience. I'm a big person, but what we work on are small things, and the thing is, in the last 10, 20 years, we have received and discovered tools that allow us both to visualize the very small level and also manipulate that. And so the question is, what can you do with these new abilities, and it really is an amazing new frontier. in terms of the economic impact of this, right, because that's the overall question, the federal government puts an

investment, what kind of return is it going to get. Well, you can look here in terms of the joint economic committee reviewing this. I mean, just to read, these changes will generate large amounts of wealth, enforce wrenching changes in existing markets and institutions, they are going to impact across all these different areas: Communication, IT, transportation, and energy. And the thing is the United States is in this game and there are lots of other players. In the United States, through the leadership, actually, of Bill Clinton who started the National Nanotechnology Initiative, the NNI, right now that's been continued by George Bush, and in FY '08, 1.4 billion is being allocated to it on the federal level, and there is just as much in the commercial space as well. You can see here, it's not just us, but also Europe and Japan, China are also putting in equal amounts of money. And, again, it's going to hit all these different industries.

Today we're going to be looking at energy. This is just a take home message. This is from nature a couple years ago, but it really details. This isn't going to be an easy thing. It's not going to be like IT where you hear cyber and -- it's going to take a great deal of work and effort and research to really garner the commercial opportunities that are there. But they are

there. And biotech energy, really we're going to have utility that we never had before.

Again, I'm the associate director of the Nanoscience Center. We have about 18 faculty members. We've got a little over 3 million dollars of state funding. We exceed that in external funding that we attract from NIH, from a whole group of NSF. We have people from very diverse fields. We have chemists. We have people in imaging, computer scientists, engineers, mechanical engineers, biologists, all working together to solve these difficult problems. Cancer, photovoltaics, increasing the efficiency of those. These are difficult problems that are sort of -- the easy problems have all been solved. Now we're on to the real attractable ones. Again, here are some of our partners. We have -- this year, we have three NSF career awardees and one DARPA Young Faculty awardee, and that is unusual in one academic unit to have them all together. We have lots of toys. This is an XTS in terms of characterizing different surfaces, but what I'm going to talk about here is a little bit about energy.

This is the breakdown now in the U.S. energies, what we use. 85 percent is from fossil fuels. You can look down there in terms of the solar photovoltaics, it's just a small -- you know, a very small addition.

Now, that -- and you can see burning all these fossil fuels, it's controversial in terms of what is the actual impact that's going to occur in 50 years, a hundred years, but everyone knows it's a bad thing. You know, we're just dumping this stuff in. It's not a good thing for the environment, and what we have, we know now is it's a very bad thing for our economy to have this money drain going out of the country.

Many different ways that you can tap into these sources. What I have been looking at here is sunlight, and based on direct electricity from solar cells, there's a tremendous amount of energy that hits both the atmosphere of the planet and the surface of the planet. So you can see here about 1,300 watts per square meters hits once the sun is out. And then you go through the atmosphere, it's, you know, 900 watts about by the time it gets down to the surface of the planet and filters through the atmosphere. And, of course, there is regional variations depending upon the cloud cover. And this is kind of the take on this. You can see there in terms of the production of electricity from photovoltaics, you can see the upsweep there. Now, it's coming from a very tiny market, but it shows the interest that is occurring in this market space. And as mentioned before, these new technologies are allowing

greater utility in bringing down the price in these systems.

What I am going to discuss very briefly are just three different generations of photovoltaics, or solar cells. The first is what we all know, is the silicone based. The second are polymer or thin film technologies. And the third are these, you know, if you will, more advanced systems. And the take home message is the silicone systems are -- they're fairly efficient, but they're expensive because you are actually using silicone that you can make computer chips from. The thin film are less efficient, but they can be made in a less -- it's less expensive to actually make them because you are actually making these plastic rolls.

And the third has the potential of being both efficient and easy to make, and that's why we're putting a lot of effort into that.

So just to briefly review, the silicone that which we know, you can see there is about 25 percent efficiency of converting sunlight directly into electricity. The second is this thin film. You can actually make -- you can think of just rolls of these sheets being applied to replace shingles. So you actually protect your roof, but also you can get a gain from this -- the charge that's produced by these systems

when sunlight hits the surfaces.

Now, some of the problems a lot of research is going into, it's polymers, it's plastics. There's a degree of which, you know, bleaching. They may not be as durable as the silicone, but, again, they are so much less expensive that they're very attractive. And you can see here now the efficiency now is around 15 percent less efficient. But, again, if you can produce it for far less, then, you know, it's a very attractive option.

The third is what we're kind of putting our bets into, and that is -- not to get into all the details, but now the traditional photovoltaic cell is a single layer. Now what we want to do is make it multiple layers so it can pickup the spectrum of wave light that's coming in and, if you will, efficiently grab those electronic charges that are occurring by essentially creatively looking at these different variables. How can you use nanoelectronics in terms of the wiring, the actual pickup there. Make them very tiny, make them fibrous, fuzzy, so it's just more efficient in that little -- in that small space of the fuel cell. How can you link these together to more efficiently gather that electricity? Currently, now you are down to about 10 percent, so the system, the functional systems, the prototypes, they are not as

efficient as the other two systems. So you think, oh, you know, it's a waste of research money. But, actually, the theoretical efficiency is far higher. 40 percent, 50 percent, even 60 percent is envisioned and possible, again, through tweaking these systems. And once these systems are created, then from our perspective as a research center, we create patents, we, you know, share those licenses, those great spin off companies, we have disclosures that occur all the time. You know, five, six patents established a year from our center and more. We're growing now. We'll probably take up in the next couple years 8 to 10 more faculty members to pursue these kinds of work. So here's kind of the group that we're working with, and, yeah, it's a team based approach. Looking at the basic mechanisms, the design of the plastics, the nanoelectronics, and then integrated device development and partnering with others to meet these energy needs of the country.

Well, thanks for your attention, and thank you for putting on this program.

MS. CHADWICK: Did you guys get all that? He did a great job of keeping it in layperson terminology. I like the fuzzy hair thing.

Next up, we have Dr. Louis Chow. Dr. Chow is with the Advanced Materials Processing and Analysis Center

out at UCF, also known as AMPAC for those of you who are out in our neck of the woods. Dr. Chow received his Ph.D. in mechanical engineering from UC Berkeley. His research interests include heat transfer, computation and power systems, miniaturization of electrical engineering systems, spray cooling, thermal control, and many other focus areas. In addition to his research, Dr. Chow also serves as the chair of UCF's mechanical engineering department and he's conducted research that has been part of the foundation of some of the most promising technology start ups coming out of UCF.

Dr. Chow?

DR. CHOW: Thank you. I'm here to represent AMPAC. I want to -- the goal is I have 10 minutes. I have about 35 slides, so you are going to see ship, ship, ship, very quickly. I just want to get you a feel, but at the end, I want to point out a couple of technology that look very promising that has a lot to do with Clean technology.

Now, AMPAC is a center, and also it is an educational unit. It handles material science and engineering program, graduate and Ph.D., and, actually, AMPAC has a lot to do with somebody sitting right there, our former dean, Marty Wanielista. I think I can safely say this would not happen without his help and he was

really a wonderful supporter. I can say that because I was working for him. I was the chair of the mechanical and materials and aerospace department, and he was the most supportive dean there I know.

Let me just go through quickly. Okay. I just want to maybe spend 30 seconds on it. UCF wants to be a international leader in material science and engineering. Actually, we are very good. This is one of the strong disciplines at UCF. The missions, I'm not going to read them, we want to do education as well as research. And we have nine faculty. That's all we have, nine faculty, but then we also have 16 people. I'm one of them, and there are some people in here. Jacob Hart is one of them. We also do some research related to materials. And we offer 27 graduate courses and 14 undergrad, so you can see we're really not just doing research. We participate a lot. We really basically lead the material science, MS&P program, and we also as a facility, we provide some materials characterization facility. This happened mainly because of boosting technology and searing technology at that time and I-4 and also we -- actually impact has a lot to do -- have a lot to thank I-4 for as well. We also have some clean room facilities and other things.

And these are the faculty. There are nine of them.

These are the main -- these are the ones that are funded by the AMPAC center. The other 16 were funded by others, like college of science, college of engineering, and I will spend maybe about 10 seconds on each of the research areas on each of them. And I want to conclude with two or three that are promising for, especially related to, Clean technology.

This is the first one. L. An works on ceramics. And there are a lot of very, very good stuff. He's very well funded in this field by a lot of agencies, including NSF. He has two pretty big NSF contracts going on right now, and there's a tremendous application in this. I don't have time to go through this. Actually, I don't know a lot about it anyway, so.

J.U. Fang does a lot of biomolecular materials, self assembly, very fascinating things. Since I was the intern director, I learned a lot from these guys. I was really impressed by them.

And Heinrich is a TEM person. He's really an instrument person and providing the third dimension of high resolution TEM. If you have anything you really want to look and visualize, he's the person to go to. And that's the second slide he gave me.

And then Klemenz is a crystal grower on the compound semiconductor as well as connectivity. Well

funded as well.

And we have a modeler, Dr. Schelling, Patrick Schelling, who can do molecular simulations. These are his couple of slides. Funded by NSF as well. He just recently got a pretty good sized grant from NSF.

And Yongho Sohn does a lot of things, among them thermal barrier coatings so that gas turbines can run a little warmer than otherwise.

And the other thing is nuclear. Maybe nuclear is a Cleantechnology, too, but I did not pick that one as something I wanted to talk a little bit more. So this is it. This is the one slide on nuclear.

