BEFORE THE
FLORIDA PUBLIC SERVICE COMMISSION

DOCKET NO. UNDOCKETED

In the Matter of

FLORIDA RENEWABLE
TECHNOLOGIES ASSESSMENT.
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PROCEEDINGS: WORKSHOP

BEFORE: CHAIRMAN LILA A. JABER
COMMISSIONER J. TERRY DEASON
COMMISSIONER BRAULIO L. BAEZ
COMMISSIONER MICHAEL A. PALECKI
COMMISSIONER RUDOLPH "RUDY" BRADLEY

DATE: Wednesday, August 28, 2002

TIME: Commenced at 9:45 a.m.

PLACE: Florida Community College at Jacksonville
Advanced Technology Center
401 West State Street
Jacksonville, Florida 32202

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IN ATTENDANCE:

ADRIENNE VINING, FPSC General Counsel's Office.

JUDY HARLOW, FPSC Division of Economic Regulations.

JIM DEAN, FPSC Division of External Affairs.

SUSAN LEHR and LINDA J. AUSTIN, Florida Community College at Jacksonville.

OSCAR GANS, Florida Power & Light.

JOHN MASIELLO, Florida Power Corporation.

KERRY BOWERS, Southern Company Services.

MICHAEL McCARTHY, Gulf Power Company.

JOE CASCIO, Tampa Electric Company.

BERDELL KNOWLES, JEA.

GARY BRINKWORTH, City of Tallahassee.

GUS CEPERO, Florida Crystals.

ROBERT D. CRUZ, Washington Economics Group, Inc.

RYAN J. PLETKA, Black & Veatch.

ASHLEY HOUSTON, APX, Inc.

ROGER E. CLARK, Clean Energy Funds Network.

KATIE CULLEN, Integrated Waste Services Association.

THOMAS CUNILIO, Center of Sustainable Agroforestry, Inc.

FREDERICK J. MURRELL, Biomass Development Company.

RICH ZAMBO, Florida Industrial Cogeneration Association.

MEL JONES, Sterling Planet.

HERBERT WILLIAMS, Florida Hydro Power & Light.

APPEARANCES CONTINUED:

RICHARD BREITMOSER, U.S. BioPower, LLC.

MARK van SOESTBERGEN, International Carbon Bank and Exchange, Inc.

STEVE GORMAN, Florida Solar Energy Industries Association.

JOHN RYAN, Sierra Club.

DAVID WENTWORTH, Energy Developments, Inc.

DEB SWIM, Legal Environmental Assistance Foundation.

P R O C E E D I N G S

CHAIRMAN JABER: Good morning. We're going to go ahead and try to get started this morning. I want to thank all of you first of all for being here. It's a wonderful turnout. And all of the comments and the presentations we'll have today will go into a very productive report that we've been asked to do for the Florida Legislature.

And I'll tell you a little bit more about that as we get started, but first and foremost, I want to give much gratitude, a lot of thanks to the college, Florida Junior Community College. If you take a look at the surroundings, I don't know if you noticed walking in the solar panels outside, and you'll hear a little bit about that from our college folks here. I want to introduce Susan Lehr who's going to tell you a little bit about the facility, but please join me in thanking the college, and then I'm going to pay respect to JEA who has a large part in all of this too.

Susan.

MS. LEHR: Thank you. Hi. Welcome to Florida Community College, Jacksonville. We're very proud of this facility. It just opened in January. It's a $25 million facility when it's finished. And we have four technologies that we want to highlight here with our business partners. But I thought it would be best if I let somebody who really knows the details tell you about the building and provide an

opportunity for you to tour between, I think, noon and two o'clock -- we're going to arrange that for you -- if you wanted to see the whole building.

I'm vice president of government relations. My job is to get the money for the facility, and that accomplished, I kind of move on to the next project which, by the way, is Cecil Field. But I want to introduce you to the executive director of the Advanced Technology Center, Linda Austin. And she's going to give you just a couple of minutes on the facility and inform you of how you can take a tour if you'd like. Thank you.

MS. AUSTIN: Good morning and welcome. We are so pleased that you're here today and pleased to host this event today at the Advanced Technology Center at Florida Community College. And we thank you all for being here. We're delighted to have the opportunity for this many people to come in and be aware that this facility is here and that we want to be here and serve the community.

I've put some brochures on the table over here. They were not there when many of you came in. In addition to the brochure which talks about the facilities, services, and partnerships available with the Advanced Technology Center, there's a little insert that we call our sound bites, our key facts about the ATC. It tells you things about this building being 75,000 square feet with a new addition coming on-line in

next January. This one just opened in January, by the way.

Next January, we will open an additional 45,000 square feet. This building is really the realization of a vision for Jacksonville by the Chamber and the Economic Development Council and a study about four years ago about targeted industries for Jacksonville for economic growth and development. And this is intended to be a true economic engine for Jacksonville.

The four targeted industry sectors represented in the building are information technology, advanced manufacturing, transportation technology, and biotechnology. And that was again gross sectors for the economy here, so that's the emphasis. I think a lot of the interest today may be in our partnership with JEA and renewable energy sources, and Dale Jones is here on the front row here with JEA and has just worked with us on the installation of solar panels. There's one classroom also where there's some equipment, and that can be part of the tour at a later time.

We'll be glad to offer you some tours between noon and 2:00. And I'll be downstairs, and the staff in the building will be happy to show you around. We just are really glad you're here. Thank you for being here. Please pick up one of these, and let us know if you have questions. We'll be glad to answer them about what's here in terms of both college programs and also hosting business corporate training and

incumbent worker training and training venue for our business partners in the community. Thank you very much.

CHAIRMAN JABER: And, Linda and Susan, if you could also pass our thanks on to Dr. Wallace, the president of the college. I made a faux pas. I called it the Junior College; it's the Florida Community College. And obviously, we want to thank JEA. When we first found out about the report due to the Legislature, our Commission staff conducted the first workshop. I think it was July 2nd, Jim? And we wanted to have a Commissioner workshop. And we thought, let's take it on the road. Let's pick a place in Florida where we can actually look at renewable energy being used in the workplace.

And I happened to be having a discussion with JEA about the renewable workshop, and they said, well, you know, Florida Community College. So we couldn't have found a better place. So I want to thank Berdell Knowles and Teala Milton for all your help.

We're going to get started. I wanted to tell you briefly about the report that's required by the Legislature. House Bill 1601 directed the PSC to look at the feasibility and cost associated with increased use of renewable energy. We've had a staff workshop. This is the first Commission workshop. There will probably be a second staff workshop. What I thought I'd do now is let our staff summarize the results from the first workshop, and then we'll turn it over to the presenters

that have indicated to us that they want to speak.

We ask that you keep the presentations to ten minutes each, recognize the Commissioners may have questions of the presenters, but we have 21 people that have signed up to speak, and that's wonderful, but as you can imagine, we need to stay on schedule. I do intend at the end of the presentations to ask if there's anyone in the audience that would like to make comments. So with that in mind, we'll get it started.

Jim Dean and Judy Harlow, I want to just commend them for all the hard work that they've done. And in case you have not met the Commissioners by now, please do take an opportunity later on in the day to meet them: Michael Palecki, Terry Deason, Braulio Baez, and Rudy Bradley is on his way. He got stuck in that traffic and construction on 95, so he'll be here shortly.

Go ahead, Judy.

MS. HARLOW: Thank you. Can everybody hear me? Okay. Good. Well, I'm hoping you'll bear with me today and kind of smile through this because staff prepared the most beautiful overheads you've ever seen. You just cannot imagine how beautiful they are, and of course, we don't have an overhead projector. So just bear with me and smile through it, and we'll make our way through this discussion of the first workshop.

The staff was very pleased with the attendance at the

first workshop and also with the information we received. We've been very happy to talk to many of you on the phone, and we've collected some really great information. We were pleased to have about 25 speakers at the workshop with approximately 70 other attendees and also as well as various people from different state agencies included with the other stakeholders.

The speakers were great because they had so many various points of view. We had Florida utilities, renewable industry representatives, environmentalists, and academics among our speakers. And we've also received numerous responses to the questionnaire that staff prepared. If you haven't heard about this, please come up and speak to Jim and I sometime during the workshop. We prepared a questionnaire to get information from you on specific technologies that you are working with or have in place at this time, so we can get cost specifics on that, land use, water use for cost comparisons in our report. And there are also environmental emissions characteristics of your technology. So it's not too late to fill one out. Just grab one of us sometime during the day, and we will be happy to e-mail you a copy.

Also, one more cleanup issue. We have a sign-up sheet in the back of the room. We have a pretty extensive e-mail list now with probably over 100 people. If I promised you I'd put you on the list and you're not on there, please sign up and give me another reminder or send me an e-mail. And

I have my business cards here.

So what we wanted to do with our beautiful slides today is point out to you just some of the broad highlights from the first workshop. It's certainly not exhaustive. We're just going to kind of hit the highlights and then get our speakers to come up and provide specifics.

First, I'd like to discuss the types of renewables that were reviewed at the workshop and their applicability to Florida and then move on to potential policy options to encourage renewables that were discussed. Tom Tanton was our first speaker from EPRI, and he provided information to us on existing renewables market and their applicability to Florida. Tom had some excellent points on why this market is expanding in the world, and among these things, he mentioned worldwide climate control issues, environmental concerns, increasing public support for renewables, government mandates in many states. And we'll discuss that quickly later on.

Some states have required green marketing programs. I know our own Commission has encouraged those. And also, some of the technologies have experienced declining costs, and of course, that's increased the value of these technologies.

Some of the more near term deployable and already deployed technologies that were discussed at the workshop were wind, of course, both on land and the potential for ocean use in the future. One of our presenters presented a map of the

U.S. that showed that Florida does not have the on-land wind potential that many other states have. And we also had a speaker who discussed using windmills in the ocean to create hydrogen to power fuel cells. So we had some very innovative approaches that day. We also discussed solar, both direct PV conversion and some solar concentrators that are currently in the western U.S. Of course, biomass, all the different types of biomass. The staff was very lucky recently to tour a facility in Jefferson County that's an eight-megawatt biomass facility, and we also saw the fuel preparation site for that.

We discussed geothermal, and once again, much like wind, there's not as much applicability of this in Florida as in some other states. Although there is potential for -- excuse me. I think I'll cover that later. And we discussed hydro, very little potential that's not being used in Florida for that at this point in time. City of Tallahassee is here, and they might want to address their 11-megawatt hydro plant at Lake Talquin. And we also had several discussions from the cogen industry on exothermic heat production processes. I know Rich Zambo is here if you have questions on that today.

Some of the future options that we discussed were, as I mentioned earlier, hydrogen fuel cells. There was a lot of interest in this at the workshop. However, we'd like to note that although hydrogen is plentiful, there are many steps that have to be taken before this industry is really at its peak,

such as converting to hydrogen, the technology for that, the storage and the infrastructure needs to be developed to deliver it.

And we also did not have a speaker at the workshop that discussed ocean current conversion, but we know there is some interest in exploring the use of the Gulf Stream current to create energy. Some of the detailed slides from our speakers on these types of technologies, again bear with me because this was a series of maps, I discussed the U.S. wind resource. What we saw from that is that there's greater opportunity in the northeastern and western states for on-land wind technology. The solar resource, once again, Florida is in the midrange of solar opportunity compared to western and southwestern U.S.

And we also discussed worldwide PV shipments. We had a very interesting speaker from the Florida Solar Center, and he showed us a graph that told us that U.S. solar shipments and world solar shipments have increased from zero megawatts in 1980 to approximately 300 megawatts today, and about 220 megawatts of that is created in the U.S. He also made the comment that the current manufacturers of PV systems that we have are about at their capacity. They are creating PV systems about as soon as they can to meet the demand.

Options for biomass electricity were discussed; the potential fuel sources, of course, agricultural waste,

construction waste. As many of you are aware, much of that waste is currently burned on-site. When we went to the plant in Jefferson County, the owner made the great point of pointing out that as we left the fuel production site, we saw a land clearing site for a neighborhood. And they had huge piles of what he considers fuel, and they were just burning them. And as you know, the emissions goes right into the air then; whereas, in his plant, they're running through a wet scrubber. That was a very interesting point that was made.

Also, discussed crops specifically raised for fuel. We had some very interesting speakers on that. Paper waste, we have nine paper mills in Florida currently and, of course, timber industry waste. The three types of biomass technologies that were discussed, of course, direct combustion just like the plant we saw in Jefferson County. One of the key points that several of the speakers made there was that it was very important to keep those plants close to that fuel source. So that kind of points to smaller megawatt plants close to the fuel source. We had several speakers that talked about needing 25 to 50 miles, the plant itself, the closeness to the fuel source.

And we also had great speakers on co-firing of biomass in existing coal plants. This sounded like a wonderful option because it uses existing technology. Dr. Alex Green and Donald Rockwood, both of the University of Florida, I have --

if you'd like more information on that, I have their presentations, and they provided excellent details. We have received several estimates of the percentage of biomass that can be co-fired in an existing coal plant without changing that technology. And some of these estimates are conflicting. If you have additional information on that, the staff would really appreciate it. And you can just talk to me about that later.

And we also briefly discussed biomass gasification which is not as well developed as the other two technologies. One of the points Dr. Green made was a study that's been recently done that showed the various types of trees -- species of trees that are best to grow for a fuel source in Florida in the different regions. And he also showed us a map that was very interesting that showed that the existing forest-covered land, which is of course a fuel source, is most prevalent in the northern part of Florida. So that points more to use of biomass technologies in those areas of the state using existing wood sources.

We discussed the use of geothermal resource. There's of course not as much applicability in this technology for Florida as in the western states. We did have a speaker who mentioned geothermal heat pumps for Florida and using those.

We moved on to municipal solid waste, and as many of you know, that's our largest renewable -- considerable renewable fuel source in Florida at this point in time. We

discussed that, and we also discussed using municipal solid waste in landfills to produce landfill gas. David Wentworth and Michael Hucks both were industry representatives, and they discussed landfill gas potential in Florida. Mr. Wentworth mentioned that most Florida landfills already have gas collecting systems at the landfill to meet federal requirements. So the first piece is already there was his point. And he also estimated that for every million tons of municipal solid waste placed in a landfill, there's enough landfill gas created for one megawatt of capacity for electricity production.

Later on in the day, we discussed policy options to encourage renewables in Florida or in other states. We discussed government mandates such as the system benefit charge, renewable portfolio standards, subsidy-based policy options such as direct government support through financing, tax incentives, rebates, et cetera; also, market-driven policy options such as green pricing and, of course, competitive markets. If a technology is cost-effective on its own, it doesn't need to be encouraged. It will just be hopefully put in place.

And Lori Bird from the National Renewable Energy Laboratory gave an excellent summary of these different policies, and I was going to steal some of her slides today. So I'll let you use your well-developed imaginations to imagine

that. And she discussed the renewable portfolio standard. This actually was her favorite option. She said that it requires -- as you know, it requires a minimum percentage of renewables to be put in a state, and the benefits of this, according to Ms. Bird, were you can apply it statewide or by utility. You can target it for specific types of renewables, and the primary benefit to me appeared to be that it uses market forces to choose the least-cost options within that required percentage of renewables.

And another interesting concept involved with this is that you can also use some kind of a trading -- credit trading option such as Clean Air Act SO2 allowances. And this would further encourage the flexibility that each utility has or each stakeholder has and encourage them to choose the least-cost solutions to put renewables in. She further discussed renewable portfolio standards in the U.S. And she mentioned -- provided a map to us that mentioned that 12 states currently have renewable portfolio standards of various percentages or purchase obligations. And these states account for approximately 25 percent of retail load in the U.S.

Ms. Bird moved on to discuss renewable energy funds or system benefit charges. This imposes a fee on all customers to fund renewables, and it can be used to target particular renewable technologies. And then we moved on to discuss how many states have this in the U.S. And again, this was a map,

and there are 16 states that have some form of these system benefit charges put on utility customer bills, and the funds amount to $3.6 billion collected through 2012.