Kevin Coffey does thin films energetic material, efforts in NSF funding, as well as I -- I guess I want to point out -- I know that there's a talk later on on thin film batteries. The thin film battery is really a very much needed technology. It's really, really not catching up with the needs of all this other technology. Really, this is a very difficult problem and I look forward to listening to what they have to say. And I guess Planar Energy Devices also has been funding Kevin Coffey's work, and you can see the other one is a nanoenergetic material. He just sent a proposal yesterday. I was just reading the abstract. Very impressive stuff.

Then we have Raj. Raj is a very -- he's a outstanding faculty, and now he has a consortium of two universities and several funding agencies from NASA, especially Grant and Kennedy Space Center on shape memory alloy. I think he is trying to develop something with the medical center through some medical doctors to have a company to commercialize the shape memory alloy. I guess State maybe is one of them. But perhaps one thing that I think has -- you can consider that to be Cleantechnology is that he is using -- SMA here stands for shape memory alloy. You see this little triangle shape called chevron (sic.). This thing promotes mixing, okay, between the intake air and the ambient air and also the source, and to control it properly such that there's a tremendous reduction in noise. So there are a lot of applications how to control those gaps, those shapes, those mixing, so that there's a huge reduction. This is very important because you have -- if 787 does not get the noise code down, they cannot fly into the airport after 10:00 p.m. You can see this is something that Boeing is very, very keen on. So Boeing is one of the partners, and Dr. Raj got funding, I think it was 600,000 from NASA, just to solve this problem of noise reduction.

Dr. Seal is our -- I guess our star. Very proud of

him. I actually have something to do with his hiring, too, about 12, 13 years ago. He's very fantastic. You can see this guy does not sleep so he works all the time. You can see all these topics that he does. One of them, I think I'm going to spend maybe a couple minutes on, one of them is the construction of material. This is -- there's a company already doing this called Nanoholding. The subcompany under Nanoholding is called nSolGel. What that does, the specific work -- maybe I should just go ahead and show the slide -- is to create a cement based on fly ash. This is really junk, right. This is byproducts that go to the landfill anyway. So he can take those and do some nano scale surface modifications using the solgel technique and can make them comparative and can replace cement. And I think one thing I wanted to point out is that we see the cement industry produce 6 to 8 percent of the world's CO2, CO3 emission. So this is a big thing. So the replacement of this cement has zero carbon emissions. So I guess that's the relevance. He gave me a lot of slides. Let me just try to point out a few things. I guess you see a lot of big numbers, millions, tons, to kind of give you an impression that this is very -- has a lot of potential. And also it is ready. He has all the equipment to make it into the industrial scale,

large scale production. These are all the number of metric tons that is needed. The world needs 2,270 tons of cement and the current price is at the hundred dollars. He gave me a slide why it is so important, what is the premium. He thinks that even though he cannot make it at a hundred dollars a ton, it still is competitive because there are some other benefits. I think you can get actually money by producing this with no carbon dioxide emission. Okay. So I think he told me that he can make it for under a thousand dollars a ton, which is about 10 times more than the concrete that we can buy from Home Depot. But anyway there are some markets that can be competitive, and, of course, that solgel process is a cheap process, and it's a matter of time to get it done much cheaper, much cheaper. So this is -- these are some of the samples he gave me. All right. So that's one thing that he's doing.

The other thing he is doing is he and another faculty member who has -- who's now at Texas A&M, they put nanoseria, which is a nanoparticle. Nanoparticle has a very large surface to volume ratio, and on top of that, the surface has a tremendous amount of oxygen vacancy so it can absorb a lot of oxygen. So they use it for a lot of things. For example, make people live longer. That means delay aging because it can -- it can

absorb the antioxidants. But one other application is to reduce soot emission. Soot is the formation of incomplete combustion, so if you -- I don't understand how exactly the thing works. I guess it must be very complicated kinetics. Everything is very complicated, but somehow if you put this nanoparticle, which is very cheap, put it in gasoline or diesel fuel, you can get the emission down.

So, for example here, they put this nanoparticle in diesel fuel and put it in a truck. This is a real live measurement coming out of a source of a diesel engine. You can see that this is a -- I guess a IR laser that comes through, and the more soot particles, the more absorption. If you have less absorption, that means you have less soot. That means the nanoseria was responsible for the soot emission reduction.

And I guess I really need to stop here. This is what it looks like in the gasoline, this is what it looks like in diesel fuel. So this is a patent that he just got recently in September, and I guess he is interested to see investors trying to promote. So the idea is that this will save -- this will really -- this is really green because it'll save -- get the smog down. Okay.

MS. CHADWICK: All right. Our final speaker with

respect to the UCF centers is Dr. Jay Kapat.

Anyway, I'm going to introduce Dr. Kapat while we go track down a laser pointer.

Dr. Kapat received his doctoral degree from MIT, and is a renowned expert in research areas that include miniaturization of engineering systems, micro-scale fluidics, heat transfer and related sensors with applications to memory devices. I assume that's what MIMS is, right?

DR. KAPAT: I did not write that.

MS. CHADWICK: I'm pulling this stuff off your bios on the website. I didn't get it off these bios. I was late last night. Is it right, though?

DR. KAPAT: Yes.

MS. CHADWICK: Okay, then. Anyway, he also does quite a bit of research in aerodynamics and heat transfers for gas turbines and other turbo machineries. In addition, he's the associate director for the MES initiative at UCF and is here today to introduce UCF's Center for Advanced Turbines and Energy Research.

DR. KAPAT: Well, I guess I need to kind of a little bit explain what I'm doing here, because typically people do not associate turbines with clean or Cleantech. So I have to go a little bit of introduction first before I get to my point.

Now, there are two pieces of information here. Turbines are involved in generation of about 98 percent of all electricity that is that close to U.S. grid. Now, how did I come up with that? I have used studies so you see the difference, and if you look at the pie chart on the left-hand side, that kind of breaks down all the little pieces, and the sector called renewables is actually farther magnified on the right-hand side. Now, if I go around the block on the left called -- that is typical steam turbines, or it could be a combined cycle, one of the cleaner ones which is close to clear water on the typical. It could be natural gas, either standalone gas turbine, or combined cycle with steam turbine. Nuclear, there has to be a steam turbine, which ultimately produces the shaft that clears the power. And the small pie, which is really not turbine, which is actually diesel jet sets, obviously extreme quality, and I'm not going to be talking about that. Now, if I look into the renewables, which is 9 percent of the whole pie, and that is further magnified on the right, hydros, that is a turbine, and that is very clean, and geothermal, again, there's a steam turbine there. Biomass is mostly turbine, although there are some jet sets that are not on biomass and biofuel kind of thing, so I really cannot claim all 7 percent of the

9 percent is turbine. Wind, again, that is turbine. The small line that you see between biomass and wind, that is -- that represents a solar thermal and solar thermal being the larger of the two in terms of power production. And, again, that is turbines. So this is how we got the 98 percent. And actually the last 2 percent is the small line on the left-hand side, which is a diesel engine mostly.

Well, you may say, that is today. What about in the future? And we have to do some predicting to go to the future, and there will be lots of different predictions. I have picked up, again, DOE's EIF predictions.

By the way, before I go to the next slide, I'd like to also point out turbines pretty much power 100 percent of commercial turbines in aviation in the country. Every single plane that you fly is powered by a gas turbine. So if we -- so that actually handles a lot of the technology.

Now, obviously, we need to have a crystal ball. Whose crystal ball should I use? And there will be a lot of controversy. I have used here the one from, again, EIA, which is part of U.S. DOE, and they claim that will be the picture down the road. Whether that is going to be true or not, I cannot say, but that is what

they say. Don't get me wrong. Between the last picture and this picture, the photovoltaics has got a hundred times increased, so that is going to be a tremendous amount of increase. But that also could be the portion of the pie left that we need to think about. For example, if you think of 2 percent, a hundred per -- 98 percent is turbines, and you have a hundred cars on I-4, 98 of those are polluting really bad smoke. If I just change one of those with a clean car, still 97 of those will be producing real bad smoke. Maybe some of the resources should be how to cut down that emissions from those 98 persons. We may have a better impact. In other words, there is not a silver bullet. We have to make sure we do not put all our eggs in one basket.

Now, when we are talking about this topic of energy, we cannot be just talking about consumption. We have to think from the left to the right, from sources to ultimate consumption, because a person could be 98 percent efficient, but what about the light bulb in my house is only 5 percent efficient. It is a product that makes the most important thing.

Second thing, one more aspect I'd like to point out as an example. Many times, we have so much carried over with very specific technology, we forget about the whole picture. One example is a company called Envirofuels,

which is based close to Tampa, they're supposed to be producing internal and they submit a permit to the County for their plan, and overnight they became one of the largest water producers of the whole state of Florida. So we have to be careful. Are we going to be trading our fuel -- or our water for fuel. So we have to look at the whole picture as a whole from sources to ultimate consumption and see that the carbon footprint, water footprint, utilization in every step of the way. That way, we have the complete picture.

Now, obviously, a lot is at stake. That is why we cannot put all the eggs in one basket. Now, I wanted to have the last column. These are all the current power generation technologies. The ones in bold are the primary sources of energy that we have got. Obviously, coal, oil, natural gas, nuclear, solar, and over there, there are some X's, means what kind of sources are being used, and you see non turbo machines are a few of those, but they are few and far between on all of those. But one thing I would like to point out is that some of the derived fuels we cannot mine from nature, like hydrogen, we cannot mine hydrogen, but that could be derived from coal, and coal, there are a few hundred years of supplying the country. So what about we take out all the bad stuff, we capture the carbon, we sequester it

underground, and bond the pure hydrogen, and we could be powering all those gigawatt turbines at Florida Power and Light and Progress Energy that they use to supply our electricity. So we don't have to give up too much. We just have to innovate more clear technology. And that could be done over here.