One of the last policy options that we discussed was green pricing programs. As you know, this has been encouraged in the Florida PSC's conservation goal-setting hearings and the order that came from that. This is typically a voluntary program. And utility participants that are interested in renewables pay the cost differential that there typically is between renewable energy sources and traditional sources. At this point in time, five states require utilities to provide green power programs, and several other states have kind of gotten the ball rolling by requiring a percentage of green power to be used to power the state buildings and all the state energy needs.

And at this point, I'd like to hand it over to the Chairman to introduce our first speaker. And if any of you need further information on any of these speakers, please contact Jim or I, and we'll be happy to get that to you. Thanks for your patience.

CHAIRMAN JABER: Thank you, Judy. And I have to apologize from the beginning if I do not pronounce some of these last names. Please forgive me. I think our first speaker is Oscar -- is it Gans -- from Florida Power & Light.

MR. GANS: Okay. Good morning. My name is Oscar Gans. I'm the manager of new product development for Florida Power & Light. And I want to provide an overview of FPL's history and experience with renewable energy within our territory. I'm very proud to say that FPL has been involved in different aspects of renewables since the '70s. And let me just give you a history of what we have been doing.

In the late '70s, we started with assisting with the Florida Solar Energy Center, and we installed a residential PV system with some of the installations of the first PV systems in the state of Florida. From there, we installed a 10 kW PV system at the Flagami substation down in Miami in 1984. Now that was pretty much -- if you think about photovoltaics, that's pretty much in the infancy of the technology, and it was primarily a technology to us to see how do these things work, what's the reliability, get some usage history. In 1982 and '87, we had a solar water heating program where over 48,000 customers installed what is now being referred to as solar thermal energy.

We also got involved in passive energy or passive energy usage, and we had a -- in the mid-1980s, we had a passive home program where customers were able to get blueprints and build a home that was very energy efficient. In fact, in some cases if they went strictly by the blueprints, they wouldn't need air-conditioning or water heating, solar

water heating. The way the building was constructed, it created a lot of ventilation. Most customers ended up putting in air-conditioners anyway.

In the early 1990s, we also were involved in conducting some R&D. We felt that there was -- with the concentration of swimming pools in the state, if we were able to run the pool pumps with solar energy, it would be a good fit. So we did an R&D program that evaluated the use of photovoltaics to power swimming pools. In 1998, we had a green energy program, and that program was a little bit different. You know, we had evaluated all the secondary research, and we new that there was programs around the country. And what we really wanted to do was, was there sufficient consumer interest in solar energy to participate in a program? And so we put -- it was a voluntary contribution program, and we had over 10,000 participants respond to the program. They could submit voluntary contributions, and we had contributions anywhere from $5 to over $200, one-time contributions, to get the solar site installed. We ended up installing 10 kW of photovoltaics, and they're located right now at our Martin facility. And they're providing energy into the grid.

We're also involved in renewables with our generation area, and we're looking at -- we're purchasing power from qualifying facilities, and the sources include biomass, waste heat, municipal waste, bagasse and by-products. So what are we

working on now? Well, right now, we have got a couple of initiatives that are going on. The first one is our green pricing initiative. And the purpose of that is to develop a firm program that we can offer our customers on an ongoing basis. So far what we've done is, we've done extensive consumer research. And we've been able to confirm that there is sufficient interests by our customers that if we had a green pricing option for them, they would participate. Now, the biggest question we have right now is determining what are the appropriate sources to hit the price points for those customers.

We also -- in addition to that, we're doing a pure R&D project where -- it's called the photovoltaic R&D project where we've installed -- our plan is to install seven photovoltaic systems in residential and commercial facilities, and see how do those systems actually perform as far as meeting those specific customers, their needs, their energy needs, and how do they perform as far as coincident to the peak, et cetera. So we're monitoring them. And as of this point, we have five facilities that have been installed, and we hope to have seven installed before the end of the year. And the monitoring plan is for at least 12 months because we want to see the full seasonality. So we want to see a summer, fall, and winter.

In addition to that, we've been involved with some --

looking at fuel cells. And if you look at the literature, there's a lot of interesting fuel cells. There's a lot of development. And we've been able to purchase -- have a contract to purchase some fueling cells. We're in the process of siting and installing those. And we're going to install them in several sites around the state. I think we'll have a total of -- I think the plan is to have five fuel cells installed and monitored. Similar to the R&D project, this is still early in the technology, but we want to see how do those things operate. We want to get an understanding of what the impacts on other not obvious -- for example, during the installation phases, we're realizing that some of the inspectors have issues with regard to the water usage, emissions, et cetera, noise, and so we're trying to get an understanding of what are all these surrounding issues associated with these technologies.

Then the microturbine. Our plan right now is to install a microturbine, and we're working with the state of Florida to select an appropriate facility and install a -- we're looking for approximately a 60-kilowatt microturbine, install it, monitor it, determine what the operating characteristics of those things are. This will hopefully provide us some insight on the technology itself and how do we maximize it in order to bring the cost-effectiveness to the consumer.

Okay. As you can see, we've been involved with renewables for quite a bit; we continue to be. We're constantly trying to evaluate and see how do we maximize the use of these technologies and how do we apply them so that we can meet the needs of our customers. At this point, I'd like to take any questions if there's any.

CHAIRMAN JABER: Thank you, Mr. Gans.

Commissioners, do you have any questions?

Commissioner Palecki.

COMMISSIONER PALECKI: Yes. Do you know what type of fuel cell that you'll be purchasing, or are you trying several different types?

MR. GANS: At this point because of the cost of fuel cells, we're looking at one vendor. We're working with Plug Power which is a -- working with General Electric fuel systems, that they seem to -- from our evaluation, they seem to have a technology that is promising long term. And we're also looking to see -- it looks like they're going to be able to get a system. They're going to get to the finish line as far as cost-effectiveness. It looks like they're going to be in the lead. So they were able to give us a very good price on the fuel cells, and right now, we're working with one manufacturer.

COMMISSIONER PALECKI: Does it use hydrogen as a fuel, or does it take natural gas and convert it to hydrogen?

MR. GANS: The fuel cells that we're looking at right

now do the conversion technology of taking natural gas, converting it to hydrogen and then have CO2 emissions.

COMMISSIONER PALECKI: Thank you.

CHAIRMAN JABER: Mr. Gans, you may already be working with staff on this, and that's great, but the law asks that our study include an assessment of cost and at a minimum cost, feasibility, deployment schedules, and impacts on the environment of increased use of renewables. I heard you touch on each of those with respect to cost and impact on the environment though. Is there a comprehensive study that you could share with our staff for purposes of the report?

MR. GANS: Those issues are specifically going to be addressed with each of those individual projects. Since they're in progress, at this point we don't have a comprehensive document that we can provide you. We can provide the ongoing findings right now, but it's still very early. Especially with the fuel cells, we're finding that there are more unknowns. Whether they're concerns or not, we're not sure, but it's a -- the technology is new enough that there's a lot of questions surrounding that. So as we're going through the siting process and working with the local inspectors, we're finding out what those issues are, and then we're able to find the answers.

CHAIRMAN JABER: I would just ask at some future point if you meet with our staff and give them what you feel is

in some final fashion so that some chart or analysis could be included in the report on those two specific issues.

MR. GANS: I think we can do that.

CHAIRMAN JABER: Thank you. Any other questions, Commissioners?

MR. LOTITO: (Inaudible.)

CHAIRMAN JABER: With respect to -- and you know what? Sandy, I don't think my microphone is working either. With respect to questions from the audience, if you just raise your hand, we'll bring a freestanding mike out to you, so you can speak into the microphone. For purposes of the court reporter, I ask that you just give your first and last name, and perhaps spell your last name, if necessary.

MR. LOTITO: Good morning. Ray Lotito, SCS Engineers. What do you plan on fueling your microturbine project with?

MR. GANS: At this point, I'm not able to answer that. I don't know the specifics on the fuel source. It's going to be dependent -- we're looking at some type of waste conversion, but I do not know the answer to that. I can get that for you.

MR. LOTITO: Okay. Thank you.

CHAIRMAN JABER: Two more questions from the audience and we'll move on to our next presenter.

MS. HUGHES: Hi. I'm Susan Hughes with JEA. I'm

just curious, you said consumer interest is high on the green pricing. Do you have some kind of an estimate on the percentage of your customer base, and is it localized in one part of Florida, or is it widely distributed across the state, the level the interest?

MR. GANS: Yes, I can answer that. In fact, let me introduce Josh Bass who is the program manager for that.

And, Josh, would you mind?

MR. BASS: We found that our research that was conducted was consistent with the findings on the national level, similar to probably what Lori Bird has presented from the NREL side, that interest levels are high anywhere from 30 percent and upwards of people that have an interest in participating. Now, that doesn't always equate to actual participation rates. So those we estimate to be consistent with averages of anywhere from 1 to 10 percent.

MS. HUGHES: Of actual participation once the green pricing --

MR. BASS: To actually sign up; right. There certainly is a higher percentage of our customers that have indicated that they were -- would be interested in actually participating, but then those who would actually commit the dollars is at a much less percentage.

CHAIRMAN JABER: Last question from the audience.

MR. MEADE: My name is James Meade; I'm with

Materials Recycling. Could you answer me, what is your current output from coal and natural gas of your current production in megawatts?

MR. GANS: Actually, I can. Just a second, please.

MR. MEADE: Okay.

MR. GANS: Okay. The document I have right now talks about what we are getting from renewable sources.

MR. MEADE: Could you answer that question? How many megawatts from renewables, or is it in kilowatts?

MR. GANS: Right now, we have megawatts. And in -- from firm capacity projects, we have about 1.2 million megawatts that we've purchased in 2001.

MR. MEADE: 1.2 million megawatts?

MR. GANS: That is correct, megawatt hours.

MR. MEADE: Okay.

MR. GANS: And on the fuel perspective, as available we purchased 214 megawatt hours.

MR. MEADE: Okay. Thank you very much.

CHAIRMAN JABER: Thank you for your questions. Our second speaker is with Florida Power Corporation, and I believe it's John Masiello. And let me encourage members of the audience to see the presenters after the presentation too. I just ask that we all remember the purpose of the workshop is to allow the Commissioners to hear the presentations and to ask questions.

MR. MASIELLO: My name is John Masiello, and I'm manager of program development and administration DSM at Florida Power Corporation. This morning I want to provide you some preliminary findings of a research project that we're doing on photovoltaics. We're proud to say that this project recently won the Interstate Renewable Energy Council's innovative award for new PV projects. We partnered in this project with several partners. We partnered with the -- a builder of manufactured housing, perhaps one of the largest in the nation, a company called Palm Harbor Homes. We also partnered and received a grant from the Florida Solar Energy Center and assisted us in this project and, of course, Florida Power.

To give you an overview of the project, the intent was to work with manufactured homes, six new Palm Harbor Homes, to prepare these homes in the factory during the assembly for these PV installations and to install systems that ranged in size from .8 kW to 1.3 kW and to continue to monitor the data for at least the one-year period. Our objectives for this project was to improve the overall efficiency of the housing stock produced by the manufactured building industry, increase public awareness of PV technology, and research green power installations and programs, reduce the labor costs associated with the field installation of PV systems, and monitor project results and gain insight into the potential of PV systems.

Our first objective, to improve the overall efficiency of the housing stock produced by the manufactured building industry, we're provided technical assistance. We did full-scale reviews of their installation procedures. We worked with the Florida Solar Energy Center and installed airtight distribution systems. We required that each of the homes in this project obtain at least our entry level of our new construction program in terms of energy efficiency requirements. Four of the six homes received Florida Power's premium energy stock program designation. So these are relatively very efficient homes. Additionally, we did diagnostic duct testing and blower door testing. And we went to the model centers to train the sales staff on PV systems.

I handed out a brochure, and I apologize that we got here a little late and put them on the table perhaps after the majority of you got here. So if you care to, you can see the brochure. We worked with the Legal Environmental Assistance Foundation on developing an educational piece for PV. This is a brochure that we developed which talks about PV systems and how you can obtain more information.

Additionally, we developed a Web site at fpc.com to provide our customers with additional information on photovoltaic systems. And finally, we also provided a $25,000 grant to educate students. We're going to be going into 30 schools and approximately 7,500 students with solar kits, sort

of a Mr. Wizard approach, where the students can actually go and build a little solar car. And then at the end of the year, we actually have a contest where they can race these little miniature cars, and it's quite interesting. And I judged one recently and I can tell you it was great fun. And it's a good learning opportunity.

In the factory is where we're able to really reduce the cost. We are able to streamline the installation of photovoltaic systems. The factory, especially for manufactured homes, we need to support the roof to be able to take these photovoltaic systems. That additional support would be very difficult to do once the home was built. So during the construction of this home, that's when additional support is provided for the roof structure. Additionally, there is conduit chase put in for the wiring, so you can easily run the wiring down from the roof to the belly or the crawl space below the manufactured home and whatever penetrations we need to install the system. As a result of the work in the factory, we're able to lower the installation costs by about 50 percent. So it was quite effective.

The two major components in a photovoltaic system, you have a top, what would be the modules, and they were approximately about a kW in size, and the other major component is the inverter. The inverter takes the direct current that the module produces and converts it to AC electricity that a

home can use. And the third element within a system is what we call the balances system. That's all the other items that come together to make a photovoltaic system; that would be the mounting brackets, the wires, the fasteners, et cetera. Because this has been an ongoing project and we're presenting preliminary results, we have at least one year for, I think, several of the homes. We have perhaps as much as six months minimum on the remainder of the homes. The project was actually started in February of 2001 and concluded on the six homes in December of 2001. So that gives you some idea of the span in terms of the data collection.

What we found and what we're providing to you right now are actual costs. Modules and inverter costs 5,600 average per site. This is all average per site. I mean. this would be the average of all the sites collective. The balances system was approximately $800. The average installation cost was about $600, which is about half of what it would normally cost given the preparation we did during the manufacturing. The average system total was somewhere around $7,000, and the average system size was 1.08 kW.

Here's our finding. We found that the systems on average were putting out 3-kilowatt hours a day which would translate to 93-kilowatt hours a year, 1,116-kilowatt hours -- I'm sorry, 93-kilowatt hours per month and 1,116-kilowatt hours a year. The expected production for this unit given a 20-year

life would be about 22,327-kilowatt hours from this average size system of 1.08.

To give you an idea how each of the sites performed with the exclusion of Site 4 where we had unfortunately too many inverter problems to present any real information for you, and as you can see, the typical load profile will show that the system comes on early morning, peaks midday, and then tapers off. If you see manufactured Site 1, the system size was 1.2 kW with about a 4.27-kilowatt hour production a day. And it ranges from that to a low of -- Site 3 had 1.04 kW with about 2.19-kilowatt hours a day. And that's where we got our average of 3-kilowatt hours.

What we did was a very simplistic approach. This is what we will refer to as the lowest cost or low cost. This is strictly taking nothing more than the cost which was 7,000 -- we said approximately $7,000 in the production, which would be 22,327, and come up with a cost per kilowatt hour. There are no maintenance costs. There are no inverter change-outs. This is just simple costs versus production, and we come up with about 31 cents a kilowatt hour.

We then included some costs that the utility would see. For example, we would finance the project at 7 percent. Inverters currently -- and it's kind of an interesting problem with inverters. Older inverters seem to perform better than some of the new inverters, and yet we're seeing a migration

happening at this point where we'll see better inverters coming. The inverters that we're seeing currently unfortunately will last about five years. That's been our projection. We could debate that. It could be seven years; it could be ten years. We hope for systems to come that we would see longer durations, but with a replacement every five years, the inverter costs $1,500. We had a maintenance cost of $300 a year, and then we had an escalation rate of 2 percent. At that, we would come back with $1.31 per kilowatt hour. Now, I don't suggest that that's going to be the price, but I tell you that there's a range that we're working with. And I think that's a reasonable range for the preliminary study that we've done on this project.

Our conclusions: We want to continue data collection for further analysis. I think -- you know, obviously the weather we had recently has maybe not been as normal as we had in the past. It's been more cloudy days, cloudy afternoons. That's why there's some consideration maybe to orient these a little more to the East than perhaps to the West. So there's some work that we can do there. We want evaluate the impact of collective orientation, and that's the example I just gave you as to its orientation. We want to work with inverter manufacturers to improve and increase the reliability and performance. Quite frankly, this is where we had the biggest problem. The inverters were very inefficient, very unreliable.

We had five of the six inverters fail. In addition to that, we had something like six major failures throughout the time. Fortunately, they were all under warranty and all repaired, but this was a real situation.

And what we did was, we made a projection. We said, well, what if? What if we can get the system to be the best that it could at this time? And we saw a 66 percent increase in its production, and we raised it to 5-kilowatt hours per day. At 5-kilowatt hours a day, given the same scenario that I gave earlier on price range, you would see a range of somewhere between 19 cents per kilowatt hour and 80 cents per kilowatt hour. Again, it would fall somewhere in that range. That's my presentation.

CHAIRMAN JABER: Thank you.

MR. MASIELLO: I can open up to question.

CHAIRMAN JABER: Commissioners, do you have questions?

COMMISSIONER PALECKI: Just one question. Was the photovoltaic system you installed adequate to actually run the cooling system, the air-conditioning, on the homes?

MR. MASIELLO: Good question. There were an occasional time when the air-conditioning wasn't running that the system was -- actually, at least one or two of these in the more efficient homes were able to provide some power back to the grid, but it was minimal. But there was no time that they

would be able to run the air-conditioner.

COMMISSIONER PALECKI: And what about heat in the winter? Were they able to provide heat?

MR. MASIELLO: In all cases, they were able to provide a portion of the need but never the total need.

COMMISSIONER PALECKI: I imagine that many of the coldest days are also cloudy days. Does that prevent the photovoltaic from being adequate enough to warm the home?

MR. MASIELLO: Good point. We looked at this from a DSM potential as well, and unfortunately, we peaked between 7:00 and 8:00 in the morning on January 6th. And at that time, we're not getting production out of the unit; it's minimal production. So to answer your question, yes. When we would need it the most during the winter peak period in the morning, it would not be producing.

COMMISSIONER PALECKI: Thank you.

MR. MASIELLO: But likewise, in the summer when we're meeting peaks, the system would be peaking also. So there's some reverse benefit in the summer.

CHAIRMAN JABER: Commissioners, any other questions?

Thank you. And, Mr. Masiello, will you make yourself available please for questions from the audience or other companies?

MR. MASIELLO: Certainly.

CHAIRMAN JABER: Thank you. Mr. McCarthy with Gulf

Power and Kerry Bowers with Southern Company.

MR. BOWERS: My name is Kerry Bowers. I'm the manager of customer technology research for Southern Company. It's my pleasure to talk to you today about some of the Southern Company's views about some of the renewable generation technology options and costs as we see them. I'm going to focus today's remarks about these three technology areas: Wind, solar, and biomass.

And I was interested to hear the remarks from the earlier workshop. I understand that you've gone over wind maps. We're looking at this as trying to relate wind maps to the traditional utility economic criteria of capacity factor to try to understand the amount of true generation you can get from these sorts of technologies. We observed that in various times of wind class areas, there are -- I'm sorry, there should be -- I should back up here.

What happens is, the amount of energy you can get from different wind class areas equates to different amounts of capacity factor, and really, that's the traditional utility way of looking at utility economics. Wind Class 1 areas as in the state of Florida may be on the order of 5 percent capacity factor. Wind class areas of 4 or so, as you might see in other southeastern locations, wind up being in the range of 25 percent. Out in the far West in Texas where wind resources are more plentiful, yes, you may be able to get 35 or 40

percent capacity factors. And so we're working on these kinds of planning numbers internal to Southern to try to understand the true costs of wind, but clearly here in the Southeast, it's a limited economic capability.

I understand you have already looked at solar maps, and Florida does fall in the midrange. There's another issue with solar though as already presented, which is our view of the capital costs. Capital costs for solar technologies, whether it's photovoltaic or solar thermal, are still very high; combined with limited capacity factors, say, less than the optimum capacity factor, winds up giving most of our costs of electricity in large scale power generation projects that are still fairly expensive from traditional points of view. So whether it's in the mid-70s for flatplate photovoltiac or in the, say, 20 to 30 cent per kilowatt hour range for solar thermal, those tend to be still compared to traditional forms of power generation fairly costly.

So what we spent our time on at Southern Company in the last several years is looking at ways to use existing power generation assets in the form of co-firing of biomass. This is a photograph from an Alabama power company plant, a sister company in the Southern Company family. What you see in the background there are bales of switchgrass. This is a native growing grass. It grows well in the Southeast on marginal lands, and those represent about 1,000 bales of switchgrass

that was co-fired at this plant in a test burn period.

We did the co-firing at about a 10 percent level. The amount of switchgrass there is roughly comparable to the coal pile. So in terms of just volume of material, you're looking at a large volume of material. Each bale -- and I'll get to this later -- weighs about a ton. To make sure this could be fired in the plant, this green building in the foreground is the additional capital investment we had to make to actually put a separate grinding system in, a separate milling system. And you can see right in the foreground a feed line that actually pneumatically conveys the pulverized or ground switchgrass directly into the boiler. This is a direct injection method. It's the technique we find you have to use to get to larger amounts -- ten percent or greater amounts of renewable energy into the boiler.

One of the issues with respect to cost in any form of renewable fuel like this is the cost of the renewable fuel itself. These are the kinds of costs that we see with respect to switchgrass delivered in bale form or switchgrass that can be actually chopped in the field and pelletized to look more like a coal pellet were arranged on wood (sic) delivered to the plant. In any event, these are higher than our traditional fuel costs.

And speaking to the question earlier, we have also done some effort to evaluate whether we can put this directly

on the coal pile and use minimal additional capital to introduce this into the unit, and we find you can do that to some limitation. But a coal plant was designed for coal, and there are limitations on the ability to inject this material. We think up to about 4 percent is about as high as one could go. Maybe you could get to 20 percent direct injection of the material.

And here's some photographs of what's involved in doing that. The Plant Gadsden work had to lift these one ton bales. They had to be put into pulverizers and grinders that were additional equipment at the facility. And there's not a lot of energy per unit volume. This is a photograph of 5 percent switchgrass by weight with respect to coal. So you can see it's mostly switchgrass by volume. By weight it's still mostly coal. But the volume material handling issues are a problem for us in trying to do renewable generation. And that's what this chart is intending to show. We go from coal to switchgrass. We're experiencing a lot more material handling kinds of issues which impact our cost of generation.

So this really quickly summarizes our experience with switchgrass firing. It is a lower Btu content. We can only put a certain amount of mass and volume into the mill -- into the plant. We have mill capacity limits. There's a fair amount of limitation on mill capacity. We do have these large site storage requirements, as you've seen, and the handling

costs.

A couple of the issues at the bottom are ones that are unresolved at the moment. We have solved most of the others and are getting experience on being able to use this kind of fuel, but the ones at the bottom are of concern to us. To minimize waste disposal issues, we try to sell as much of our ash as we can from coal production. Concrete specifications don't allow any amount of non-coal ash in that material.

And the one of most concern to us as we are implementing SCR, selective catalytic reduction, additions to our coal plants, we are finding a concern that the constituency -- chemical constituency in ash from renewables may actually accelerate the deactivation rates of SCR catalysts. So part of the research at this power plant you just saw is to explore SCR catalyst deactivation with that kind of fuel.

And one slide sort of for the future, this is a little plug for Southern Company's R&D program. There's been an extensive effort between Southern Company and the DOE to look into coal gasification. This is a facility; it's near Birmingham, Alabama. This technology is coming. We think it's available. Maybe it's the option long term for biomass to make a syngas and actually have ability to generate power -- large scale amounts of power at costs that are roughly comparable.

CHAIRMAN JABER: Mr. Bowers, on that slide, the DOE/Southern project, is that using any sort of federal grant money?

MR. BOWERS: It's a cooperative agreement program between the federal government and Southern Company. So, yes, it is -- the majority of the funding is funded by the DOE. Yes.

CHAIRMAN JABER: What are the criteria? Was one of the criteria that it needed to be a renewable energy project or --

MR. BOWERS: No. I'm just pointing out that here's the technology base that's being researched in coal, that it may be transferable to biomass.

CHAIRMAN JABER: Okay.

MR. BOWERS: And so the opportunity exists to adapt the learnings from this work which has been funded largely by the federal government, to adapt the learnings of this technology work at large scale, perhaps add additional R&D capability. Put biomass in instead of coal and make a syngas that is now compatible with modern generation equipment. It's not here; it's just -- it's a concept.

Summarizing then, we come to these kinds of cost numbers. Let's just sort of explore those for a moment. In terms of waste wood co-firing, switchgrass co-firing, we have the wind, PV, solar thermal and other technologies. These are

the planning numbers that we're using inside our company to evaluate these various options.

So from a technical point of view, I mean, I think it's understood that wind and solar resources from a generation -- power generation point of view are limited basically due to high capital and relatively low capacity factors issues in the Southeast and in Florida. Biomass is an option. Co-firing at existing power plants is an option. There are some engineering difficulties we've got to address. Maybe gasification for the long term could get us closer to those kinds of cost numbers that we need.

Any other questions?

COMMISSIONER PALECKI: Is switchgrass for energy production a valuable cash crop for our farmers?

MR. BOWERS: Yes, well, we believe it will be. There's been a high degree of interest for the -- among the agricultural community in Alabama, for example, where this grass was grown and tested. Both the local university and the farmers are interested in exploring that for a new cash crop.

COMMISSIONER PALECKI: Where it was tested, did you grow your own, or did you go and sub that out to local farmers in the area?

MR. BOWERS: Bought it from some local farmers.

COMMISSIONER PALECKI: Thank you.

CHAIRMAN JABER: Did you want to switch it over to

Mr. McCarthy?

MR. BOWERS: Yes, Mr. McCarthy now.

MR. McCARTHY: My name is -- is that loud enough? My name is Mike McCarthy; I'm with marketing services of Gulf Power. And what I'd like to do is address a few -- of some issues and concerns more -- not from the technical side but maybe from the policy side of things and on the customer side. And I'll just hit four points. One is the voice of the customer, which has been briefly touched upon, the funding mechanisms of how you would do a renewable portfolio standard or a public benefits type charge. What is the role of DSM? I want to talk a little bit more about that in its discussion of renewables and green energy options, and then some of the things that are happening really not so much on the federal and state level but that there are things happening, not the specific ones, but how do we reconcile them and make sure that we optimize those opportunities coming from both sides.

On the voice of the customer, one of the things we think ultimately that will be the most successful products and services that we as a utility or as an interest group can provide is make sure that we're incorporating the voice of the customer in everything we do. Now, we've heard just very briefly that you can get a lot of -- and I think it's been a very narrow focus what we have heard on the voice of the customer. Most of the programs have been very stilted utility

generated, and I will agree that even we have been part of that problem. And we've asked folks. And yes, they'll say -- 30 percent will say, yeah, we like green; we like renewable, but then you end up with this participation charge of 1 percent -- I mean, yeah, participation numbers of about 1 percent. And we think that's because we really haven't done the amount of customer research we really think is necessary; that is, what does the customer really want? How does he want it packaged? What options does he want? Does he want just green? Does he want renewable? Does he want DSM there? What can he choose from and what are his options? I think we've got to let the customer decide and choose among all the things that all the presenters are going to be -- try to present to us, but I think they need to be there.

The voice of the customers is obviously very integral to the process. And actually, I think -- if I can go back one. Things like -- and again, I was talking about the choices and how we deliver those options I think are very important. We need to explore more. We need to bring them in. I think Gulf Power being a prime example, without the voice of the customer, we would never have come up with it like our GoodCents Select product, our DSM product, without listening to the customer. It would have been so easy just to go direct load control. We ended up with GoodCents Select, and we end with now a nationally recognized program that we're quite proud of. But

without that voice of the customer, we would have never known how to do that.

Some of the things like pricing options is very simple. Some of the very early learned experiences is, we have tried to -- in our photovoltaic rate rider, we have sold blocks of -- might purchase a 100-watt block or a 500-watt block, or you buy five 100-watt blocks, whatever. I think there's a certain segment of the population that understands. They understand what a watt is, kW, kWhs. There's a large segment of the population that has no idea and doesn't care, and I think that's okay. What they understand though is, I want to buy 1 percent of my energy or 5 percent. Whatever I'm doing out there -- they can equate to that. Some people want blocks, some people want a percentage of consumption. I think we have to look at those program designs and all those different delivery mechanisms and the choices, how can they buy those various options and stuff. And I think that's really important. We think to maximize in the success of these programs is get the customer involved.

Funding mechanisms. Whether it be a public benefits charge or a renewable portfolio standard, we think it's very important that we not tax just one class of energy consumers, that we not just focus on electricity consumers. I mean, you can even narrow that down to classes of electricity consumers, an IOU consumer, to fund these benefits charges. We think that

taxes that affect public policy should be a broad -- all classes of energy consumer. We should not necessarily focus exclusively on one class of consumer. We think that's true whether you consume electricity, natural gas, propane, or fuel oil. We think we ought to apply across all those fuel choices. Again, because it's a public policy, what we're trying to do is benefit everyone, and these things can quickly be viewed as -- and rightfully so, as actually a tax on a particular class of consumers.

There's the equity issue. Again, I think I just hit on that. It should apply to all the citizens. If you're trying to affect public policy, is this the way to do it? Do you go after one class of consumer? We think it's -- you know, all -- just like a tax policy and public policy and fiscal issues, you know, you talk about equitability, fair distribution to achieve these social objective or objectives, and we think that ought to be incorporated. We ought to think about that and discuss that, bring this out to the open.

We have a particular interest when you tax one class of consumer that puts maybe electricity, for instance, at a competitive disadvantage to the other end use fuel options. We do compete with Gulf Power with natural gas. We also compete against -- for an IOU against electric co-operatives and municipals for new customers. We compete -- in the state of Florida, we try to recruit throughout the Southeast and

nationally to get industrial and high tech commercial firms to relocate to northwest Florida. We start taxing electricity, that increases our costs, increases the costs to those customers who are thinking about relocating to northwest Florida or anywhere in Florida. That's very important.

And then you add on top of that, that's one competitive issue, then we have to look at our existing customers. Now, they compete nationally and internationally. Now we're going to add another to them. We have to really think what burden that does play on their competitive positions too. Again, I'm not trying to expound the answers to these or anything but trying to bring the issues to the public forefront, that these things are important, and there's things that we consider every day when we talk to customers who are talking about expanding or relocating.

DSM. We firmly believe a kWh or kW never consumed is never generated; it's the ultimate green. We think DSM plays a very important role, but we don't know yet, and we haven't really discussed in a public policy type forum how does that play in. What role will it play? Should it be a part of the mix? And does the customer consider that? Some customers consider that very green. We know in our GoodCents Select program that they think they are contributing by their conservation efforts that they are participating in a green environment. They are reducing emissions because they're not

consuming electricity from our traditional sources and stuff.

And then will it be part of the portfolio? Do we consider it part of the portfolio of green and renewable options? Or do we continue on the path we are now as a very distinct role that we have now in our ten-year DSM plans, should it stand alone? Again, I'm not advocating that it should or shouldn't. I just think we need to definitely think about what role DSM is going to play.

And then finally, we just need to make sure I think in the state of Florida that we coordinate and reconcile the similar indifferences of what's happening on the federal level. We need to monitor that to make sure that we're not in conflict. Now, where there are synergies, we ought to adopt those synergies, and that will obviously help minimize the cost, increase, we hope, participation and public acceptance if we can get the two together. And I think we're going down what seems similar paths. Who knows which way we will eventually end up.

And kind of just in total to summarize both what Kerry and I are saying is, Gulf Power Company with our sister companies in the Southern system, we're committed to the research, development, and delivery of these renew and green energy options. We think they are very important. We do know there is customer interest. We do think it is the right thing to do. We do have a very strong environmental policy and

philosophy within Southern Company, and we do want to -- we are going to pursue these things. We need the voice of the customer. Let's bring him in. Let's see what he wants. Let's make sure we're doing the best for the customer as well.