Similarly, syngas. That is basically synthetic gas out of carbon, out of coal. And, again, we can probably think about carbon capture technologies that we could do over here.

Now that we have talked a little bit of turbines, I'm just going to have a slide where I think that this combination of three is what is important to make what you're talking about today to clear new innovations. Obviously, we are here. That basically says that there is lots of those and I don't have to talk about the bottom pie there, but I'm going to try to say a little bit. The industrial foundation that we have to make all of this possible and that kind of institution that actually produces masters that actually can innovate that we are hearing from many speakers so far that also we have and I'll be trying to make some cases about the top two pies because it is foundation that really helps. If there's a foundation, it is much easier to build something than if there is none. Then we would have a

lot more.

This is a picture that many of you have seen before, some of you have seen before. It is a whole map of U.S. I have put all the major power generation companies that produce -- that people like Florida Power and Light and Progress Energy have placed electricity in our houses, they buy their machines from typically mostly one of those four companies, and two of them are in Florida. Two of them are in Orlando. How many times we see such a big concentration of large industrial conglomerates with global reach in one place. That is a big opportunity for us and we'd better use it.

Now, just if you talk about -- if you are arguing about the dollar numbers, they are up there. Annual reports, and those numbers are fluctuating, so you might be targeting whether it's 100 billion, 20 billion, but those numbers are big, and without big numbers to support us, we can really take our technology a whole lot. If you add up the energy sector of the three companies, right away Siemens is across the street from UCF, Mitsubishi is in Lake Mary and in Sandlake, and Alstom, they are in West Palm Beach, and going through a grand expansion and Mitsubishi and just opened a new plant on Sandlake Road. So there's a lot of activities happening on these. If you add up the three, that

counts about 120 billion, 2. That is the foundation I'm talking about that we can use to move further. And all of them are investing heavily in diesel. We have a cluster of companies and we need to use that.

Now comes the other side of the whole circle. We need to have people with that kind of expertise that can compete on a national level. Now, this chart is based on a chart that is done by DOE at their national technology lab which is based in Morgantown, Pennsylvania and Pittsburg, and this lists all the proposals that have been funded over the last 20 years. I do not have the 2008 number. Well, they fund 2008 ones last year. I do not have that. But not counting those, we are doing pretty well against the big boys. So one thing is we have a national foundation and we have got the technical expertise and we need to do a little bit more about it. And that was pretty much the starting point of this center, which is kind of talking about the college of engineering, the department of mechanical and engineering.

The main portion of this is basically we started with the Siemens Center of Excellence. They have been funding us for sometime and, again, I have to really be thankful for the high tech corridor, because without them, we would not be here. What we have done over the

last six, seven years, the lab pretty much built up with help from Siemens and help from FHGC, and that really started the whole thing. Then we had the big NASA project that just ended, and UCF is leading that among the whole state of Florida. So we are recognized as somebody who can do this turbine and energy systems research in the state of Florida, and probably perhaps more.

Now, I should also point out Florida Center for Advanced Aero Propulsion that is one of the two newest state funded center of excellence that just got announced, and FCAAP is full university center, UCF is one of the -- of those four. And that is also kind of geared toward all of this.

Now, obviously, the real technology, that is people, that is faculty, and there are students. I could have gone over each of those boxes and mentioned all the professors' names, but that would be taking too much time. But the point is we are capturing a huge amount of expertise, and this is the collection that gives us the niche. It is not one of those boxes. The companies can go out. Other universities find one box. We can put a system together. We can think of a system. Some of the professors Dr. Chow talked about in his presentation, they are also working here. It is just

not one unit, it is a broad base, the coalition under the university and the college of engineering and computer science.

Now, what can we do based on all that I have talked about so far, how is it related to Cleantech, and these are some of the topics that we are talking about right now. Now, for example, there is a graduate of ours who got his Ph.D. Actually, I was his supervisor. He was working in Siemens, went up, opened his company in Greenville. Now he's a major supplier for retrofitting of all those old power plants in China. That could be here. Meaning we may not have coal but we can produce the technology that can go all over the world and retrofit all existing and current power plants so that no single carbon goes out of the atmosphere. This is carbon neutral technology. And then somebody else can come up with the technology apart from the carbon. It could be, for example, sequestered into the ground. So it could be hydrogen. Well, those are the primary source. So it could be hydrogen turbine with precombustion carbon capture. It could be oxyfuel with carbon capture. I could be retrofit of existing or new plants with post combustion carbon capture of the plant which is on Alafaya. Well, we can put the carbon capture technology and make it zero carbon, and that

carbon could be sequestered into the ground. So that is how we can also have Cleantech based on the fuel cells that we have lots of in this country. It could be offshore wind turbine. For example, the wind requires the same kind of technology that the boat industry requires, composite based. We have got a good bit of boat industry in the state. We can actually use their help to have manufacturing of the wind turbines, and there is some talk going on right now, and some other time I can mention more about it. We can have solar thermal storage, and all of those, that is where the turbine technology can play a very strong role.

Now, this is -- the next slide is my end slide, and what I will say is that I would end with some paraphrasing. The CEO and president of solar and Siemens Energy over here, and he was present in the dedication ceremony of Siemens Center, he just came online earlier, October 8, and he said in his statement at the end that he -- just the proximity of the companies and UCF, he thinks that there is potential for us to be a silicone valley of energy. He also said that America in the future will go through Alafaya Trail. And I will paraphrase that statement with one statement that, let us make Alafaya Trail to be America's energy avenue.

That is it. Thank you.

MS. CHADWICK: Okay. I think we all probably need a quick break. For the sake of time, if we could probably expedite that to maybe five minutes since we're way behind, and I'm going to bank on my entrepreneurs to catch us back up, so we'll see you right back in five minutes.

(A break was taken from 10:23 a.m. until 10:48 a.m.)

MS. CHADWICK: The next four speakers are with some of the Cleantech companies here in the Orlando area and we're very excited to have all of them here. They're going to present their companies, and if they have put some thought into, I've asked each of them to chat just a slide or two on beginning the dialogue on things we can do to promote this sector here in Central Florida.

Our first speaker is Scott Faris. Scott is the CEO of Planar Energy Devices. Scott's a serial entrepreneur. I've known him for a long time. He's an amazing guy. He has almost two decades of operating venture financing and commercialization experience. Planar is the first spin out of the U.S. Department of Energy's National Renewable Energy Lab, also known as NREL. Before founding Planar, Scott held positions as both an executive and an investor in a range of early

stage companies and investment firms. Scott was the CEO of Waveguide Solutions and a founding director and COO of Ocean Optics. Scott's investment roles include being the director at Florida Seed Capital Funds and the founder of Enterprise Corporation, which is a technology accelerator. Scott was also a partner of MetaTech Ventures and Zero Stage Capital. And with that, Scott Faris.

MR. FARIS: I've been told I've got eight minutes, which for me is a real challenge, so good morning. I'm going to skip some of my slides, but as Kirstie mentioned, I'm the CEO of Planar Energy Devices. We're based here in Orlando. Somewhat unique company in terms of how we came to be. I've spent most of my career working in either the venture side or the operating side of technology companies. Planar is a unique company in the sense that this was a company I co-founded with the venture capital arm of Battelle Memorial Institute. Battelle Memorial Institute is the -- I believe the largest not-for-profit R&D organization in the world. They have their own labs. They also manage seven of the national research labs, including the National Renewable Energy Lab. As Kirstie mentioned, Planar is actually the first spin out of NREL. NREL has been around for about 30 years in different phases. This is the first

time we've actually taken technology out of NREL. We've taken research staff out of NREL and formed a company around it. We happened to do it here quite simply because (a) I live here, but also there are tremendous resources in this community. A lot of the infrastructure that was left behind in terms of people from the old Agere facility and the active Triquint facility up in Apopka are key reasons that we decided to locate this company in Central Florida. And, quite also honestly, it's a great place to recruit people. We have a staff now of about 12 Ph.D.'s and we have absolutely no problems bringing people into this community from places like San Jose and other research centers across the country.

Some of this has been covered before, but I think one of the things I wanted to mention this morning is a lot of people talking about Cleantech, they get very focused. Cleantech is much more than greentech, and where we fit into that, this came from, again, the Cleantech organization. Most of the emphasis right now on Cleantech is in the energy area. In fact, if you look at the venture capital dollars that are flowing into Cleantech, the vast majority is going to solve the energy problem. The energy problem transcends a lot of issues, environmental issues, economic issues, security

issues, the bulk of the resources going into energy, and it's going into energy because quite simply the fuel that we're using to get our energy is running low. We heard some presentations this morning on different fuel technologies, but ultimately what really is going on is we're moving into an economy worldwide that's being increasingly driven by electrification.