We need to talk about the equity and competitive issues of how we fund some of these things, whether they be voluntary or they be mandatory. Let's look at those. And then finally, what role would DSM play in the near future or in the future of these discussions.

CHAIRMAN JABER: Thank you, Mr. McCarthy.

Commissioners, do you have any questions of Mr. McCarthy or Mr. Bowers?

COMMISSIONER PALECKI: Yes. With regard to the competing fuels issue, I'm familiar with a manufacturing plant in Florida that burns coal because there is no utility tax or franchise fee on coal, and thus it becomes the most cost-effective alternative for them. Would you advocate a Btu tax where all forms of power are taxed equally so that they compete on a level playing field?

MR. McCARTHY: That's a toughie. No, I don't think I'm prepared to say that. And I don't want to say that do I think -- it is a fair question, and should it be discussed? I think, yes. I think it must be. I don't -- I'm really not prepared to think of what all the -- you get into Btu tax. And now, Btu could be gasoline, it could be fuel, or it could be

coal that someone's doing. It really opens up Pandora's box, and I'm not sure of all the public policy issues. I'm not really prepared to go down that street. But I think it's a fair question, and it should be opened. And we should bring it out in a public forum in these workshops and talk about what does that mean. It may be even bigger than what I think the legislative charge is asking, and I'm not sure.

COMMISSIONER PALECKI: Thank you.

CHAIRMAN JABER: Commissioners, any other questions? Okay. Thank you.

Mr. Cascio from Tampa Electric.

MR. CASCIO: Good morning, Commissioners, staff members, and members of the audience. I'm Joe Cascio with Tampa Electric Company. I'm the program manager for Tampa Electric's Smart Source Renewable Energy Program. With me today is Howard Bryant. He's in our regulatory department, and he participated in the development of this presentation. We're going to speak briefly and present information about our program initially as an overview, and then we're going to talk about some of the renewable technologies that we're using in our generation sources. And we're going to look at some hurdles to implementation also to sustain the program. We've got some midterm objectives that we'll share with the group, and we've got some photos of some of the renewable technologies that Tampa Electric is currently using in generating

renewables. And lastly, we'll conclude with some of the concerns or potential issues that we see that might face the renewable market moving forward.

Smart Source is Tampa Electric's renewable energy program. It was made available or an initial commercial offering was in November 2000. It is a tariff-based program, and it is also an energy-based versus a capacity-based program. Our price point is $5 for 50-kilowatt hours. Our technologies include an 18 kW solar photovoltaic array which is located at the Museum of Science and Industry, and I've got a photo of that in a minute that I'll share with you. We've also conducted biomass co-firing operations or generation at our Gannon station, particularly in the cyclone units which are more adaptable to this kind of co-firing operation. And we're looking at other renewable sources which include biomass gasification at our IGCC plant in Polk and also landfill gas development, which is a project that was recently approved.

This is the array at MOSI. You can see that it's prominently displayed at the entrance to the museum. Customers who -- will enter into the double doors here at the main museum entrance. And the array is actually about 90 feet in length, roughly 20 feet in depth, and 6-feet high at the back. It consists of 60 panels. Each panel is 300 watts and the nameplate rating is 18 kilowatts.

Some initial hurdles that we experienced in

implementing was, naturally, the higher cost of renewables. There was also a limited availability of renewable resources that we had within our system and also what we might be able to purchase off-system. We had to look at special permitting for co-firing with an alternative fuel, as we do with any fuel.

The fuel quality we have found can be problematic. Where at Gannon station the particle size can be as small as a half an inch, certainly nothing larger, but at Polk in the gasifier process, it needs to be much smaller, less than a quarter of an inch. We also conducted research to identify what our target markets might be. We referenced the information that was available from the National Renewable Energy Laboratory. We had done some focus panels and also some surveys ourselves specifically to Tampa Electric customers, and it was mentioned earlier in the presentation, there are people who are very interested in supporting green who indicate so on the survey. But in those numbers, you do run about 30 percent. But the actual customers, given the opportunity to subscribe and to contribute or pay and fund this kind of program, are far less than what the survey had indicated.

CHAIRMAN JABER: Does the survey include a question with respect to how much the customer is willing to pay?

MR. CASCIO: There are several questions that regard -- $5 seems to be a very typical threshold that is acceptable to most customers, but some customers are willing to

pay 10, some prefer 20. Some would pay much more. But the $2 to $7 range seem to be what was most commonly of interest to our customers that were surveyed.

COMMISSIONER PALECKI: Is that on each monthly bill?

MR. CASCIO: It is not.

And the other obstacle that we've encountered is simply educating customers on green and renewable. Most customers in the focus panels did not understand the concept of green or renewable energy, and also mentioned earlier, even something as common and as routine as a kilowatt hour is foreign to most people.

Some of the issues that we're looking at now are trying to find ways to lower the cost of the qualified renewable sources that we have that make up the generation bank for our program. Unit reliability can be a problem. In doing the biomass combustion or co-firing at Gannon, we found that there was fuel pluggage. That fuel pluggage can correlate into a fairly significant unit restriction, and that's something that we need to work very hard to avoid.

The customer acquisition cost. Marketing is very expensive, and the advertising and marketing costs for our program are substantial. And we would like to find ways to develop more effective marketing collaterals and try and find those trigger points for those customers to get a greater level of acceptance. Attracting new customers is something that

we're working very hard to do not only in the residential sectors but now we're moving into the governmental and into the commercial as well, and then retaining customers that are on the program. I'll speak in a minute about the lack of tangible aspects or benefits associated with a program like this. It's more of a service than a product.

Continuing on with our hurdles. We'd like to increase the block size or the value of the program. As mentioned earlier, we are offering for $5, 50-kilowatt hour commitment for Tampa Electric to generate that renewable source. We'd like to increase that. We'd like to keep the $5 price point because we think that's consistent with what customers are comfortable with, but we'd like to increase the value of that to perhaps 100, 150, or even 200 kilowatt hours for that $5. We would like to grow our revenues to cover all of our costs, which today we have not. We'd like to develop new renewable generation sources, cleaner sources of generation. We'd like to help better inform our customers as to what the benefit or attributes -- the environmental attributes of renewable generation or green power are.

And again, the perception of no tangible benefit where a customer is going to pay the utility more money for their electric service and get absolutely nothing additional in the way of power, reliability, or quality. What they're paying for is the environmental attributes that are being provided

through the cleaner sources of generation from those green power sources. And then a lack of support for the environmental attributes where -- because Florida's air quality is relatively good compared to many other states, I'm not aware of any non-attainment areas within Florida. There's a lack of need or call to action or motivation. There's very low sensitivity on the part of customers to do things that are really good for the environment. They don't necessarily realize that the environment is in trouble, and so why support a program that doesn't give you substantial value? And that's a perception that we're trying to work to overcome.

We have some objectives midterm. We'd like to grow our participation program to at least a 1 percent in route. Studies indicate that 2 percent is typical. There are locations in the far West. LADWP in Los Angeles has subscription rates that are in the 10 percent level. It's a completely different environment there, and motivation sensitivities are much higher.

We'd like to install additional PV. And as stated earlier, PV is very expensive. And we would like to do that, and we will do that provided that there is sufficient subscribership to fund that expensive technology. We'd like to develop new greener renewable generation sources. And the landfill gas, we think, is one of the best technologies that can support renewable energy programs in terms of emission

reductions, and create an increasingly significant, beneficial impact to the environment through generating more of our electric power from these cleaner renewable sources.

This is a picture of the array again at MOSI. It's a frontal view, and this is a view from the back. MOSI has recently installed an interactive exhibit at the site that is an educational tool that people can interact with. There's a separate PV panel. And with some hand motion or shading, you can shield the array, and you can watch the motors and the devices, which are operated from the DC power, modify their behaviors. So it's a real good tool to help and answer -- educate people on how PV works.

This is Gannon's coal field, and in this area right here, this is the biomass material. That's roughly 300 tons of biomass. And this is our coal field. We do need special equipment to fuel biomass because biomass was not part of the initial design for a coal-operated facility. We have to use front-end loaders. We have to use portable conveyors or screens. And contrast that with the fuel equipment, which is pretty much automated where there is a reclaim wheel here that is dropped into the pile, and pretty much by computer the fuel is pushed into the station.

COMMISSIONER PALECKI: What is the biomass?

MR. CASCIO: The biomass is basically yard waste that was collected from Hillsborough County yard waste collection.

It consists of tree limbs, bushes, branches, yard grass that was mulched to the consistency of two inches or less -- I'm sorry, half an inch or less.

This is a fuels analyst, and he's taking a sample of the fuel to determine its moisture content, its Btu content. There really is very little, if any, sulfur in biomass. Whereas, coal, we measure that periodically as well, and we take some other measurements including ash and sulfur.

And this is the portable conveyor or the power screen that is used where the front-end loader will dump into that. It goes onto a conveyor. This conveyor is in what we call the tipper room. And right below this is the hanging hoppers or the bunkers. And then from the bunkers, it goes into inverted pyramids or cones, and that information -- or that fuel then is funneled into the two cyclones on our Gannon Number 3 unit. The station is permitted to operate at a 5 percent blend, but we actually operate at the 1 to 2 percent levels to help assure that we're not going to get into pluggage problems that are going to disrupt the reliability of the unit.

This is an operation that was conducted late last year. This is at our IGCC Polk plant. And this is a stand of eucalyptus trees. It was grown by a company called Common Purpose. And they specifically developed that crop with the intentions of it being used to produce energy. And we harvested this material. And here, you can see that it is

being loaded into a tractor scoop bucket, and from there, it's brought down here and put into the grinder. And it goes into some screens where it's classified. And in some cases, because of the consistency, it had to go in a second and even a third time to process the material, so it wouldn't be a problem when it was introduced into the fuel stream at the plant, which is what is happening here.

You can see the operator is literally hand throttling the fuel from material that is contained in these large bags being held up by this crane. And it's a very time-consuming process. And in order to get a system in place that can do this with less labor, there is significant capital requirements necessary to facilitate that system.

CHAIRMAN JABER: As it stands now though and relative to your coal plants, what is the labor count?

MR. CASCIO: The labor count at Polk?

CHAIRMAN JABER: Well, for this process right here, for your biomass process -- just this project. If we took this project, how many employees do you think you needed from the processing standpoint compared to the processing of your coal automated system?

MR. CASCIO: After the fuel was produced -- and it was very expensive fuel because of the harvesting and the treatment or the conditioning of that fuel. When we look at just by an operation, there were several additional people. I

don't have an exact number for you, but there were several additional people associated with the operations of this equipment with loading the bags, which you can't see here, but there is three piles of this biomass material that was shoveled into these bags and several others. Now, when we look at what is done to produce electricity with coal at this facility, very much like Gannon and Big Bend, there is a process. And there is a system that is used to reclaim the coal, and there is much less operator intervention required for that.

And as you might know, Kermit has said many times that it's really difficult being green, and we empathize with Kermit because we've had this same experience. And moving forward, we have some additional concerns which might exacerbate the problem or the development of a renewable energy program. We wanted to share a few of those with you this morning.

Gulf Power mentioned earlier that there is legislation that's pending at the national level. The national energy policy is being discussed right now in conference with members of the Senate and the House. The Senate's version included an RPS; the House did not. What will come out of that is still unknown. We think it's very important that what happens at the state level and what happens at the national level are both reasonable in terms of being able to attain those goals, recognizing that there is really a finite or

relatively limited supply of renewable energy sources in Florida.

We also wanted you to realize, and it's certainly intuitive, that any RPS is going to put upward pressure on rates. And then there is an issue of the RPS measurement criteria. Should we use -- or should an energy-based criteria be adopted, or should it be a capacity base? And a capacity-based system like the PV has nameplate ratings. You are probably aware that the nameplate rating of a device is not necessarily how it actually operates or produces when it's in in-field use. Whereas, kilowatt hours is an energy methodology that has been used very consistently. It's a very mature technology. It's very accurate, and it's very common.

Program sustainability with an RPS. Will customers be willing to volunteer or to subscribe to a program when they're already paying or supporting maybe through a standard benefits fund additional support for renewable energy? And then there is certainly many questions regarding the commercial availability of new technologies. Many were mentioned this morning. The one that, in my opinion, may hold the greatest promise for Florida is ocean currents. And we may hear more about that a little later this afternoon. But I'll also mention, Florida is not a state that's rich in wind. There's only one site that has been identified in Florida as a potential wind source, and that's at Cape Canaveral, and it's

marginal. We have no real rich geothermal. We have no hydro to speak of. So biomass is our primary method of being able to reach or maintain -- attain any kind of a renewable requirement.

And then the limitations of biomass itself. As the demand for -- or the requirement for renewables goes up, we will see more biomass being grown in Florida, and what kind of species, and whether or not they're invasive, and what are the water or fertilizer requirements for those. How might that impact native species as well as the animal life in the region? So there are many issues or concerns that can be associated with doing large scale biomass. Many of these could be addressed, but certainly there are a lot of questions that remain. And that concludes our presentation.

CHAIRMAN JABER: Thank you, Mr. Cascio.

Commissioners, do you have questions?

COMMISSIONER PALECKI: Yes. With regard to the customer participation issue, have you considered a check box on the bill where once a customer checked the box or perhaps signed their name, they would be billed an additional $2 every month until that customer tells you to stop?

MR. CASCIO: We've not considered that specific kind of program, but we have done bill inserts on a fairly regular basis. We have asked customers to participate by visiting our Web site. There are phone numbers that they can call. We are

making them aware of the program, but we have not asked for a $1 or $2 donation. We feel like the subscription program that was developed is the more appropriate method and that's the $5 price point.

CHAIRMAN JABER: Commissioners, any other questions? We have a question in the back. Could you wait for the microphone and we'll let you identify yourself?

MR. RYAN: My name is John Ryan. I'm with Sierra Club, and I work with their energy committee.

CHAIRMAN JABER: Ryan?

MR. RYAN: John Ryan, R-Y-A-N. Actually, I'm speaking as a ratepayer now rather than for Sierra Club. I am a subscriber to the Tampa Electric Smart Source Program. The only criticism I have is, is that -- and I'm speaking a little contrary to his presentation, is, is there has been very little customer saturation relative to the program. The only way I found out about it initially was, I'm part of Sierra Club, and we had a discussion about Smart Source during a renewable power discussion with the green accreditation program. I went to the site and subscribed to it.

At the time of the subscription, you couldn't even find it with a search engine. I don't know if that's still true. And since -- as a subscriber to Smart Source, since my subscription which was at least a year ago, a year and a half ago, I have received only one brochure myself. Now, I'm sure

that Tampa Electric does target distribution, and I may not be part of that target distribution anymore, but nonetheless, I've only gotten one brochure during that entire year.

So the criticism I would have of the voluntary approach is, is that there's not been -- I agree that it is going to be a smaller percentage than this survey has prescribed on interest, but there has not been the aggressive market generated commercial marketing that one would expect from a normal marketing program that you would get with some other program.

CHAIRMAN JABER: Mr. Ryan, let me thank you first and tell you that as I have listened to the presentations, one of the things I've identified we should include as a discussion in the report -- because, recognize, the law gives us the minimum and we're supposed to add factors that we've identified through the workshops -- it seems to me and staff and Commissioners, I'm assuming you'll agree here, there should be a discussion about the consumer education piece --

MR. RYAN: Correct.

CHAIRMAN JABER: -- and how the outreach efforts are being conducted by the companies and perhaps some recommendations on where there could be improvements.

MR. RYAN: Now, I also don't want to completely criticize TECO. It's a good program. I support the Smart Source Program. And they are making a very strong effort to do

renewables. I think that some of the technical side and some of the marketing side is not speaking very well to each other right now and that -- there lies the problem. And maybe some encouragement on broad-based education throughout all the utilities might increase the market saturation to the point where you would get a higher number, not just utility-wide but statewide.

CHAIRMAN JABER: Thank you, sir.

MR. CASCIO: If I could respond to John's comment. First of all, John, thank you for being a subscriber to our program. We have done several bill inserts, and we're also putting the slug (sic) for Tampa Electric's renewable program, the Smart Source, which is hopefully going to be identical and develop some recognition. We're planning on doing some billboards. We've done some targeted mailings. In fact, a fair amount of targeted mailing based on geocodes, but the population is too broad with Tampa Electric's 550,000 residential customers.