Electrification is the energy our cars will be run by electricity. Much, much more of what we rely on for our quality of life is going to be driven on electrification. The question of how we create the electricity is one issue, but the other issue and the reason that I'm here today and the reason that Planar exists is there is one little problem with the whole electrification problem, and that is you can't store electricity efficiently. Batteries, quite simply, are the Achilles heal to the whole equation, whether it's solar, whether it's geothermal. A lot of these renewable energies are driven by what I call opportunistic energy generation. In other words, when the sun's up, you can have photovoltaics, but you need to store some of that energy so that you can use it at night when you need to turn your lights on. So Planar, quite simply, decided to focus on the energy storage problem. We believe it's the weak link. It's also one

of the most significant problems and the one that has, quite honestly, received the lowest amount of attention in terms of investment experience. So Planar is focused on solid state energy storage. If I had to paint an analogy of where we are today in energy storage, we are quite simply in the vacuum tube era. The batteries that we use in our devices today are vacuum tube type of technologies and what Planar is focused on is moving the energy storage world into the solid state world. In other words, into the transistor kind of technology. And the way we do that is by focusing on materials and processes and device designs that allow us to get us there.

We didn't make this up. The DOE issued a report in 2007 that effectively said the same thing. Looking ahead, looking at the demand for energy storage across all applications, the Department of Energy did not see a single platform that would address the future energy storage requirements, and, in fact, began to start looking at what they need to do and what the federal government needs to do to start driving resources to address this really critical headache. Because not too dissimilar to what we saw back in the bubble when web 2.0 fizzled out, not because we didn't have creative programmers, but because the broadband didn't exist to

get the content out into the marketplace. Same issue we're seeing with renewables. Lots of great innovation going on in the energy capture side, but unless we address the energy storage side, we're going to have the same kind of headaches. It's an attractive market, so, again, we're a venture backed company. We look at big markets with big growth opportunities.

Energy storage, the secondary energy storage market, is a 10 billion dollar growing market. If you look at the verticals that we're focused on between network applications and transportation applications, these are very rapidly growing applications. Quite simply, what our approach is, we want to get the living out of these devices. Most batteries that you use today are batteries that have multiphase materials. They have liquids, they have solids, they have gels. These materials behave differently. That's why your rechargeable batteries don't last very long. These batteries will change. They're living devices. Planar is focused on solid state. Again, technology is driving the semi conductor industry. We're taking those technologies and we're applying that to the energy storage problem and we're applying it in three specific areas.

On the design, the process technology, and the

materials technology. Companies based on a number of platform technologies, the strategy here is that we believe that the solution to the solid state energy storage was really a collection of many technologies that didn't reside in one location. We developed a patent portfolio of nearly 40 patents in the last six months from multiple national labs, multiple private companies, multiple research centers around the country, brought that all together. The three enabling technologies are this notion of the way we build a battery. We build a battery upside down. Seems like an obvious thing to do, but when you start building batteries anode side up, it changes the whole dynamic of how a battery is built.

Multi layer electrolytes. Basically, we can build a battery with very durable guts to them. And this liquid phase deposition is a technology that is a local homegrown technology that we ran across that has the promise to not only change the economics of how we make batteries, but has the ability to change many industries, from the semi conductor industry, the flat panel display industry, even in the solar industry. This is a very robust technology we're investing a lot of money in on a local basis to help become part of our technology platform.

What this allows us to do is we can build small batteries to big batteries. This has never been done before. Each kind of battery, each size of battery is usually made with a different chemistry, a different manufacturer, a different part of a role. For the first time, we're able to get scaleability. In other words, we can make small batteries to go into little sensors and large batteries that go into vehicles. We can do that at all one production platform. This gives us tremendous economy to scale. And more importantly, this allows us to set up the notion that we can do this domestically and we can bring battery production back into the United States. Almost all batteries in the world are made either in Southeast Asia or in China itself. The U.S. has lost the ability to build energy storage devices. It's all gone offshore. In the end, if we switch to electric vehicles and we don't get into the business of building batteries in this country once again, we've simply switched our energy dependency from the Middle East to Asia.

Real quickly, some of the products we're working on. This is our first generation solid state battery. It's a very small battery. What you take away from this light is, if you look at the chart down here, the traditional rechargeable battery is only good for a

couple hundred cycles. This battery has already cycled over 300,000 cycles and has had no degradation. That's the value of a solid state battery. What it means in terms of devices like this, you don't have to build the battery in with a trap door, you build the battery in with the circuitry. The battery becomes part of the electronic system. More importantly, when you have this kind of functionality, you can do neat things, like in this case, I apologize, we're having some resolution issues, but what we're able to do is actually collect ambient energy so all these signals floating around in this room that your cell phones are receiving, we can actually collect that energy and charge a battery using that methodology. We can integrate it into a solar cell. So what we've now done is married not only the energy generation to the energy storage, but we can take this into higher and higher levels of integration where the devices get smaller and smaller.

In terms of our local impact, again, Planar has been around for about 18 months now. About half of our staff are UCF grads, the other half are researchers we brought in, Ph.D. level researchers we brought in from throughout the United States. This was sort of foreshadowed earlier. We've invested heavily in Kevin Coffey's work out at UCF. A lot of our prototypes are

being built out at UCF. Just about two weeks ago, we turned on our R&D facility over on Michigan Avenue. We have the capability of producing several million ships a year out of that facility on a pilot phase, and we've been very actively looking at additional technology across the I-4 corridor. So, again, we're actively engaging in these partnerships with universities to find pockets of technologies that we can pool into this.

Most importantly in terms of what the future of what Planar is about, this is our corporate headquarters. When we talk about economic development, we talk about retaining and growing companies, the corporate headquarters is where the action is. That's where the focus needs to be is building companies locally. You don't move corporate headquarters, you build corporate headquarters from scratch. You take small companies coming out of the university or out of different locations, and you put resources into them from the community, from the outside world, and you help grow those companies to be successful. Intel wasn't recruited, Intel was grown locally. If you look at all the success stories, these are companies that have grown, their roots are in the community with executives from the community, and that's what Planar's committed to do going forward.

And I went over by a minute and 30 seconds.

MS. CHADWICK: You can always depend on start up entrepreneurs to crank it out in 8 to 10 minutes.

All right. Next up, we have Tom Bland, who is the chairman and CEO of AcquaFiber Technologies. Tom's background includes more than 33 years of executive management, finance, and economic experience. Mr. Bland has held executive positions at Martin Marietta, Coleman Research, International Analytical Corporation, and Olinco (ph.) International. Mr. Bland also served as a management consultant in a number of domestic and international firms, with a specific focus on management and financial affairs of those companies. Mr. Bland's entrepreneurial career began in 1994 when he founded TenderCare Assisted Living Services where he still serves on the board today. In addition to his role of CEO of AcquaFiber, Mr. Bland is a UCF alumni and serves on the College of Business's Dean's Executive Council and was inducted into UCF's College of Business Hall of Fame in 2004.

Tom?

MR. BLAND: Thanks, Kirstie. I'd like to thank everyone that's here for coming to this great first of the series event. I'd also like to announce that I'd like Dr. Fiber (ph.) to be a cosponsor for the rest of

the series and we'll do whatever we can do.

Basically, I'm going to make it simple. I was going to start out by saying we excel in organic thin film layers which we grow organic solar and carbon capture cells upon. But I'm going to change that, is that we're an algae firm. We grow algae. We harvest algae. But what do we do with the algae and why are we bothering? Well, basically, we're a water remediation firm. We clean water. Primarily surface water. We've been at this for eight and a half years. We have been in R&D just about that entire time. We have bid on two contracts and we've won both of them. Recently our contract to remediate five metric tons of phosphorous from Lake Jessup will probably begin the first quarter of next year. And it's unique in that I opened my mouth in 2003 in Key West at a water conference and said, I believe that as a taxpayer I'm tired of paying money to companies who say they can do things but end up not being able to do them and we've wasted our money, so I think we should go for pay-for-performance contracts. Well, somebody was in the audience that listened to that, and two and a half years later out came the RFP that we responded to which said it's pay-for-performance. They pay us for a pound of phosphorus removed. We have to go to the DEP, the

districts, the Corp of Engineers, all these places. We have to get all the permits, then we have to sink all the money into the equipment in the ground, and then we have to do our thing and we remediate the water, and we only get paid when we take a pound of phosphorus out of the ground, out of the water. Well, we love it. We're going to excel, and we've had eight and a half years to prove it to ourselves, et cetera. But we've gone slightly beyond water remediation, even though that's what we do.

We recently discovered that there are alternative energy implications to our biomass. And do we produce biomass. We produce tons and tons of biomass. Tons and tons of biomass. As a matter of fact, when we first came into existence, I was asked by a Fortune 200 company to start AquaFiber because they had a technology similar to what we use, and their Achilles Heel, they thought, was the fact that it made tons and tons of biomass daily and they didn't know how to get rid of it. Well, of course, I didn't know how to get rid of it either. But we've learned. And alternative energy is a key focus. Now, we have not made ourselves known to the media. We have not gone out and spun ourselves. We have a very low key website which basically is a woman's skirt. It's short enough to cover the subject, long

enough to keep you interested. Or did I just say that backwards. But as you can see, I've got a board of directors which includes some very, very distinguished members of the community, including Dr. Wanielista right there, to include M.J. Swallow, who is UCF's head of research and commercialization, Tom Kean, who is the dean of college and business. Also includes Dick Nunice, who's the former chair of trustees, and Tom Yokum, vice chair of trustees. Bill Haymire, former CEO of Progress Energy, and a number of other board members, as well as a 150 shareholders. We've raised about 15 million dollars in the last few years, all on the QT, nothing venture capital, et cetera, et cetera.