If we spent just $1 on marketing collateral, 35 cents of that would be in postage, we're over half a million dollars, and unfortunately, we don't have that kind of funding to support that. But we are working hard to get the best value for the dollar -- advertising dollar that we possibly can. And we're trying to be more intelligent in the audiences that we approach. We think that governmental and certain types of

industries like the home improvement centers and health care facilities and maybe restaurants or restaurants whose clientele might be sensitized to supporting customers who have a sensitivity for environmental awareness might be a better target for us, and those are the ones that we're going to be going after.

CHAIRMAN JABER: Thank you, Mr. Cascio.

Commissioner Deason.

COMMISSIONER DEASON: Madam Chairman, I appreciate your comments, and I know that we're here to try to learn and see if there are innovative things that we can do in addition to the direct charge we have, but we're here to also explore and try to be innovative, and I think that's the correct approach to take.

I would just ask our staff if they could perhaps include in their considerations whether it would be feasible to try to have some type of statewide marketing to get people's initial attention and let them know that many of the local utilities have such a program. And then if they are at least made aware of it, it may be more economic to have that mass communication outreach, and then individual customers, if their local utility has an 800-number or something on their Web site or something, then they can pursue the specifics with the local utility.

CHAIRMAN JABER: Yeah, I completely agree,

Commissioner Deason.

And, staff, as follow-up, the Bill does say for the study to describe options and mechanisms to encourage the increased deployment of renewables within our state. So I think a section on outreach, advertising, marketing is appropriate. And just to wrap up sort of the comments I've heard from the morning, there are companies that have Web sites, for example. It would be good to include who does and how effective that is.

We heard FPC talk about the education of the school children program. TECO has the research center that includes information on this. And I know you have a very productive Web site.

MR. CASCIO: Correct.

CHAIRMAN JABER: So, staff, I would ask that you go ahead and include a discussion as Commissioner Deason described and as you've heard here this morning.

Commissioners, any other questions?

COMMISSIONER PALECKI: Chairman Jaber, could I ask -- also ask our staff to include a discussion of the possibility of a monthly voluntary supplement that would be made on a voluntary basis by customers? I can't help but think that there are many, many customers who would be more than willing to pay $2 in every bill, or perhaps $5, to see green power in the state of Florida. And I think that's a much more feasible

method of funding some of these programs than just a single one-shot payment.

CHAIRMAN JABER: Thank you, Commissioner. I think that will be included in the general discussion.

COMMISSIONER PALECKI: Thank you.

CHAIRMAN JABER: Thank you.

MR. CASCIO: Thank you again.

CHAIRMAN JABER: Our next presenter is Berdell Knowles from Jacksonville Electric Authority. I see, Mr. Knowles, they've got Jacksonville Electric Authority down here; it's now JEA.

MR. KNOWLES: I noticed that. Madam Chairman, on behalf of the board and management of JEA, we welcome you to Jacksonville, and we're indeed honored by your presence here. I'm going to talk just a little bit about what JEA's experience is with renewables and a little bit about some of the R&D we're engaged in.

Unlike my industry peers that have come before me, JEA is a little bit different. We're a municipal utility. In fact, we're the largest municipal utility company in the state of Florida. We also provide water and wastewater services in the Jacksonville area. We're the eighth largest public power utility in the nation. We serve the greater urban area here, a population of approximately 1.1 million according to the 2000 census. JEA is committed to environmental leadership primarily

because, you know, it's important as a customer satisfaction issue. It's also important in attributing to fuel diversification and also rate stability. And I need to point out that fuel diversification and rate stability are probably the compelling issues that govern our deployment of renewable technologies.

A significant part of the community commitment comes as a result of a stipulation we have with a local Sierra Club and the American Lung Association. And we've agreed to achieve 7.5 percent of our peak generating capability with renewables by the year 2015. Specifically, the renewables would comprise about 6 percent of the 7.5 percent, and that's equivalent to about 200 megawatts. And the other category we call an equivalent clean, 1.5 percent of 50 megawatts. And this will be things that we will do at power plants and with DSM to mitigate an equivalent amount of emissions from a conventional generating source.

JEA's internal goal and direction of meeting the long-term goal is to have 4 percent clean capacity by 2007. This sort of summarizes our current portfolio. Solar PV accounts to approximately 162 kW; solar thermal, 893 kW; landfill biogas, the most significant component, of course, and digester biogas -- and I'm going to talk about these in a little bit more detail later -- giving us a total of almost 8 megawatts of clean or renewable generating capability.

JEA has installed PV panels in all of the public high schools in Duval County. Many of the JEA facilities have solar PV panels. And of course, there's an opportunity that's going to be provided later, I guess at noon, to see an installation that's right here at this facility. PV at the high schools and here, of course, provide high visibility, and I think it stimulates interest, especially among impressionable minds. And having exposure to the public is also an important aspect of it.

These are photographs of some actual deployments, and these are panels in the approximately 4 kW range. And you see one prominently displayed on top of the Chamber of Commerce, and then there's Lee High School and Parker High School. Our experience is, deployment costs us about $12,400 per kW, and the high cost is due largely to structural things that have to be done to protect from high wind and so forth. Some of these are roof mounted also, and that adds about 8,000 per kW to the installation.

JEA does not have a green pricing program, but JEA does meter the renewable energy to receive revenue for green tags. Our average energy production is about 5.84-megawatt hours per year, and again, the average system is about 4 kW. This relates to about a 17 percent capacity factor.

Now, this is a photograph of a solar thermal application. It's actually a heater for a swimming pool, and

this is deployed at Ed White High School. JEA has installed one solar thermal facility at its facilities, and it's for water heating, at a cost of $20,000. This is $2,000 per kW approximately. Average energy production is 14.6-megawatt hours. And again, the pool heater at Ed White High School, and this was a retrofit kind of situation where they had an existing heater, and the installation cost here was $50,000. And it had -- it's the equivalent capability of 344 kW. And this cost is about $145 per kW. The energy production is 502-megawatt hours per year for year-round operation. And the issues with swimming pool heaters, of course, have to do with the fact that during the peak part of the summer, the water doesn't need to be heated. And also, during the peak winter season, it doesn't need to be heated because the pool is not going to be used.

JEA has a residential customer solar incentive program who just rolled out in February 2002. 101 systems have been installed with the capacity of 539 kW. And we provide the incentives as listed.

CHAIRMAN JABER: Can we go back to the incentive slide, Mr. Knowles?

MR. KNOWLES: Okay.

CHAIRMAN JABER: Thank you. So if they sign on to your program, under those slides is it that they pay $2 to $4, or are they receiving back a credit with that? Explain that.

MR. KNOWLES: Okay. If I understand this correctly, they could receive a credit of $2 to $4, but the cost is $10.

CHAIRMAN JABER: All right. So for -- is it for every $10 they receive a credit?

MR. KNOWLES: I'm not sure. I notice -- is Kimberly Owens here? Okay.

CHAIRMAN JABER: And we don't have to do this now unless --

MS. OWENS: I can answer really quickly. The average -- the customer secures the relationship with the vendor.

CHAIRMAN JABER: Let me give you the microphone.

MS. OWENS: My name is Kim Owens; I'm with JEA. The customer has the relationship with the vendor, and then they -- and from experience, we've found that the average cost of the systems that they're paying for is about $10 a watt. From that, they would get about a $2 to $4 a watt depending on if it was a local vendor or nonlocal vendor that they chose. So those total costs are the actual costs of the systems, and then you would subtract out the incentive cost.

CHAIRMAN JABER: And how does your relationship work with the vendor? You don't really know who the vendor is. Your relationship will be with the end user?

MS. OWENS: Our relationship is really with -- well, we rolled out the program to the customer, so it's promoted to

the customers, but we have a selected group of vendors that apply to be part of the program. They have to meet a certain amount of criteria so that we know that our customers are getting good solar installers and suppliers. So their customer relationship is with the vendor, but they're already all preapproved through us.

CHAIRMAN JABER: And do you find that there is a good competitive selection of vendors for the customers? Is that ever an impediment to this kind of renewable energy?

MS. OWENS: We've opened up our vendor list to any vendor that wishes to apply. And I think a lot of them that are outside of Jacksonville are learning a lot about our program and wanting to come into the program. The vendors that we've had in Jacksonville are all experienced, but mostly we've found our experience with pools. So we're trying to get some outside vendors and trying to grow, experience outside of residential pool community to bigger systems like commercial systems or to PV systems. So it's all an educational process. We're opening it up to all vendors. We do offer a higher incentive if it's a local vendor, and we have a certain formula that we apply to determine whether it would be a local installation or a nonlocal installation.

CHAIRMAN JABER: And finally, I know you have a very active Web site. And the list of vendors, is that on the Web site?

MS. OWENS: The list of vendors is on the Web site, and our Web site is being updated. In October, we'll have -- I think that's when they're going to roll out the new Web site, but if you went on the Web site now, you'd actually be able to see the list of vendors. And I can bring you a brochure on our solar incentive program. It has all the vendors listed.

CHAIRMAN JABER: Thank you. Commissioners?

Thank you.

MR. KNOWLES: Thank you, Kimberly.

MR. RYAN: I have not been recognized.

CHAIRMAN JABER: Yes. Go ahead, Mr. Ryan.

MR. RYAN: John Ryan again. I just wanted to say, I'm also working with JEA at this time. I'm not a customer and not a ratepayer. They have done an aggressive marketing program and are meeting their targets as they speak. So I'm drawing an example here of the nature of this municipality's aggressive marketing approach. The other part of this is, is that one of the problems some of the utilities have is separating the electricity from the environmental attributes. The environmental attributes are what sell it in a voluntary program. Under an RPS system, it's not necessarily so that those attributes are needed to sell it because it's a mandatory level. But in an involuntary level, those attributes must be sold independently of the electricity generated so that that marketing effort is independent of the sales of electricity.

JEA has done an exemplary job so far. They are meeting their targets, and they are discussing with Sierra Club, the local group and the energy committee of which I belong to, about active participation by Sierra Club members and other conservation organizations in that marketing effort to lend even more credibility to marketing those attributes. So JEA is an excellent example of the efforts in the marketing side and the results that can generate it. They're meeting their targets right up to this day.

CHAIRMAN JABER: Thank you.

MR. KNOWLES: Thank you. Lessons learned to date, and I think a couple other speakers have alluded to this. In terms of solar in Florida, it's most applicable for pool heating. We've also identified a need to work a little bit closer with commercial customers and try to warm them up to the technology. Solar PV and solar water heating generally is not cost-effective because it has longer payback periods, and I think business customers are normally comfortable with a payback period of three years or less.

I think an earlier speaker mentioned that municipal solid waste is probably the state's most predominant resource. And JEA has developed two landfill gas projects. One we're referring to as a stand-alone facility and another is a remote facility. The stand-alone facility is at Girvin Road landfill, and in that situation we have four 800 kW engines that generate

electricity and also a facility to clean the landfill gas. The remote facility is located near the north side generating station, and there's a landfill there. And it's been capped, and the gas is piped directly to the north side generating station. And the cost for the stand-alone facility is $1,266 per kW; the remote facility, $110 per kW. And the respective sizes of the facilities are comparable, 3 and 3.2 megawatts respectively. The thing about landfill gas, it's not sustainable for the long term because as the biological process, you know, erode the resources, the gas ceases to be available. And the good thing is, they're relatively easy to develop.

Another kind of unique renewable, probably as a result of this synergy of being a wastewater utility, is the use of methane gas that comes from anaerobic digesting of, I guess, human waste. And what you see here is two anaerobic digesters at our city's -- JEA's Buckman wastewater treatment plant. And the methane gas that's captured from this process is actually used to offset other energy needs at that facility. The cost for this facility is $2,125 per kW, and it's going to have the equivalent capability of 800 kW, expecting energy production of nearly 2,000-kilowatt hours per year. And this is very close to being operational and may be at some later date. If there's interest, we would be happy to show you this facility.

And now, moving into the renewable technology research, and we're going to talk about three things. Some of these things JEA is directly involved and some we're just, you know, trying to get more information about. The first one is high temperature solar thermal absorption. And the photo on the left, you see a glass tube, and this little gadget is -- the glass is coated with nonreflective coating, and inside is a long piece of metal. It's actually copper; it's painted black to be more absorbent. And it has copper tubing, and it has radiant shields to basically focus and capture as much of the radiant energy as it can. And as a result of this, this can produce water at much higher temperatures than conventional thermal solar that we talked about earlier.

An example, the residential heating we talked about earlier produces water at 150 degrees Fahrenheit, and under ideal situations, this can produce water at a temperature of 400 degrees Fahrenheit. The pictures on the left shows a couple of ways these are deployed. This is actually a result of a cooperative kind of actual R&D effort by JEA with a local company here called Energy Laboratories, Incorporated. And, you know, they are going to develop a prototype for JEA, and JEA will have license-free access to it once it's done.

COMMISSIONER PALECKI: What process is used to turn the heat into electricity?

MR. KNOWLES: It's thermal. The radiant energy heats

water, basically.

UNIDENTIFIED SPEAKER: Steam, actually.

MR. KNOWLES: Pardon?

UNIDENTIFIED SPEAKER: Steam.

MR. KNOWLES: Steam, yes. Biomass technology, as been alluded to earlier, JEA also thinks is going to be the lowest-cost option for Florida. And if you'll acknowledge my colleagues, both Kimberly Owens and Joe King, they're responsible for putting this presentation together and most of the research. And Joe discovered through some of his own research that Florida has more urban waste available at a cost of under $20 per ton than any other state. Duval County has 250,000 tons available.

Biomass is probably going to be best when co-fired with -- in a fossil fuel. JEA has also entered into a purchased power agreement with a company called Biomass Industries, Incorporated. And this is a concept where the developer is going to grow a crop of E-Grass and bamboo and is going to gasify it and is going to sell the capacity from that to JEA. And we're expecting about 70 megawatts of capability from this. And this by far is going to be the largest component of JEA's renewable portfolio. There are issues related to air permits and emissions, storage and handling of the fuel, and by-products consistency related to heat content and how it might impact the boilers.

JEA also has its own biomass energy farm near one of -- a wastewater treatment plant in the north part of the service area. And there are 8,300 trees and plants, and that farm is irrigated with reuse water from that wastewater plant. And again, this is relating to environmental issues. This is certainly a positive. And, you know, things of interest, they are, what are the yield rates tons per acre per year.

COMMISSIONER BRADLEY: I have one question. At the top on the biomass, it says -- the first block says, "More urban wood waste," would you -- (Inaudible. Microphone off.)

MR. KNOWLES: Urban wood waste are things like tree trimmings. Florida has a lot of urban wood waste associated with that kind of activity because it's a heavily treed state. But it's -- I imagine maybe some construction debris might be part of that, but it's mostly from -- okay. There's a person in the audience that's telling me I'm all wrong. Maybe -- would you care to offer some clarification, please. Okay.

COMMISSIONER PALECKI: While you're getting the microphone out there, do the electric utilities use the waste from their tree-trimming programs at all for the biomass projects? I would think that on a statewide basis there would be a significant amount of biomass from just tree trimming over the power lines.

MR. KNOWLES: I don't think it's used to a large extent in any boilers, but it's used for a lot of other things.

And I know utilities do --

MR. MEADE: I can probably answer that question.

MR. KNOWLES: Okay.

MR. MEADE: I can probably answer that.

CHAIRMAN JABER: Go ahead. Identify yourself for me again.

MR. MEADE: My name is James Meade. My company is Materials Recycling. Urban tree waste is the kind of material that I -- my company typically handles. Our site is located outside of the Orange County landfill. We also have a couple other sites. Urban tree waste is mostly from tree trimmers. We get -- actually, when they trim for power lines, that kind of material, some land-clearing debris is brought into the site, and then we grind it and make it into mulch. It's our goal to ultimately make this into a fuel, which is part of the reason why I'm here today. So typically though construction debris like wood that may be pressure treated or may have lead paints or things like that are specifically prohibited from the facilities that I operate and would not be part of any kind of materials that we would be handling.