So how do we do what we do. Well, we use algae. The problem is we have 23 patents in 20 countries, including the U.S., and 21 patents pending, but those patent pendings, we treat those as trade secrets. Of course, when you're treating something as a trade secret, it's hard to tell people what you're doing. So when Kirstie asked me to speak today, I said, wow, what kind of a tap dance am I going to do. Let me tell you what we can do. On Lake Apopka where we have a facility right now, the district, St. John's District, which is a wonderful, august -- without the St. John's District, we would have extreme problems with our water right now.

But they've worked on Lake Apopka for nearly two decades, a decade and a half, and their system takes out about seven pounds of phosphorus per year, per acre of land that they flow water over. We've gone through many iterations, but our latest technology flowing about the same amount of water that they flow over there, 600 to 700 acres, we can take out about 53,000 pounds of phosphorus on one acre. So seven pounds per acre, per year. We can take out 53,000 pounds per acre, per year. That's a fact. It's not a brag. So fast forward, what do we do with all that biomass? Well, gee whiz, in 2001 we took biomass up to a Dr. Alex Green at the University of Florida, and he pyrolyzed it. And, whoa, we had a huge hydrogen yield. We didn't know what to do with hydrogen. There wasn't a market for hydrogen. Recently, we've gone to a number of utility firms here in Florida and we've discovered that we can help sequester their carbon, because the number one thing that algae does is it consumes carbon, it consumes phosphorus, it consumes nitrogen. Of course, we use algae and all those good things in it to do something. We have discovered that we can, for example, in a local utility, which will go unnamed because we don't have a deal with them, but we're in talks with them, we made a presentation whereby we could sequester 25 percent or

more of their daily carbon emissions. We could then provide them with more than 20 percent of their daily energy requirements with our alternative energy source, which is our biomass, through gasification and other situations. We've also discovered that we can do some pretty cool things with this biomass. We can make some non petroleum polymers. And that turns out to be -- I didn't understand the significance of that when I first learned we could do that, but it turns out to be huge.

We also take pharmaceuticals out of water. Pharmaceuticals are turning out to be a big problem in water, and it's going to be worse and worse, especially in marine environments. By the way, our system works good in fresh water, better in brackish waters, and best in marine environments because it proliferates better in marine environments. We've also discovered that our process can remove chlorides from water. I didn't realize what that meant until my scientist told me, but basically let's make it simple. In the brackish water, if we can remove 90 percent of the chlorides in a very economical and very land efficient methodology, that enables lower cost and lower energy requirement reverse osmosis membranes to work more effectively and have a longer life. So we've been talking with another power company about a nuclear effort they want to do, and they

want to be able to get less expensive water. Now, we've set our company up to be able to use huge amounts of water in land efficient areas. For example, soon you'll be hearing about it, the first quarter of next year, and you may not be hearing about us, but you might, but we have a 10 billion gallon per day plan to work on a lake nearby in the state of Florida to remediate phosphorus, nitrogen and carbon, and we can make quite a bit of power from that. At a local utility, we're talking about a plan that will remediate about five billion gallons a day where we would use water to help remediate carbon, grow algae, and harvest the algae on a daily basis.

My time is up. I greatly thank you and we look forward to hearing from Dr. Wanielista.

MS. CHADWICK: Thanks, Tom. Next up, we have the one who's been referenced by all, Dr. Marty Wanielista. What do you call yourself, the grandfather of storm water management?

DR. WANIELISTA: Something like that.

MS. CHADWICK: I think it's even here in his bio that I swiped from his website. Dr. Wanielista has been at UCF for 39 years, and previously served as the University's dean of college of engineering. Today, Dr. Wanielista is the director of UCF's storm water

management academy and is a professor ameritus at UCF. He's completed over 70 projects in the areas of hydrology and storm water, has over 250 publications, and has written seven text books. He has been very active in the creation of storm water policies throughout our state, including a new statewide storm water ruling that happened recently. In 2004, Dr. Wanielista founded STE. I believe it stands for Stormwater Treatment Environments which provides green roofs solutions to commercial properties. I've seen this system. It's actually got a live green roof out at UCF. It's awesome. He's been identified, as I mentioned already, as the grandfather of storm water management and is credited with introducing the state of Florida to green roof technologies.

DR. WANIELISTA: Hi, you all. Nice to be here. Good to see you again. It's like old hometown for me coming back and seeing folks that I have missed for a few years.

I've kind of changed jobs from the university. I've gone to the side of promoting a lot of the technologies that we developed at UCF, and, certainly, it was really great for me to listen to Jay and Louis talk about all those things that really excite us, and part of the motivation that I have had over the last few

years is to try to promote some of those products which are Cleantech products. And a lot of things that we do within the university is related to protecting the environment while also enhancing economic opportunities that are available to us.

We got our start, STE, got our start through the venture lab and they helped us with a business plan, and said, hey, you know, you all have something here that has some value in the future, and possibly we should encourage you to do something about that. So I am very, very appreciative of the opportunities that we got for from the venture lab.

Myself and Mike Hardin put this presentation together. Mike is my partner in this and he's sitting down here in the front, and he has some brochures he'd be happy to share with you and also talk to you about some of the ideas and some of the things that we have going on within STE. Why we got started, again, is my motivation, and I think the motivation of many here is to protect the environment and our natural resources while not having a strain on the economy. Our background -- and when you want to get into this, you talk about having some extensive experience, and the need to bring some of the lab to real life world projects. Right now, UCF has about 4 million dollars

worth of research in the stormwater management area that's ready for commercialization and ready to go out. We develop products. We develop services. We also see -- and those of you who are not aware of this -- our state is under a compliance with the federal EPA mandate to clean up our waters. We have many impaired waters, and we have to get out the nitrogen, the phosphorus, the metals, the bacteria that is entering and degrading our water resources around the state. So there's a need to really come into compliance with laws and regulations which also provide then a constraint on what we're doing. We have to -- we have to do it. I mean, there's no two ways about it. Otherwise, we'll get a reduction in federal funding that comes to the state. There is other dire consequences that we may have. So by protecting Florida's economy and we derive from solutions that are now solutions which are both environmentally sound but also economically sound is what we try to do.

So we have many products. I'm going to talk about only those products that are related to water pollution control, and one of them is the pollution control media that we've developed. We have this media which takes pollutants out of the waste stream, it keeps or sequesters those pollutants and then has -- makes these

pollutants available for the biological lives within our system. We also show on this slide some of the type of products that we're using or type of media that we're using in these different applications, such as green roofs, pervious pavement and water reuse. Water reuse is one of those areas where we protect and remove pollutants from stormwater, but also provide an alternative water supply. I now have in this state over 300 water reuse projects using stormwater that are actually in operation. The biggest one is in Orange County. It's in southwest Orange County. 550,000 acres of land that has a Florida Public Service Commission franchised area. That means something. Okay? That means they have the ability and the right to provide water at a reduced cost. When you are providing water at a reduced cost, we're talking about cutting the cost of irrigation water from somewhere around a dollar, two dollars, and even five dollars a thousand gallons, down to fifty cents a thousand gallons.

Protecting the environment and making money. Who'd ever think you could make money out of this. Right? You can actually get yourself a franchised area. If you don't want a franchised area, just go out and do it and you'll save people money by water reuse and stormwater reuse.

We also have many other areas that we operate. Look at -- this is a stormwater system. Look at it. That looks pretty attractive, doesn't it? Looks more attractive than a pond which has all kind of debris in it. We're designing these systems around the state and the new state law is regulating that we put these systems in. Right outside of this building, our exfiltration system which was built in 1979 to put water into the ground and help protect Lake Eola, our valuable water resource and the city beautiful lake that we have here. Now, isn't that great that we can protect that lake, and we did so, and that lake is still functioning and still working well since 1979 through a exfiltration system design.

This is a stormwater reuse picture. These ponds that we're building are very attractive. I like this because can you see the little rainbow on that? You see it there? That's a pot of gold underneath it. Many people really do think there's a pot of gold. And when you can reduce the cost of stormwater treatment and make money at the same time, wow.

Also, the new American home only about a mile from here has a green roof. It lives with photovoltaics. Photovoltaics actually operate more efficiently on a roof top when you can reduce the heat or you cool the

roof down. So green roofs save energy, save water, and in this particular case we have a lot of our products out here. Everything from bioswales to the green roof to systerns that collect water, treat the water, and the water is reused back onsite. This house has never had a discharge. Okay? No stormwater discharge from this home. That's right here in Orlando.

Another way you can do it is by pervious concrete. Now, you say, well, gee, pervious concrete costs more. Yeah, it does. It costs about a buck fifty more than regular concrete, about two dollars more than asphalt per square foot. However, if you notice, the water goes into the ground. There's no water there. Okay? You can't see water at this site. We had a rainfall about a half hour before this. The water goes through the pervious concrete, goes into the ground. You know, there's pipes that are needed when you don't have pervious concrete. Pipes have to take the water from the site. We just saved a developer here $232,000 in the development cost that he would have to pay for stormwater management by the use of pervious concrete and reducing the infrastructure cost. Some of the value that the university has and the university is now providing for the community.

We even provided computer programs. And those of

you that are in this field know that the water management district has to improve this. If you notice, this is a computer program that is available through the water management district and also available through our website, the stormwater management academy website, at the university. But this allows you to design these pervious pavements and then to reduce the size of your holding ponds. And one site here in Orlando -- I'm sorry, in Orange County, we saved the developer over a million dollars in costs on that one development just because of the fact that he put more water into the ground and did not need as big a pond. The pond size, you also have to pay for the land for that pond size. That was where the major cost came.