CHAIRMAN JABER: Thank you.

COMMISSIONER BRADLEY: Thank you very much.

MR. KNOWLES: Does that answer your question, Commissioner Bradley?

COMMISSIONER BRADLEY: Uh-huh.

MR. KNOWLES: Okay. Thank you for that.

And then finally, this comes to us also as a result of research by Joe King. And this is related to offshore wind as a resource. These SABSOON towers are actually used by the Department of Defense for airplane navigation, and these are radar towers essentially. And what you will see, I think it's pretty discernible, is there are two actual wind turbines there as well as a PV panel. And these essentially provide electric power for these systems. They are backed up with diesel generators.

And just so you get an idea of scale, you know, the top part extended from the platform is about 170 feet. And the reason that this is offered here is that just, you know, it sort of demonstrates that, you know, there is a wind resource. However, how substantial it is is still largely undetermined.

You know, my associate feels that, you know, with some additional modeling and maybe getting another weather station, the information can be developed to determine how viable this is as a generating technology.

Okay. Madam Chairman, that essentially concludes my presentation.

CHAIRMAN JABER: Thank you, Mr. Knowles. Commissioners, do you have any questions?

I think we interrupted you along the way with questions. Okay. Thank you.

We've got one more presentation under this section, and I think we'll finish this section and then break. As Mr. Brinkworth prepares his presentation, let me announce that the JEA lab will be open between 12:00 and 2:00, I think. Feel free to take advantage of touring that lab. We will take a lunch break after this presentation. It will only be for an hour, however, and I do ask that we come back right on time so that we can go ahead and get started.

MR. BRINKWORTH: While we're plugging up, Commissioners, I have to apologize. In my haste to get over here from Tallahassee, I left your beautiful color handouts in my office.

CHAIRMAN JABER: I think we'll forgive you this time.

MR. BRINKWORTH: And I discovered -- after I discovered that, the audience handouts were also already gone, so you're going to have to indulge me while I talk, and you won't be able to follow along, but hopefully it will be entertaining. We're having a technology opportunity here, I don't know.

CHAIRMAN JABER: Mr. Brinkworth, what I'm going to do is -- see, I should have spoken earlier. What I was going to say is, we could take a break and let you adjust that. And I think we'll do that. We're going to go ahead and take a one-hour lunch break. We will be back here at one o'clock. It's my understanding that there is a cafeteria in the

building. I think it's on the first floor, if I'm not mistaken. There are also little sandwich shops in the downtown area. We will see you back at 1:00.

(Lunch recess.)

CHAIRMAN JABER: We're going to go ahead and get started. Mr. Brinkworth, we're waiting --

MR. BRINKWORTH: I think we've got our technology problems licked now.

CHAIRMAN JABER: Go ahead and get started.

MR. BRINKWORTH: Madam Chairman, Commissioners, my name is Gary Brinkworth. I am the director of business development for the City of Tallahassee's utility services group. And I'm here to talk to you for a few minutes this afternoon about our green pricing program that we're about to launch in Tallahassee. First, a little commercial about us. We are the 4th largest municipal electric utility in Florida; 28th largest in the United States. We serve 221 square miles of service territory in and around Florida's capital city with about 98,000 customers.

We are very proud of our long-standing commitment to clean energy. Our two primary generating facilities at Hopkins west of town, the Purdom station on the coast at St. Marks are both natural gas-fired facilities, and of course, as staff already mentioned, we do operate one of only two hydroelectric stations in the state of Florida, C.H. Corn. That among other

things creates the Lake Talquin recreational area out west of Tallahassee.

Our commitment to renewables is a long-standing commitment that actually ties back as I've already said to C.H. Corn. We have several solar thermal facilities that are installed around town. We've actually got one on a municipal pool in Tallahassee. We have six fire stations that are fitted out with solar water heating systems. We have several others that have been installed over the last 10 or 12 years by our customers through our energy conservation loan program.

We have now taken over the ownership and operation of a photovoltaic vehicle charging station that's actually located behind your conference center in Tallahassee out at the satellite office complex. Through an agreement with LEAF, we committed to some higher levels of energy conservation to expanding our solar PV portfolio and to moving forward into a green pricing program which we're about to launch this fall. Our most recent addition to our renewables portfolio is a 10 kW PV system located at the Trousdell Aquatic Center near the Tallahassee Mall there in Tallahassee.

When we started out our efforts in renewables, we started with some market research. We did actually two runs of market research, a phone survey about four years ago while we were participating with some other utilities in the old UPVG organization, the photovoltiac group. The results of that

phone survey of our customers lined up very well with national trends at that time about interest in green power and about willingness to pay a premium to encourage our acquisition of green resources. We followed that up. In those intervening years, we were working on some other projects we didn't implement right away. And so we came back in the summer last year, and we did some small focus groups to make sure that we were still on target with what our customers were expecting and wanting in terms of green power.

Here's some of what we found out. They are very supportive of renewable sources, especially solar energy. They think, however, if we do that, that we need to couple any commitment we make to green resources with an enhanced commitment to conservation and to energy efficiency, especially on behalf of the city itself. They are willing to pay a premium for green power, but they have divergent ideas about how much that premium ought to be, whether the utility ought to split that premium with them and put some green financing in rate base, or whether we ought to look for customers to pay that directly.

They were a little concerned about how we might use the funds we'd collect through our green program, if we could guarantee for them that the revenue that we generated through green sales would actually go to expanding our green portfolio instead of paying other obligations of the utility. There were

some questions about supply. How do they know that what they're buying is really green? And where is it coming from? And how can they prove it? And the last point they made was that community-wide support is absolutely critical, especially in the environmental community, if we expect to be successful with the program.

We took all of that information and the rest of the material that we got from our focus groups and developed a program design. We are going to launch, as I said, in the fall using basically a green tag model, because we think that using tags helps us to accelerate the implementation of a green program, yet avoid some of the problems that I believe you get into when you try and wheel or transmit green power, physical power through the grid in Florida, things like that. We also think that it makes it easier for us to expand as well as to tailor our program, if we go, if it involves primarily the sale of green certificates. However, along with that, we're committed to a strong presence of local green supply in Tallahassee. And I'll talk a little bit later about how we propose to do that.

We are going to implement this program with a program -- with a partner because we believe that we'd like to take advantage of some expertise that's already in the industry about how we launch these programs. So this is basically our partnership. We have three players. The city's electric

utility. Sterling Planet is our program delivery partner. Sterling Plant is going to help us with marketing, with acquisition and verification of supply, with customer care, with billing and a number of the other tasks that are involved in rollout while the city is beginning to gear up and decide exactly how much of the program we want to manage in-house.

LEAF, the legal environmental assistance foundation, is our other partner. They've been very instrumental for us in terms of helping us shape the program and to come up with components of the program that are understandable to our customers, understandable to the environmental community. So we see these two partners playing a really important role for us as this program gets ready to roll out and then even after we're rolled out.

Very briefly, this slide just talks about the business model that we're working on, the sale of green certificates. You can see that all of the electricity from both green and conventional sources would come through the electric grid as it ordinarily does. We would deliver it to our customers just like we always do. At the same time, our partner, Sterling Plant, will acquire the attributes and translate those into green certificates. And those will be marketed directly to participating customers and sold in a separate transaction.

And what we're trying to do there, as you know, is to

capture the intangibles associated, the attributes associated with green energy like reductions in carbon dioxide and NOx offsets, like economic stimulus, things like that. We intend to capture all that benefit, or as much as we can, in and monetize it in some kind of price premium based on what the market is telling us now those are worth, and then sell those to customers bundled up along with the electricity that we'll be generating.

So here's our energy mix. What we want to do is provide 50 percent of the energy that will be sold in our program from local solar resources. We're going to make a commitment to expanding our PV and solar thermal portfolios to stay in pace with what our customers are asking in terms of their participation in this program. So at least half of everything they purchase through the green program will really be local in Tallahassee where they can go out and see the facilities. The other 50 percent we're going to pick up through tags regionally, probably be a blend of biomass and wind.

We are also developing some programs in the city not unlike what you heard the JEA talking about. We do have some municipal solid waste facilities we're looking at, digester gas from those facilities becoming ultimately a part of this green program as well. We are committed to making sure that our supply mix does meet whatever state certification standards are

finally produced in order that our product can be green-e certified.

COMMISSIONER PALECKI: What are some of the locations you're looking at for the wind generation?

MR. BRINKWORTH: The wind tags we'll buy regionally, Commissioner. Right now, we're looking at perhaps a purchase from the TBA who has some wind resources. We're trying to stay with the constraints that are being developed for green-e certification in the state of Florida, and there's a regional boundary that we need to work with in terms of where we can acquire those alternative resources. And right now, the SERC electric region is as far away as we can go. So we're looking right now possibly at TBA as being that supplier.

Let me talk for just a minute about our choice of solar. Why did we pick solar? Number one, because our customers told us that's the thing they like the best. We think it's very modular and expandable. You can put it on a lot of different places. It works very nicely for our service territory characteristic because we've basically got a bunch of urban rooftops. In fact, I'm hoping someday to be able to look out my office in City Hall and see PV panels on the roof of every state office building in downtown Tallahassee, because we have a lot of untapped kilowatt hours that are laying out there on top of those roofs, and they aren't doing anything.

They are simple to install, by and large, and they

are easy to maintain, low cost. And probably most importantly for my marketing staff, they leverage our position as the capital of the Sunshine State, and we want to be able to take advantage of that in our marketing strategy. We also have a program already in place called "Catch Some Rays" which has been promoted for about the last eight or nine years in our conservation programs. And through Catch Some Rays, what we do is encourage our customers to invest in solar thermal primarily, but we think that in the fall we're probably going to roll out some PV as a part of this program so that we can continue our focus on solar.

When we get ready to finance the program, what we've done, at least preliminarily, is to create a fund that will support our future solar ventures. We're going to carve out a piece of the fund that we've had established for a long time that supports projects that are part of our energy conservation portfolio. And that fund is going to be set up so that we can make project debt payments. We can take the income from the green tags. We can take income from -- imputed income from the energy sales and the interest earnings and keep that fund solvent. And our models right now are telling us that we can meet what we think will be our customers' demand in the near term with this fund and remain solvent so that we won't have to continue to infuse capital into this fund when we set it up for the first time. We think that it will stay self-funding.

As I said, program delivery is coming up soon. We're working through our partner, Sterling Planet, who's going to handle probably our two most important pieces of our rollout, which will be our on-line. Web sites are going to play a very important role in our program. We have a Web site already; we're developing a second one. Sterling Planet has a set of Web sites, too, that step the customer through how to sign up for the program. So those are going to be an important mechanism.

We also have some call center support. Our utility call center will handle some of the business, and then we'll pass off some of the detailed inquiries from our customers directly to a Sterling Planet managed call center.

We're going to launch this program under what's called the "Every Choice" campaign, and you see the graphic for Every Choice on the right there. And some of you that have handouts may not be able to read what it says, but the campaign is, "Every Choice makes a difference. How will your energy choices today affect Tallahassee tomorrow?" Now, this is a campaign that we actually launched in Tallahassee about 11 years ago as part of a push for energy conservation. We're going to reshape this program a little bit and reissue it along with a series of our other choices programs. This green program is going to be one of those, our recycling programs, all of our conservation programs, our optional gas utility

rebate programs are all going to be bundled up under this Every Choice campaign.

We're going to launch on a -- sort of a soft launch, as the marketing folks call it, in October as part of our centennial celebration, because actually about middle of September the city will mark 100 years of electric service. And so in October we planned a series of events in town that coincide also with Public Power Week, and at that point, we will be providing information on the green program.

Our official kickoff won't come until November, and then we will also tie in later in some events in December like the Festival of Lights. The city's electric utility is going to be the parade sponsor again this year, and so we're going to have a high profile in that event as well. And we think that will help us build some momentum for our customers. I'll be glad to answer any questions.

CHAIRMAN JABER: Thank you, Mr. Brinkworth.

Commissioners, do you have any questions? Okay. Thank you very much. That brings us to our second section of the presentation, and the first speaker identified is Gus -- is it Cepero?

MR. CEPERO: Correct.

CHAIRMAN JABER: Mr. Cepero.

MR. CEPERO: Thank you.

CHAIRMAN JABER: Mr. Brinkworth, if you could

remember to send back to us a copy of your presentation, that would be great.

MR. BRINKWORTH: I will. Madam Chairman, I'll make sure that you-all get a copy.

CHAIRMAN JABER: Great.

MR. CEPERO: I am only going to introduce our principal speaker, but I'll take a minute to make a couple of remarks. First of all, after the presentations this morning, I want to say that biomass generation really works. I'm an officer with Florida Crystals. Florida Crystals owns and operates two biomass-fired facilities in Palm Beach County. And the Okeelanta facility, our larger facility, generates enough power every year to serve about 50,000 residential customers 100 percent, so serve 100 percent of the needs of 50,000 residential customers each and every year.

We use about 650,000 tons of urban wood waste which comes from primarily the south Florida region. We have very win-win type relationships and contracts with Dade County, with the Palm Beach County Solid Waste Authority who has representatives here today, and with about 25 private recyclers all throughout Florida. So this technology is real. It works. And it's making, we think, a positive contribution to the power supply and the environmental picture in Florida.

What we would like to talk about today though is cost and economics. We have provided information to the staff about

cost, environmental performance, and just renewable characteristics of biomass generation. And we're happy to the extent that more information is needed to cooperate with that. And we are going to make a proposal in what we think the renewable energy policy for the state should include. So I think environmental benefits have been documented. I think the renewable benefits are self-evident, the fact that you're using sustainable fuel as opposed to finite fuel.

What we would like to talk about today is cost. And to sort of give you a summary, the cost using traditional definitions of biomass generation, total costs are about six to six and a half cents a kilowatt hour, operating plus capital. That compares with an average cost of production plant for the investor-owned utilities of about five and a half cents. If you look at your rate, about five and a half cents of the rate is production plant. And that compares with a cost for gas-fired combined cycle generation of about four to four and a half cents depending on your assumptions on the price of gas. So it is more expensive using the traditional definition, but it's not way out there either.

What we would like to offer today is a different perspective on how to think about these technologies from an economic development standpoint. When we say biomass is six cents, an average cost of power is five and a half, and combined cycle is four and a half, we're assuming then the

impact on Florida's economy of these three technologies is the same. We're not drawing a distinction between these technologies on the impact on economic development. So what we have done is, we have retained an economic consulting firm to analyze where this money that is being spent to generate this power goes, particularly how much stays in Florida and how much goes out of state, and what's the impact on things like jobs, income, taxes, and general economic activity in the state. And I think hopefully you'll find this somewhat revealing because the basic bottom line is that 90 percent of the dollars paid for gas-fired combined cycle generation go out of state because most of it is fuel. Whereas, when you look at biomass, just the reverse is true. Almost 90 percent of the dollars that we spend stay within the state because it is a labor-intensive industry and it generates a lot of jobs.

So I think that's the perspective we want to offer today. And I'd like to present the Washington Economics Group to do that. Bob Cruz is one of the principals in the group. He is a graduate of Georgetown and the University of Pennsylvania. He is an associate economics professor at Barry University and in past history has been associated with Chase Econometrics and University of Miami and is quite well versed in economics and economic forecasting.

I'll also briefly mention the other coauthor of the work is Tony Villamil who some of you may have heard of. Tony

was our Secretary of State under the Bush Administration and most recently served as the head of economic development for the state of Florida under Governor Bush.

So Bob.

MR. CRUZ: Thank you, Gus. And good afternoon, everyone. Thank you for the opportunity to address you here today on this important issue. Gus mentioned that Tony Villamil I think he said Under Secretary of State; he was Under Secretary of Commerce -- but I think Tony wouldn't mind that at all -- in the Bush One Administration. So I just wanted to clear that up.

As Gus was mentioning, we are looking really primarily at the economic benefits. But I think to put it in some -- in context, we should -- into a broader context, let's look at why should we consider -- why should Florida consider encouraging the use of renewables. Now, many of these answers or these reasons you're all very familiar with. First of all, expanding the use of renewables is really Florida policy. It's prominently displayed in the Energy 2020 Report. I mean, it's there. It's given a prominent position; we know that.