Probably our crowning glory, we say we bring your projects to life or we bring your roof to life. This is the roof out at UCF, our student union green roof. That particular roof has value in terms of energy effectiveness but also in a conversation and in a telecast from around the United States on energy efficient operations, this was noted as one of the ways of sequestering carbon by planting plants, sequestering carbon from the environment, and then also saving energy while you're saving stormwater for future generations.

We have a lot of sites that have received national

attention. USA Today said, Florida's showcase green envirohome is the best designed, energy efficient and water efficient home in the United States. We have a green roof, and these are pictures of us putting a green roof, five different green roofs on that site. We also used all of the gray water from that site.

A residential development, our goal is only 35 gallons per person, per day. Does anybody know how much the regular home uses per person, per day?

Yes.

UNKNOWN SPEAKER: 50.

DR. WANIELISTA: 50 to a 100 inside, and outside, another hundred. We're talking about 35 for both inside and outside use. 35 gallons per person, per day. Florida's showcase green envirohome. We had the benefit of tropical storm Fay went up the coast line not too long ago. It dumped 25 and a half inches on this site. We had no run off from the site. Zero. Zero contribution from Florida's showcase green envirohome. If you want to know more about this, talk to Mike and I later. We'll get you a tour of this place. It's a wonderful place and it's going to be open next January for tours.

Our stormwater green roof, which Mike completed. Plant selections. You know, we -- we definitely use

natives and we want to promote the native use of all native plants within all 10 roofs, and have been doing that.

Well, it's my pleasure to tell you that I think we're -- I'm very optimistic, and even more optimistic after hearing some of the talks today, and I think we can control pollution, especially water pollution. We have a bigger company -- it's called Green Smarts -- controls a lot of other things besides water pollution, and we'd love to talk to you and to work with you and to tell you that the venture lab really works and it's been really helpful. I appreciate the opportunity. Thank you.

MS. CHADWICK: Okay. Our final company to present today is Petra Solar, and Dr. Khalid Rustom is here to present the company. Khalid and I also go way back. He has been in the venture lab here and there, and in the early days, he was working at a UCF center called Apicorp (ph.) and was one of the vice presidents there and a product engineer. One day, he came in and said, hey, I have this guy who wants to take our company and thinks he can raise a whole bunch of venture capital. Should I do it? And I was like, whoa. And today that is Petra Solar. They have raised 14 million dollars of venture capital, and Khalid is the cofounder of that

company, is currently leading all the development efforts in their facilities which are located in Research Park, and yet another great example of a company spinning out of UCF and creating high paying jobs and making things happen in Cleantech.

Khalid?

MR. RUSTOM: Thank you for the introduction and thank you for allowing Petra Solar to participate in this symposium.

I would like to start by giving you a short overview about Petra Solar. We founded Petra Solar late in 2006. This is where we actually start fundraising, and the first thing we did is to talk with Dr. M.J. and Dr. Tom here to license some of there ideas that's relevant to our project. Then we started fundraising. In six months we were able to raise 14 million dollars from four different contributors. Among them, DFJ Elements, one of the largest community funds in the nation, Blue Run Ventures, which is our Nokia funds, U.S. Government presented by On Point, a non profit venture with the U.S. Army, and actually we wanted to give the company an international dip and we raised some money from the Kuwaiti government as well.

In order for solar actually to penetrate deep in the electricity production, it needs to reach parity

with a grid and becomes comparative, and the first thing we did is we looked at the solar value chain where we can see that the solar panels from silicone to the actual solar panel only contribute to 40 to 50 percent of the cost and there is another 60 percent that goes for installation and for the electronics part. We said if we can reduce the installation cost by 30 percent and reduce the cost of the electronics by 30 percent, we can actually help the solar to penetrate more by actually allowing a greater jump in the value. We know that the development of solar panels themselves and billions of dollars were invested to actually improve and make the solar panels more efficient, but not much attention was given to the balance of the system.

Here is just a quick overview about what a traditional solar system looks like to the right side and what's Petra Solar's concept of solar system to the left side. And traditional inverters were called string inverters. You have to put many solar panels and series and connect them to a centralized inverter. Doing this, actually you have to deal with a high voltage from the solar panel approaching 600 volts. You need to design the system to make sure that the size of the solar panel matches the inverter. The orientation of the roof is actually matched between the solar panels because they

act like batteries. If you shade one side, the other side will actually get hurt as much as the other -- the rest of the panels. In addition, the safety concern with firefighters because of the roof and 600 volt wires.

Our system actually works in a different way. We took the central inverter and we chopped it down into microinverters. This way we created a smaller microsystems. You have the solar panels with the inverter acting like a small microsystem that is ready to go and produce solar electricity.

The application is wide and actually we have -- we opened the door for more applications in the solar industry. By taking the solar panel inverter in the system, we can actually install one and add more in the future. You don't care about the mismatch between the solar panels because actually you have -- the solar panel is a system by itself. You actually don't care about the shading affect also because each one of these inverters are maximizing the power of the solar panel by itself.

In addition, we opened the door for hobbies, to buy one solar panel this year, another one next year, buy a different brand next year. It doesn't matter.

If you look at the parking lots, we can see that

there is a lot of lighting poles there. You can put the solar panels there and you don't need actually to store the energy in a battery, bulky and need maintenance. You can just push the energy to the grid during the day where it's mostly needed and take the electricity back from the grid unit at the night.

So microinverters versus traditional inverters, they have a lot of advantages. It's truly modular and scaleable systems. System failure is a major concern. When you have one panel down, you don't have to disconnect the system. And more, if you have the inverters down, you have to disconnect the system and wait for service. Now you can do that in individual panels. We have what they call maximal ballpoint tracking which maximizes the energy out of the solar panels. Traditionally, it's being implemented in a string scale. Right now we are maximizing the power from each solar panel individually. And our study shows there are 10 to 30 percent increase in the energy that we can harvest using the solar panels. We get rid of the disconnect and wiring and fusing. Regular electricians right now can deal with the system because it's only 120 volts, and we hope in the future even hobbyists can be able to install the system, buy it from Home Depot and just try one or two solar panels. It's

an incremental low budget installation. If you cannot afford to put a $35,000 solar installation, you can start with two panels for $1,500. Also, the inverters now we sell -- instead of selling one inverter, we sell around 50 to 100 inverter installations. That would allow us to go to mass production and actually to reduce the cost more for the electronics. You don't need to invest time or money in design itemization because the system comes already installed and ready to be used.

The value for the Central Florida actually going green is a culture of change and a vision. If we can start adapting some green values and reduce the footprints, this will actually help our future generations.

Orlando was named a solar city by the Department of Energy and the sunshine state. I think it is time for Orlando to step up and lead the nation in terms of solar energy. Environmental concerns and global warming actually get affected big time. Dependency on foreign oil is a national trend. Solar industry growth and future employment we know that all that are hitting at this time. One of the sectors that we know that's going to keep growing in the future is the solar. We have a joint research program with the university. Currently, we actually invested more than a million dollars in

terms of research efforts and we are actually planning to invest around 3 million dollars in the coming years to develop our new generations.

And that's about it.

MS. CHADWICK: I have to brag about Khalid for one second because in the early days back when he was -- when I first met him and he was working at Apicorp, I remember him sitting at his desk going, I just want to do my research. I don't want anything to do with business. I'm very happy with my designs.

Do you remember that conversation?

MR. RUSTOM: Yeah, I do.

MS. CHADWICK: Well, look at him today. The other day I saw him in the lobby. He's actually going to help us with some technical side of the coaching. So there you go. So good case study of entrepreneurship at its best here in Central Florida.

Now I'm going to turn it over to our keynote speaker, Sena Black. Sena is hiding back there in the back. Come on down.

Sena is the senior vice president of marketing and strategic intelligence at Enterprise Florida, the public private partnership that's responsible for leading Florida's statewide economic development. Ms. Black supports EFI's mission to diversify Florida's economy by

overseeing the development of the statewide strategic plan for economic development and the marketing of Florida as a world class business location. Ms. Black helps lead the development of Florida statewide strategic plan, which is a road map for Florida's future. A key focus of this plan has been to advance Florida's innovation economy with new policy directions, including the design of high impact and emerging cluster strategies such as life sciences, homeland security, and clean energy. Ms. Black also directs Enterprise Florida's technology entrepreneurship and capital committee which focuses on entrepreneurship growth and strategies for the innovation economy. Sena has over 25 years of experience in economic development policy, research, marketing and business development. She formerly served at the senior officer at the South Carolina Department of Commerce and is a lecturer at the University of South Carolina's college of business. She has been recognized for outstanding public service and has won national awards for breakthrough research, strategic planning and marketing. She is the author of numerous articles and publications on technology based entrepreneurship and economic development strategies.

Ms. Sena Black.

MS. BLACK: Thank you very much, Kirstie.

Appreciate it.

Thank you very much. It's a pleasure for me to be here. And, also, you know, I really learned so much this morning, and just listening to the presentations, both the university and the company presentations, I mean, this is really an exciting time and Orlando has such a critical mass that it truly is exciting.

What I'm going to talk about today is really to kind of share with you from an economic development point of view, not so much a science, I'm not a scientist, but really from an economic development and policy point of view why we are so excited about this whole area of clean energy, Cleantech. And we do know that there is a difference between clean energy and Cleantech. I'm going to kind of touch upon it a little bit, but the key thing from an economic development point of view is that, you know, very often in Florida what we tend to do is we tend to kind of look at other places and say, you know, they're leaders in this and they're leaders in that, and we should do the same thing. And so we tend to play catch up very often. And when we play catch up, as we did, you know, though very successfully in the whole life sciences area, you know, we were playing a little bit of catch up out there. And now, you know, we've been successful. We are one of the

top five regions now. We were nowhere on the radar, you know, a few years ago. I think that this whole area of clean energy is an opportunity from an economic development point of view really to be on the leading edge. To be as somebody else mentioned earlier sort of the silicone valley approach for economic development rather than the catch up model to economic development. And that's really one of the things that I think is very exciting about this whole area of -- let's see. How do I do this thing.

Kirstie?

We are excited about alternative energy. We understand fully the importance of alternative energy from the environmental climate change point of view. But, as I said, you know, kind of I'm coming at it a little bit more from an economic development point of view, and this is an incredible marriage where it's a chance to establish technology leadership. And this is truly very important technology leadership because we really see the future of Florida in some work that we're doing as really an innovation economy. That's where the future is going to be. And if Florida wants to compete and be a global leader, we're going to have to shift our mind set to be a player on the innovation knowledge based economy. That is going to be critical.

Otherwise, we're going to get further and further behind.

And so it's in that framework of the innovation economy that this whole clean energy, Cleantech area plays an even more important role because it helps us really get on the forefront of that particular area.

So at Enterprise Florida, we started from maybe about two years ago starting to look at this whole area of clean energy, and it happened to be parallel to the time that Governor Christ was also expressing an interest in whole climate change and this particular area. So it dovetailed extremely nicely. And as we look at the kind of research, and this is an updated research up here, is the whole clean energy market. We wanted to know whether or not if we put sort of our resources, our economic development strategies there, was this a growing area, was this declining, or was there no market out there. And what we found was that it really was a significant market and it was growing very, very fast.

So here's some statistics, you know, with the projected growth. Already in the time that we've updated the information, we had the 2005, 2006 numbers, we have 2007 here, and it's already grown by about 20 billion. And then we look at the next decade. You can

see that this is going to be a very, very significant market, and the markets we looked at were, you know, kind of data that we could get. Biofields, wind power, solar, fuel cells. So it's a very -- it's a tremendous growth opportunity.

The other chart on the right-hand side also kind of really indicates, and this is something that somebody else said earlier, is that that's where the VC money is going as well. That there's a lot of VC money, there's a tremendous opportunity up in that area. You can see the growth of that chart has really been extremely significant. So the growth market is there. So that was the first question that we had to ask, and we're very convinced that it's -- it's an important kind of opportunity for Florida.

We did some comparative landscape analysis as well. And we found that, you know, there's a lot of action out there. There are a lot of global efforts. More than 50 countries, more than 20 states that one way or the other are already beginning. And I think internationally, you know, there was a lot more action. A lot of it was fueled by government policies. And in this area, government is a very important partner in economic development because governments, to a certain extent, government policies, energy policies, help create market

demand. They help accelerate the market demand. And that is -- that's why that energy policy of efficiency and use is extremely important in terms of the payback and acceleration of technology. So there is a strong partnership there. And we know -- we noted, you know, some of the global leaders. Germany. Germany is discovered, to our great surprise, many of you may have known that but they're leaders in solar. And they have significantly less sunshine than we do. And so, you know, there is real potential here for Florida particularly in solar and some other areas as well.

Some of the things that other people were doing. We took another look at what other states, what other countries were doing, and we sort of said, you know, we kind of were amazed at the -- a lot of different initiatives, many of which we're beginning now to take a look at and to deploy. Their technology demonstration grants, seed capital funding, what is a very important component, including debt capital. Dedicated technology incubators, green venture funds, you know, particularly that whole area is, in fact, an area where VC money is migrating to and also what states are doing in terms of incentives and the like. So this gives us a little bit of the landscape of what we felt was very important and a really good opportunity for Florida.

So the first question we asked ourselves is can Florida be a player. And we knew that Florida had a great deal of R&D assets, we had some natural resources, we have a large consumer market, and we actually have a large network of supporting industries. I think what is interesting is the chart out there that our analysis, and this will change over time, really shows, for example, that some of the technologies kind of on the Y axis there, we noticed, for example, that Florida's industry strengths probably were in maybe just a couple of areas. But what is very significant is that our research strengths were in almost all areas, that we had opportunities in all those areas. And that really told us was that what is very important is that our R&D base, which was going to be vital to this industry in any case, was going to be especially important in Florida, our universities and the partnership with our universities was going to be especially important if we were to be a player. And that we had opportunities in almost all areas, and some of the verdict is out as to what will happen. This is very much an innovation driven area.

But we do have more than people think we do that might think of in Florida. R&D centers are important and we have some clean energy R&D centers. Some of them

are listed out there. Very, very important. I mean, this audience out there is testimony to that, and UCF, and much of what is happening here. We also have, even though it's not purely in the clean energy area yet, kind of a whole supply base, a supply chain concept, and so we took a look at Florida and, as you can see, there is really some strength in a potential supply chain. And then most recently, obviously, there has been 50 million dollars in money for the university energy research consortium, which will help kind of fuel this as well.

So one of the things that we took a look at, and in terms of strategy in the whole clean energy area, is that we felt that some of the strengths that we had at this time, it will change over time, were in some key targeted areas. One is solar, biomass, and many of you spoke to that, many of you have spoken to solar. Fuel cells, and primarily because of a lot of DOE work here, and ocean. We do, after all, have a fairly large coast line and some rather significant things that are happening in the ocean area. So the first thing that we have done, and I've got a few copies here, is we have really produced a Florida prospectus on clean energy, you know, to really begin to kind of put our resources in place in terms of, you know, what is our business

case out there. So I do have some copies here if anybody would like some of that.

As we developed our strategy for really having this as an economic development really for the innovation economy, we see three strategy pillars which are very critical. The first one is government is a very important partner. Local governments, state governments. Very important partner. Because by setting up renewable fuel standards, efficiency standards, other standards, that really helps to generate demand and accelerate technology development. It actually also helps to accelerate technology deployment. The governors's -- recently, the governor issued his action team, the clean energy action team, report. And it's a fairly comprehensive document of government policies, and, you know, last year there was some legislation that was also passed and some standards and the like, but one of the critical things is that right now as we look at this economic climate, one of the things we are facing is there's a downturn on so many different fronts, but the governor's clean energy action team really made one statement that I think is very important, and that is that we should not let the economic crisis, the economic downturn, really affect and lessen the energy behind really government policy in

this area. I think that's a very important factor because if it's government policies accelerate, it actually will -- actually will create some demand. And one other point about clean energy cluster in terms of the overall economic context is, as we look, we do see the economic climate having an impact on a number of clusters in terms of, you know, kind of just understanding the interest, business interest, leads and things. But we see the whole clean energy area as maybe not immune to these headwinds but a little bit more resistant to the headwinds, which means that in some respects, in this particular juncture, it is a time to be more opportunistic in terms of the clean energy area. It is a time, actually is a window of opportunity, not to let up on this. And so I think I will kind of share with you some of the things we're doing in marketing because we think this is, in fact, the most important thing that we could be doing in this particular economic context and that we have a window of opportunity here.

So the first pillar is a policy pillar in terms of use, and that is extremely important, and I think that Florida is really beginning to -- and local governments, you know, Orange County government, others are really beginning to do a number of initiatives and those are extremely important in the overall play of really even

an economic development side. The second big pillar is really the innovation pillar, and there, I think, that you know, yes, we -- I don't mean to say that, you know, recruitment of companies, helping existing companies is not important, but we do see that the kind of innovation strategy, what we call the creation strategy, the technology based economic development, as somebody mentioned, you know, growing our headquarters of the future is actually a very, very real opportunity and, in fact, the best way to go about it in the clean energy area. So innovation strategy is absolutely at the forefront of this particular strategy here, and they have somewhere different components. And I will just spend a couple of minutes on some of these.

We know that R&D technology commercialization is very critical. It actually is going to drive -- this whole is a search for solutions, is a search for new technologies that will solve real problems in cost effective ways and that will later be deployed so. R&D in our universities is a lynch pin, it's extremely important, but technology commercialization is extremely important because getting it to market is really the name of the game. The energy center -- but there are a lot of other efforts across. We do have a dedicated energy technology incubator. It's in Gainesville. But

I think that, you know, a number of other incubators will come to play. And so I think the whole ecosystem is very important for R&D for technology commercialization. There are a couple of other things that are going to come into play. What is coming online is an institute for commercialization that has been -- was established last year, and this institute for commercialization is a one-stop shopping place, if you will. It's housed in south Florida, but it really is a network of all of the universities in order to be able to really send a message out and to be able to kind of agree. The venture lab has been doing great, the service here in this area. So initiatives such as that are going to be extremely important and we're putting a lot of emphasis in terms of policy, the strategic planning for the state of Florida, and we are also working with the Florida Chamber in terms of really doing a vision 20/30 for Florida which is really founded upon being a top 10 innovation leader by the year 2030. And that's a quantum leap in terms of one, but it is based upon really an innovation economy. So that ecosystem is very important. So R&D and technology commercialization. More needs to happen, but it is on the path.

The second area that we recognize is very important

and very important for this industry is seed and venture capital. And Florida has never been a venture capital hub, and for early stage venture capital, the seed capital stage, we've done abysmally in the past. We just have not done well. And so several years ago, we really started to focus that area. Some good news on that particular front. The first of all is there was a piece of legislation that was passed called the Florida Opportunity Fund, which is 30 million dollars. Enterprise Florida is a fiduciary agent setting that up. And what is going to come online in January is the Florida First Corporation, which is a partnership between Millcom and Credit Swiss. So that is going to be a fund to funds. We really expect it to be more early stage rather than later stage, and that fund to funds is going to have a match on there so the amount of money it has is going to double. So that is going to be an extremely important development in clean energy to help fuel that as well as other industries, but we think that clean energy will benefit from that area in particular.