Other states have already taken the lead in generating or encouraging the use of renewable fuels in electricity generation. We've all heard of early this morning there are 12 states that have renewable portfolio standards in place. So those are the requirements of a minimum percentage

of the electricity generated within the state has to come from renewable sources. Already 12 states -- and we'll talk about those in a moment, but the more important point here is to say that these states are taking the lead in this area. And it's very likely that those states -- where this technology is going to be developed, where it's going to be refined, where the cost of producing electricity through renewable sources is going to come down is probably in those states that have these RPS standards in place, because one of the things that they have done is, they've basically taken a -- they've identified that a clear proportion of the state's future energy needs are going to come from renewable sources. So investors and those companies that are engaged in developing this technology recognize that they have a market there, and they are going to put their investment sources and their knowledge sources there.

Renewable fuels, as Gus mentioned, are home grown, if you will, homegrown resources. And as a result, a lot of that -- a lot of the money that is spent on producing -- a lot of the costs that are spent on producing electricity are going to stay -- with renewables are going to stay within the state. They're not going to be shipped externally, and therefore, what that's going to result in is less economic leakages and more net economic benefits. Now, if you think about it, whenever a company expands production, it needs to acquire inputs from other companies. It needs to -- these supplier relationships

are important. Well, in the case of the traditional technologies, those inputs are being purchased from outside of Florida. In the case of renewables, those resources, a great proportion of them, are going to be purchased from other firms within the state. And so this spending is going to be recycled within the state and lead to positive net economic benefits.

It's also important to keep in mind that diversifying your portfolio fuels has economic value in and of itself, just like an investment portfolio of an individual benefits from a diversified portfolio. All right. That economic value that's created through diversification reduces risk. That's also true with respect to energy policy. And we're going to look at some of the fluctuations in prices of natural gas to sort of make that point at the end.

Now, I'm going to skip over these. All of this is in the Energy 2020 Report, and all of you are very familiar with that, so I'm just going to skip through them. But one of the things that is clear there, that Florida aims to be a leader in developing these new technologies. And we really don't think that that's possible unless you have some type of policy that requires a certain production of electricity coming from renewable sources.

Basically an RPS standard is consistent with the goals, objectives, and strategies of the Governor's Energy Policy and creative use of biomass. And we're focussing on

biomass because biomass is really, at this point anyway, the most viable renewable source certainly at this stage. So the greater use of biomass as a fuel for generating electricity has a real significant potential for creating economic benefits for the state of Florida, and we're going to focus on that.

Now, as I mentioned, 12 states already have adopted some form of an RPS standard. And I'm not going to go through what those portfolio standards look like, but I just want to mention that these states, if you take a look at the list, Arizona, Connecticut, Iowa, Maine, Massachusetts, et cetera, they're a broad mix of states. You have the old economy or traditional economy states like Pennsylvania and New Jersey, heavily industrial. We have the new economy states like Massachusetts. You have states that are small; states that are large. Arizona which has -- one of their key industries is attracting retirees. So you have a broad mix of states that are already engaged in encouraging renewables through RPS standards.

Now, they all have their different sort of characteristic. Each state is different in the way its RPS standards look like, but basically there are some common elements. One, it's a gradual phase-in. These standards have been set up to phase-in over time, over 10, 15 years, starting with a small requirement of as little as 1 percent of the amount of electricity generated to be from renewables to as

much as 15 percent 10 years, 15 years out. And there's a mix of technologies that are allowed. You can use -- to meet these standards, you can use solar, you can use wind, you can use biomass depending upon what's available and what's cheaper, what's most cost-effective.

What we've done is focus in on biomass, and we use a methodology that is sort of standard for these types of analysis. We use a methodology that's been around for about 30 years now. We use a software that is sort of a standard in the industry; it's called INPLAN. Many of the state agencies use INPLAN models to do their own economic analysis, their own impact analysis. The Revenue Estimating Conference, for example, when it was trying to put a price tag on constitutional amendments was using INPLAN models to come up with their estimates of what the economic impacts would be -- costs would be. So this methodology has been around for a long time. It's sort of standard. It's well tested and it's used throughout the state.

One of the benefits of an input-output approach is basically that all of these supplier relationships, these inter-industry linkages are taken explicitly into account in the model, and that means of course that any leakages in spending are also explicitly taken into consideration in the model. So if, for example, you have an industry that spends a lot -- a high proportion of its costs are spent buying

supplies, either goods and services or labor services, from firms within the state, those industries tend to have a higher multiplier, higher economic benefits for the state.

So the stronger the inter-industry linkages, the stronger the supplier relationships, the higher the economic multipliers tend to be because of this recycling of spending that's going on. So what we've done is sort of looked at biomass and looked at combined cycle technology, natural gas, using natural gas, and put those side by side. Take a look at them side by side and see what the economic benefits of the two are. And in this table in this chart one of the things that you see is, this is for a typical production unit using combined cycle technology. A typical production unit has 250 megawatts of capacity. A typical biomass unit is only about 70. So that's about sort of three and a half units of biomass to have the equivalent capacity. However, you don't need that many biomass units in order to get the same electricity generating power on average as a combined cycle.

On average, a combined cycle is estimated to have sort of an average annual production of about 1,533,000-megawatt hours of production. A biomass unit has about 521,000-megawatt hours of production. The reason for the difference is that a biomass unit can typically run at a higher level of capacity. Now, these estimates and these numbers come from actual experience at the Okeelanta plant. These are

actual numbers of what's going on at the Okeelanta plant.

The direct operating costs -- and when we're talking about direct operating costs, I want you to recognize that we're talking about fuel and fuel transport; we're talking about sort of those fixed costs associated with maintenance that takes place regardless of whether the plant is operating or not and those other variable costs like labor costs and other variable maintenance costs that are associated with operating the plant.

On a per megawatt hour basis, the cost of producing electricity on a combined cycle is $31.07 per megawatt hour. For biomass, it's about $41.50 per megawatt hour. So it's more expensive. If you look at what's the percent of operating costs paid to Florida workers and firms, it's only about 9.4 percent in combined cycle because fuel costs are so -- such a large proportion of these direct costs, fuel costs in such a large proportion. And of course, natural gas isn't produced in Florida. It has to be shipped in from the outside. So that money that is spent on fuel leaves the economy.

In contrast to that, about 86 percent of the costs spent, direct operating costs spent in a biomass production unit stays within Florida. Those are goods and services purchased from Florida firms, Florida individuals that's taking place.

Now, capital costs are also larger for a biomass unit

than for a combined cycle unit. Biomass is about -- you see about -- there's a three-times difference; right? This is about 1.6, 1.7 million. This is about 550,000. This is per megawatt, not per megawatt hour but per megawatt of capacity. So you could just take that "H" out of there. It's capital costs per megawatt of capacity. Now, in the case of what proportion of those capital costs stay within Florida, that difference is isn't so stark. That difference is really not that big. It's 18 percent stays within Florida in the combined cycle case. In the case of a biomass, it's about 30 percent spent within Florida or from Florida firms. So that's not much of a difference there.

Biomass is clearly more expensive, but it has greater links to Florida industries. That's something to keep in mind. And by ensuring a market for biomass and renewables, one of the things that's likely to happen is that you spur more research and development in those technologies, because as I said before, what you're doing with RPS standards is, you're telling the producers of renewable sources that there's a market out there for you. If you stick to those standards, if you implement those standards, you're going to have 5 percent or 7 percent of the amount that's generated -- electricity that's going to be generated within the state has to come from those sources. So that really takes away some of the uncertainty for firms that are thinking about investing in research and

development for those types of technologies to try to bring those costs down in the future.

So I think that over the long term what you would see with an RPS standard is that these cost differences would begin to narrow because you'd see more effort in developing better, more efficient technology, because within the renewables group, there's going to be competition on how to produce that energy at a lowest possible cost trying to get a larger and larger share of that market that's set aside.

Now, here in this chart what you see is the cost based on the same capacity of production or the same electricity generating amount given the two technologies. For example, in the combined cycle, if you run a combined cycle and you produce 1.533-million-megawatt hours of electricity on average per year, the cost is $47,600,000. That's what the costs are. It's broken down. Here's the fixed cost. You see the red costs are the fuel costs. You see how large that is as a proportion of the total. And the other variable costs are relatively small. That's for the combined cycle.

Now, if you're going to produce those 1.5-million-megawatt hours of electricity per year with biomass technology, then what you get is a cost of 600 -- I'm sorry, of $63 million, $64 million a year. Notice that the fixed costs are higher as a proportion of the total, higher in absolute and higher as a proportion, but the fuels as a proportion in an

absolute amount is much smaller than with combined cycle. And the reason that comes about is because most of these costs here in the fuel is really transporter fuel, not the fuel itself. Fuel itself is very, very cheap, if at zero cost. If not at zero cost, it's really a transportation. And so that's why more of this cost that's involved in fuel and transport is really staying within the state because it's paying for transportation within the state.

The other variable costs are a little bit larger in proportion, of course, than here and larger in absolute amounts. Now, again, this just repeats what I said before about how much of those total expenditures, those costs stay within Florida. In the case of combined cycle, 91 percent leaves, 9 percent stays in the state; 86 percent stays within the state, 14 percent leaves outside of the state.

Now, because of those differences, you begin to see differences in the economic impact. These economic impacts or these multipliers are measured in a per megawatt hour basis so that we can compare the two. So, for example, the number of jobs -- in this case, it's per million megawatt hours. The number of jobs that are created by producing electricity with a biomass unit, this is again per million megawatt hours, 791 jobs with biomass, 69 jobs with combined cycle, the difference of 722. So the biomass cycle of course produces more jobs for Floridians, a lot more jobs for Floridians than

the combined cycle.

In terms of how much of this -- how much laboring becomes generated, how much income is generated for Florida families and households, well, per megawatt hour it's about $28.32 for biomass compared with $2 for combined cycle. And you can go down the line, and you can see of course that the differences -- I mean, you get the same pattern. You get basically a lot more impact from biomass than you get from combined cycle. Now, just looking at this last one which is state and local tax revenues, per megawatt hour you get about $3.55 if you produce with biomass. If you produce with combined cycle, you get about 26 cents per megawatt hour. So again, these are state and local net difference of about $3.30, net impact on state revenues from using biomass. Now, those are, by the way, the direct, indirect, and induced effects through the multiplier model process.

Now, we're going to talk about cost too. We haven't talked about cost yet, and that's not taken into consideration in that previous chart, but we're going to get there. But I just want to show you here what's going on today. Already today there's about 2.3 percent of the electricity that is generated within the state comes from renewables already. That's happening today. This is based on the four investor-owned utilities within the state, numbers from the four investor-owned utilities within the state. About half of

the electricity that's generated comes from coal and petroleum, 28 percent comes from natural gas.

Now, this proportion has been growing because this is really the most efficient way of producing electricity. And so as you begin to retire the old plants, the old coal plants and the petroleum plants, you begin to replace those as a whole, as the industry as a whole begins to replace those with combined cycle natural gas technologies. And nuclear is 19 percent.

Now, the Department of Energy forecasts, the Department of Energy forecasts electricity generation for the state of Florida. They have provided this. And they have made forecasts of where that new electricity is going to come from. And where you see that it's going to come, they predict it's from natural gas. This is in million megawatt hours. And so we're starting in 2002 with 46-million-megawatt hours being produced from natural gas going up to 141-million-megawatt hours.

If you look at what's going to be produced in the future in terms of coal and petroleum, that's going to pretty much stay the same. In the case of nuclear, that's predicted to stay very much the same. In the case of renewables, they actually predict a little bit of an increase between 2007 to 2012 but then leading to a decline. That's what their prediction is. There would actually be less -- by 2017 less than 2 percent of -- under current trends, less than 2 percent

of the electricity generated within the state will come from renewables. That's DOE's projections.

We think that's it's very doable to do a -- to have an RPS standard that calls for 2 percent by 2007 because we're really already there, if you think about it. As a state, as a whole, we're already there. We've met that standard.

CHAIRMAN JABER: Commissioner Bradley has a question for you.

MR. CRUZ: I'm sorry.

COMMISSIONER BRADLEY: Yes. Would you go back to your last slide, please.

MR. CRUZ: Yeah, I'll try to do that. My contact lenses do not give me the sharpest eyesight.

COMMISSIONER BRADLEY: Okay. My question is this: Is there any particular reason why you combined coal and petroleum? And the next question, just so you can incorporate this into your answer, is there a breakout for coal and petroleum that's separate and specific?

MR. CRUZ: There is a breakdown that's separate for coal and petroleum. Those two are -- that data is available. The reason I combined it was just not to make the graph too busy for graphical purposes, for visually to see it. There's also another reason and that is that that's really the old technology. I think petroleum and coal, as the way the DOE sees it, that's the old technology. The new capacity that's

going to come on-line is going to come in natural gas. So I didn't see -- but it can be broken out that way if you'd like.

So we think that it's doable to have an RPS standard that says 2 percent, 5 percent by 2007 -- I'm sorry, 5 percent by 2012 and 7 percent by 2017, 15 years from now. We think that that's a reasonable, doable type of standard. And for purposes of sort of analysis just let's see what does that mean in terms of economic impact. There are going to be some increases in the price of electricity, the retail price of electricity. That's certainly going to happen, but we think that even if you can incorporate the effect of that, the negative economic effect of an increase in the price of electricity, it still has net positive economic benefits.

Now, all of these, by the way, are estimates. They are ranges of numbers of what the costs might be and also what the economic impacts are going to be. It depends on some assumptions. You could tweak the assumptions here and there, but basically the same result comes -- still occurs. The results are still pretty much the same, just the numbers vary a little bit. And you know, that happens, you know, if you tweak a little bit here and a little bit there. And one assumption -- we've done these kind of simulations and see, well, what if we change the assumption a little bit? Does it really matter? And the results are pretty robust, in other words, even when you change those assumptions a little bit.

So we've got here lower bound -- this is per megawatt -- dollars per megawatt hours, the lower bound and an upper bound. The retail price of electricity we project would increase by about 10 cents per megawatt hour in 2007. Remember, that's just the 2 percent threshold, 10 cents to 23 cents, 10 cents to 23 cents per megawatt hour.

CHAIRMAN JABER: Dr. Cruz?

MR. CRUZ: Yes.

CHAIRMAN JABER: This is very, very important, and I don't want to gloss over any of it, but I do need you to try to speed up the presentation.

MR. CRUZ: Yeah, we're almost done. I think these are the last two slides or last three slides. So you can see what the impacts are. They're not really that large when you look at them in terms of the retail price. Now, why is that happening? Because we're talking about affecting only the production or the generation costs. So the transmission costs aren't affected, and the transmission costs are about 50 percent of the total cost. When you're looking at the production side, we're only affecting about 50 percent of that, and we're talking about a small fraction of the total amount of energy that's produced. Even in 2017, we're only talking about 7 percent. So therefore, the effect on the total cost is really not that large.

These are too hard for you to see, but you have a

printout of that, and I just want to let you know that the printout numbers that have the net impacts are wrong. They're a little bit different because the formula didn't -- when we revised the presentation, when we came up with new numbers, that last line didn't change, but these lines here are the same.

Basically the employment impact by -- and I'll focus on 2017. The net employment impact is about 10,000 jobs by employing this kind of RPS standards. The net impact is positive, 10,300 jobs, $396 or $400 million in household income, in terms of gross revenues to the state, $928 million on an annual basis of recurring net revenues from having this RPS standard as was mentioned before with those 2, 5, and 7 percent.

This is a chart that has a distribution of the employment impacts. I'll gloss over that, but one of the things that you'll see is that the employment impacts are generated through a variety of industries across the state. So it's not just one industry that's benefiting.

This is a state and local tax impact, but I'll just, you know, for the sake of time go faster. Basically what about security? What about employment security? What about reducing the risk? While these renewable fuels may be more expensive, they're certainly less volatile than natural gas prices have been, so therefore, they're a more stable source, if you look

at the price, stable cost source of energy than natural gas or others.