So that's one initiative. A second initiative that is going to come down the line is really for the first time Florida is dedicating about 1.5 percent of its pension monies into venture capital. And so that is a

huge amount of money. That's almost like 2 billion dollars when it comes online. And so that is being handled by the State Board of Administration, and the State Board of Administration is going to really put into VC. It remains to be seen whether it is early stage or later stage. We don't know. But there is also discussion of really having kind of a clean energy fund as well at some point in the future. So there are a lot of developments. So Florida is really beginning to address this whole seed and venture capital, and one of the key things about the Florida First Corporation, the Florida Opportunity Fund Legislation is not only to have the leverage factor in the fund to funds, but also that VC companies that is going to be Florida companies and VC companies who actually partner with the Florida First Corporation also need to be domiciled, or at least have an office in Florida. And that is going to be kind of really -- what we want to do is to grow a VC community because we know that is vital. You know, we know our universities are really going to produce deals in our companies, but we need to fuel it, and so we need to grow a VC community. So that's an important area.

Another area that I want to touch very briefly on is tax credits and incentives. We know that's important. The legislation last year really did have

some renewable energy sales tax exemptions, corporate tax credits, and then recently, we actually have now designated clean energy, but primarily in the manufacturing, what is called the high impact performance incentive. Now, the high impact performance incentive, HIPI, it's called, is really an incentive for the very large manufacturing, like turbines and other kinds of things. And it's been really kind of large investments in certain minimum number of jobs, about a hundred jobs, but, you know, the investment has got to be about 80 million. So for the large, large capital intensive projects, there are some additional incentives coming online.

So this secondary of the infrastructure, the intellectual infrastructure, the business climate infrastructure for really growing the headquarters of the future, really having in Florida all the pieces of the ecosystem that are needed to really grow companies and make us the silicone valley of clean energy for the future is really in play, as you can see. There are a number of things, and so that's a second big, huge pillar of the policy that's very important, the strategic planning that's very important.

Now, the third pillar of the strategy is we got to tell our story. We have got to be able to make sure

that Florida is on the forefront, on the radar outside of Florida, inside. We've got to make sure that Florida is seen and perceived and branded as a clean energy innovation hub. That's important because, you know, we really want to have strategic alliances. University to university all over. We want to be able to really see this as a destination, as the place to be for clean energy. So what are we doing. I want to just spend a couple of minutes in terms of what we are doing because we are a policy arm and we are also a marketing arm. We also handle projects, you know, kind of where rubber meets the road, but we also market Florida because we know that product development and product marketing go hand in hand.

So what are we doing in terms of branding Florida as a clean energy hub. And, here, what we're doing is we're really using what we call thought leadership marketing. We're not doing marketing in the traditional way of saying, you know, we're placing ads, we're just doing -- you know, saying how wonderful we are, and just touting us. We're actually taking a totally different twist in what is called thought leadership marketing. And thought leadership marketing is essentially saying that we are in the forefront of new trends, because we don't know where things will end up, but we're really

thought leaders, you know, here in our companies, in our universities, new developments, and we're really marketing our thought leadership. So we're marketing all of you, in essence, as really people, the brain power that is here in Florida. We have done -- we're doing educational webinars. We recently did one and we've created a partnership with Cleantech. We're the only North American partner with Cleantech in this. We did a webinar. If any of you want to see a webinar, it is really about, you know, company partnerships and different kinds of partnerships. And we had over 400 people from across the world in 20 countries included who really attended this webinar. It's on our website. You know, the slides are out there and you can listen to it. It's www.EFlorida.com. So you can kind of see it. But we have done it. We are also now creating a partnership with Clean Edge, another think tank. Cleantech is a think tank and an investment in the community, the venture capital community, and that's why it's very important because we want to make sure that Florida is where the action happens. So we've got a number of white papers that are going to be coming out as well because we're really kind of positioning Florida as an innovation hub for clean energy.

I've mentioned the market brief and the cluster

snapshots because we want to prove our bonafides, and so we've done that as well. The other thing we're doing in terms of our overall strategy is we are really using 2.0 technologies to really spread the word. We have created a partnership with technology review. We have a microsite that's on -- and, as you know, technology review is MIT, but it's really become more of a global platform. So there's a lot. I want to emphasize that. We're really pushing out many of our university and our company stories and our thought leadership stories with a very proactive public relationships effort. And, you know, we are placing them all over in a lot of science magazines and major publications. We also have created and invite you all to go in on our website and look at our innovation center, where our innovation center, the whole thing is, Florida's voices of innovation. What we are featuring there is really all of you. We are featuring companies, we are featuring university research, we have an academic hall of fame, we have really kind of a creative class, totally different kind of mind set. We have part casts, we have expert interviews, we have RSS feeds. Some invite you to really look at that, and, you know, as you look through this and if you have some of your stories that you would like us to consider, this is a plea to say, the more we

can kind of tell the world about what's here, the better off, and along with the policies, that's how we are really going to accelerate. And we are also doing kind of on your radar a newsletter that is specifically for clean energy that is going to go out to over 18,000. So it's a strategy that's really broad and, you know, then we are also doing some traditional things, like print ads and the like. But really the most important thing is that an overall layered approach of telling our story, making sure that we are a global center of excellence for clean energy. The spike, so to speak, so that really Florida is on a global radar, is an important component as we develop policy in our overall kind of strategy.

So finally, let me conclude by saying this area is very important. Our partnership with you couldn't be more important. We invite you to send use -- do send me more information. You've got my website, my e-mail there. We really looking to see how we can really promote. And this is a partnership that's important. And as we go forward, we know those statements made that there was a difference between clean energy and Cleantech. We recognize that. We are looking at clean energy as the market of opportunity right now, and we are also beginning to do some research in terms of

Cleantech which would include more environmental technologies and the like. And so we think that there's a morphing out there. And so this is a very dynamic industry, very dynamic opportunity, but a true ground floor opportunity. And I think that the tremendous, the robust resources, both in terms of our universities and the companies that totally even in this Orlando area is truly very exciting, and we just simply want you to know that Enterprise Florida is a partner with you in this process, that we really recognize the importance and we think that there is some very real potential that we are very excited about it.

Thank you.

MS. CHADWICK: Thank you, Sena.

MS. BLACK: If anybody would like one of these, I'll just leave them out here.

MR. LEWIS: I just wanted to recognize, Carson Frazier and Melvin Pittman. I think there may be a few other people here from Orange County. I'm very happy that they're here. There's Carson right over there hiding. Both of them are department heads. They serve on Orange County's green team, and I think it's very important that they are here today, not only so that we can match government and business interests in these areas, but whatever comes out of the symposium series in

studies in terms of action items and they've got to go through Orange County. One of the steps in getting funding from Orange County and getting the blessing from Orange County is that the ideas and proposals have to go to Orange County senior staff. We have to sell our ideas and our proposals to other department heads in Orange County because there is always competing uses for money. One of the alternatives being not to spend any money at all. So Tarzan and Melvin Pittman and other senior people from Orange County are very important parts of this seminar series and the study.

I also want to thank everyone for coming today. It's an incredible amount of information. Most of today was listening, and the next symposium there is going to be a lot more talking. But don't forget that the title of Shaun's study, the subtitle is Cleantech assets, capabilities, the presence of Cleantech in our community, its potential, and what we could do if we wanted to promote the growth of Cleantech and move forward. And there is just an incredible amount of information that came out of today that we can feed into each one of those categories and make for better symposiums in the future. And I think it's safe to say that we'll be able to e-mail each of you the full written transcript of this symposium. I don't think

there has been any symposiums or forums that you go to where you get a full written transcript of the proceedings, and we'll do that.

Thanks for coming. And thank you.

MS. CHADWICK: Okay. Just a couple logistics for closing. First of all, I think all of you -- if you don't have it, they're out front, but you should have the one pager. It looks something like that. Please be sure to list any other folks that you think need to be here. We are specifically looking for Cleantech companies. You know, we know who the economic folks are and the other folks are, but we are finding it a journey to get a hold of the Cleantech companies because there is no SIT code according to Shaun. Therefore, finding them, it's people that we know that know, and it's going to be a word of mouth, grass roots campaign. We're going to need your help. So please fill this out, leave it with us, add any comments about this particular forum. But I want to articulate again what John already mentioned, that is the next three that are left in the series will be much more interactive. This one was just trying to kick it off, let everybody get a sense of what's already out there. The next one is going to be in you all's court, which is all the more reason we really need to get folks here and involved and engaged

so that we can let everybody know what we need to be doing. I guess that's it, other than just note the dates.

Shaun did you want to add any other comments?

MR. SNAITH: Thanks to everybody for coming, and hope you can make it to the remaining series, and tell your friends in Cleantech to join it.

MS. CHADWICK: Thanks so much, and look at that, we ended on time. I know you are impressed.

(Symposium concluded at 11:55 a.m.)

CERTIFICATE OF REPORTER

STATE OF FLORIDA
COUNTY OF ORANGE

I, Leslie Richmond, Registered Professional Reporter, certify that I was authorized to and did stenographically report the foregoing symposium; and that the foregoing transcript, including 138 pages, is a true and complete record of my stenographic notes.

Dated this 21st day of November, 2008.

_____
Leslie Richmond, RPR and
Notary Public

(This signature is valid only if signed in blue ink.)