Just to speed up a little bit, here's just a price volatility that you've seen in natural gas prices. If you look at 1996 and '97, you see a lot of volatility, starting with a range of $2 per million megawatt -- sorry, million Btus. This is the cost of natural gas. From $2 going up to $4, that's 100 percent increase in really short periods of time. So you see a lot of volatility here. You see a lot of volatility again also from 2000. From January of 2000 through the January 2001, you still get volatility here. So you see that natural gas prices are very volatile, and so one of the things that this does is creates volatility in the price of electricity too.

And finally, this one, where are natural gas prices headed? Well, this DOE projection -- these are DOE projections. Again, we're at about $2 per thousand cubic feet. All right. We're about $2. They projected by 2020 we'll be up by about -- this is about $3.30, so an upward trend. But one of the things that you have to keep in mind, that we're entering into a state of heightened international tension. We have already seen what that has done to the price of oil. The price of oil has gone from $20 a barrel a year ago to about $30 a barrel today. If we continue to have these international tensions and these, you know, political problems that are

affecting primarily that part of the world that's responsible for a great proportion of the energy production, you're going to see a lot more volatility around this trend. Sure, this may be the trend, but you're going to see fluctuations around that trend, or you should expect to see those fluctuations around that trend.

And finally, conclusions, well, as I said before, an RPS standard is consistent with state and national priorities. It's been tested in other states. Other states are already using it without any other adverse consequences. Diversifying the sources of energy helps mitigate price risk. Renewables have stronger economic linkages within the state. And finally, the last slide here just gives you the net economic impacts once again, so you can see these jobs and revenue impacts and how they grow over time. That's the end of our presentation.

CHAIRMAN JABER: Thank you, Dr. Cruz.

MR. CRUZ: Thank you.

CHAIRMAN JABER: Commissioners, any quick questions?

Commissioner Deason.

COMMISSIONER DEASON: I know your study is based upon biomass. Have you done any study or do you have any opinion as to whether the net economic benefits for Florida, what they are for solar?

MR. CRUZ: No, I don't have that information.

COMMISSIONER DEASON: Okay. Thank you.

CHAIRMAN JABER: Thank you, Dr. Cruz. That was an excellent presentation.

Next, we have Ryan Pletka.

MR. PLETKA: Well, thank you very much for giving me the opportunity to speak here today. Briefly, I wanted to go through some of the renewable energy technology options for Florida. And I wanted to focus on really what I consider the practical options. My name is Ryan Pletka; I'm with Black & Veatch. For those of you not familiar with the company, we're a large consulting, engineering, and construction company involved in quite a few power projects on the conventional side but also probably 50 active renewable energy projects across the world right now. So we have a good handle on different technology options. Locally, we have been pretty happy to support JEA in many other developments.

Well, from my standpoint "practical" means it meets a need and that not necessarily is low-cost power, but somebody has a need that needs to be met in some manner. Practical also means you have a resource available, commercial technology, and it's affordable. And again, affordable can be measured in a lot of different ways. I think a lot of people here have already covered the viable options. And in conclusion, those are kind of biomass, solar, small hydro. I'll touch on that for a second, but I also wanted to cover the other ones because I have some insights that I think might put a little different

perspective on it.

From the U.S. standpoint, biomass really dominates the existing installed capacity in the U.S., well over a quarter of the small share that renewables has of the U.S. pie. Geothermal is pretty substantial but kind of static. Whereas, wind and solar, the newer players are both growing very rapidly, but you can see that they still contribute a very small portion of overall supply. Hydro I have over here on the left side just because it's easier to categorize that way but also because large hydro is sometimes not considered green.

Really, biomass has been talked about quite a bit today, and it's quite a bit -- a range of diverse different technologies and sizes from landfill gas to solid biomass. It can be pretty low cost, and it's a great resource for Florida. One thing I wanted to talk about was stealth biomass. It's kind of an illusive category of biomass. The problem with biomass, at least from a consumer prospective in trying to market it, is it looks a lot like a coal plant. It's pretty hard to sell something -- fuels for biomass, this is another problem with biomass is that you have some very clean biomass fuels that are environmentally perfect fuel, no sulfur, CO2 neutral, but you also have people who like to throw in all kinds of other things into biomass, including I've been -- people have argued with me that pet coke should be called biomass. Very low quality coals are really a biomass or a

waste fuel because we're doing great things with them.

Some interesting ones in Florida, there's a lot of interest nationwide in animal manures. And this is something I just found out recently, but dairy cows can produce up to 200 pounds per pay of manure and urine. And it creates a tremendous disposal problem, and I think down here in Florida also the same problems. There's about 150,000 cows here, so you can see that's a lot of biomass right there.

From a technology perspective, we've talked about combustion, gasification, anaerobic digestion, but stealth biomass, this is something where we're using already in-place infrastructure, and we're going to convert that invested capital into clean renewable energy resources. So this includes things like co-firing with coal, but also you can take new biofuels, biodiesel and ethanol, and you can put them into existing combined cycle plants. You pay the premium for the fuel, but you get the premium for the environmental benefits.

And then gasification, there's some complicated schemes that DOE is kind of funding and biorefineries and very advanced concepts that will take biomass through the next 20 years, but it's going to be 10 or 20 years before we get there. There are proven technologies for gasification that are kind of being overlooked because they are a little simple. And I'm going to lead into that with some of the lessons learned from solid fuel co-firing. Some of these were presented earlier.

There's some real problems that limit the amount of biomass that you can put into an existing coal plant. You have problems with ash contamination, you have boiler performance capacity impacts, increased O&M costs.

Well, a solution or alternative to putting solid biomass into an existing boiler is, let's build a small biomass gasifier, really, a very simple piece of prudent technology, and let's create a gas. We'll remove all the ash and all the contaminates from the biomass that concern the operators of coal plants, and then we're going to take that gas and we're going to introduce it in a way into the boiler that's going to serve as a re-burn gas which is going to give you an enhanced benefit of reducing NOx. We've just done a study on this for the Nebraska Public Power District, and we have also found that boiler operations performance are actually increased. There's no capacity reduction. Efficiency has increased and the overall cost of operating that plant goes down. So you can view it as not even a cents per kilowatt hour at cost, but you're looking at a way to save money at your power plant.

Briefly, on wind energy, I had to include wind because I love this picture so much, but I'd like to compare wind to solar because there's been a lot of talk about solar, and wind is maybe about a seventh or eighth of the cost on a capital basis as solar is, but we don't have the great resource here in Florida. But the resource here in Florida isn't a

seventh or eighth of the solar resource. So still, if you take the lowest quality wind resources in Florida, they are probably comparable on a cost basis to solar in Florida. In fact, we're doing a project in California right now where we're talking about a Class 1 to 2 wind site, and it's still going to have an economic payback for our customers in five years. The reason being, that California has some pretty -- I'm not quite sure how to describe the incentives that are available out there, but there's ways you can utilize those incentives to make things pay off quicker.

Solar, I think a lot of other speakers will cover this, but that's obviously a high growth technology with high costs. In fact, within the last two years, the manufacturing capacity of solar in the world has doubled. It's now about 400 megawatts. So you're going to see an ever decreasing cost basis. But a lot of the components that go into a solar plant aren't the production cells or the mounting equipment and the interconnection and the inverter. So there's a lot of other issues to be worked out besides just the technology of converting the light into electricity.

Some of the more interesting trends I see are building integrated photovoltaics. This is 4 Times Square in New York where the actual facade of the building is a PV powerhouse. Here's just some quick pictures of some different solar thermal technologies, parabolic troughs. This is a

central receiving solar type system built way back in the 1970s. And then a dish type system that operates based on the Stirling engine type concept.

I talk about small hydro real briefly here also because I think there's some different ways of thinking of small hydro than we traditionally think of as damming a river or taking advantage of something. But really, in the U.S. you have kind of the large hydro is all tapped out. There is some environmental pressures, and so a small hydro is more favored.

Practical options, building a new small hydro plant is not going to pay for itself probably, but what you could do is, you could add a turbine to an existing dam. You could put some things into aqueducts or pipelines. You can upgrade existing units and get very cheap new renewable energy capacity. Here's a small hydro unit. It's in the Pacific Northwest, and this is actually another, like, 500 kilowatt hydro power plant that's in the middle of a residential neighborhood. All this is, is we took out a valve and a pipeline and replaced it with an energy recovery turbine, and there you had 500 kilowatts of power, otherwise, before being wasted.

And different ocean technologies, there's all different kinds of things. Three really that are kind of emerging now are tidal, which actually there's a couple large installed tidal stations in the U.S. That's commercial

technology, but also wave is near-term commercial, probably expect that by next year to be offered commercially, and tidal/marine current having been offered or suggested here as a potential resource. We expect that to be commercial about 2005. There's, I think, only one installed, like, 300-kilowatt demonstration stream current type unit in the world right now, but the technology is pretty straightforward. It's based on existing other technologies in other fields.

Projects that have been proposed around the world have been very large scale type things probably not suitable here. And really, these are kind of studies done for study sake, I would say. Let's build 3,000 or 4,000 megawatts of tidal capacity, and then the costs all of sudden will be down there. Well, that's just too much risk for anybody in the world to really take on from a financing perspective.

Here's kind of a summary of the different statistics, and it's in the handouts. You can look at these later, and if anybody in the audience would like a copy of the presentation, please come up and see me. I will be more than happy to provide that. And I'm going to skip ahead real quick to the graphical presentation of this.

There's some notes here that explain things but just showing the cost of electricity. And this is based on kind of our database of projects that we've actually implemented and then other projects that are reported in the literature and the

like who really have on the low end of the scale competitive with combined cycles are things fueled with biogas. You're talking about landfill gas, possibly gas from anaerobic digesters. Wind and geothermal are also very cost competitive. Hydro is quite a wide range. And biomass, we're talking about stand-alone new biomass facilities here, are a little bit more expensive, and then solar is way down there on the list.

But two things I wanted to add to here that weren't in my original data were the rehabilitation and upgrades of existing hydro units will be very expensive, and then also co-firing a biomass is quite competitive compared to other new renewable energy technologies.

Well, I don't want to take too much time, but I wanted to at least present one practical example of how one of our clients approached renewable energy. And they're a water district, and they're actually located in we'll call it another state that had an energy crisis last year. Well, they were pretty concerned about delivering water to their customers. They were concerned that their power company was no longer going to be able to provide that electricity that if they needed to meet their critical needs. So we were investigating, you know, how to provide their own load. They were considering forming their own utility district, a number of different options. But to put a perspective on the cost in this chart, at the time we were looking at this, the wholesale power market

in California was about 25 cents per kilowatt hour. Today, it's about two and a half cents per kilowatt hour. And the rates that they are paying are around 10 or 11 cents per kilowatt hour on average.

So we did about a year's worth of study, and we looked at 30 or 40 different technologies and did tons of market projections for them. And then the first thing that they wanted to do was a solar photovoltaic project, which clearly is to the right side of the rates but clearly to them was something very tangible they could put their hands around. It's also something they can say, hey, newspaper, here's what we're doing. We're doing this beautiful solar project. So it's a 30-kilowatt project. But they're also going to do a -- like, a single 1 megawatt wind turbine, and they're looking at rehabilitating one of their hydroelectric units. So there's a range of different solutions for them just as there are for the rest of us.

So that kind of fits into, okay, what is the real objective here? What do we want to accomplish? Do you want to make a public statement? Then go ahead and put some solar photovoltaics in. If you want really cheap power competitive with the rest of your supplies, then try to develop all your landfill gas that you have in the region. Since there's a limited supply of that, you can't do that forever. If you need to meet some type of mandates, then probably the cheapest thing

for Florida to do is to buy green tags from some out-of-state generator, probably a wind plant. You can rehabilitate any hydro units you have, although there's not many. You can implement biomass co-firing, and you can replace some of your oil use or maybe some of your natural gas use and some of your combined cycles with a small amount of biodiesel or ethanol.

In the future if there's no more fossil fuels, then you're talking about some of these future technologies such as biomass, integrated combined cycle, which is probably not realistic for the near term, some of these ocean energy technologies and then whatever else happens in the next couple of years. So that's pretty much what I wanted to say.

Are there any questions?

CHAIRMAN JABER: Thank you, Mr. Pletka. Commissioners.

COMMISSIONER PALECKI: Yes, one question. The Gulf Stream comes closest to land in the United States at Palm Beach, Florida. It's just several miles offshore. What would be the difficulties in harnessing that energy? And isn't that the type of project that Black & Veatch would have the resources and expertise to latch onto?

MR. PLETKA: I'm not going to give a firm answer to that, the final one depending on what your answer is. But really, when you're trying to site to something like that, they say that about a three-mile-per-hour velocity is what you need

in the water, which is way lower than what you need for a new wind siting. And you're going to need, like, 70 feet of water depth at a minimum because you've got these giant spinning blades, really, so you can't have them coming out of the water hitting the ground. So you have some basic siting criteria like that. And then, really, the main issue is finding the developer or the technology who is going to get behind their technology and offer some type of guarantees that make somebody happy from a financial standpoint to take the risk out.

COMMISSIONER PALECKI: So are you volunteering for the job?

MR. PLETKA: Sure.

(Laughter.)

CHAIRMAN JABER: Okay. We have Mr. Houston next -- Ms. Houston, Ashley Houston.

MS. HOUSTON: Okay. Good afternoon. My name is Ashley Houston; I'm with APX. And thank you for this opportunity to speak today about opportunities to promote renewables in the state of Florida. I'm going to talk a little bit about how our environmental registries could possibly help Florida meet that goal.

Just to give you a little two-second background on who APX is, we're an independent transaction processing agent for wholesale electric power markets. And basically what we do is offer mid to back office support and software for services

such as scheduling and settlements and bidding. We run a large demand response program in California. We run energy trading exchanges in the U.S. and in Europe. And we run environmental registries and platform -- trading platforms for renewable energy certificates in California, in Texas, in the Midwest, and in the Northeast. And that's basically what I'm going to be focussing on today.

We've heard about some of these trends, but I just wanted to highlight very quickly sort of four trends in renewable markets that are driving the activity that we're involved in. First, we've heard a lot about portfolio standards. Also, disclosure policies in many of the states, someone mentioned that earlier. Many states have implemented policies where the retail electric suppliers have to disclose to their customers what their portfolio of fuel mix looks like. So they have to give them information on percentage of -- nuclear, percentage of renewables, et cetera.

Retail marketing activity in terms of green power products has also been -- there's been a lot of activity there in states such as Pennsylvania, where about 20 percent of those customers that switched electric suppliers under deregulation chose a green power supplier. So there's been quite a bit of activity. And retail marketing is basically looked at as one of the best ways to give customers a choice and give them access to renewables.

And the fourth trend is the sort of emergence of the concept of renewable energy certificate trading. And you've heard some of the different names for this today: Green tags, tradeable renewable credits, TRECs, TRCs. There's sort of a lot of different names, so if I mention any of them, you will know what I'm talking about. So there's these four trends that are going on in various states and regions around the country, and each of them raises issues for regulators. And there's quite a bit more than these, but I wanted to mention a couple of the main ones.

Basically all of these policies and programs that are being developed vary drastically by state. They're very complex. Each state has its own definition of what's renewable, what's not renewable. Do we look at only new resources? Can we include existing resources? It makes it very complicated because each policy is basically at the state level when we're operating in really regional energy markets. So the question for regulators is, how do you look at these policies from a regional perspective, and how do you sort of get them in line with what other markets and states in the region are doing, so you can create the most liquid markets for renewables?

The second issue is that verifying the delivery of green products or differentiated products is very difficult. If I'm a retail supplier and I'm offering a green power product

that's made of, say, 50 percent renewables, how do I show my customers that what I'm giving them is what I'm saying I'm giving them? The issue of consumer confidence and consumer credibility is huge, and it's one that regulators in many areas or all areas that have looked at any of these policies have struggled with to try and figure out how do we create a system or a program that gives customers confidence.

And the last one is, how do you show verification with these policies? Obviously, we've talked a lot about RPS. How can retail suppliers show you as the regulators that they have met those standards? APX has three solutions for many of these issues. And I'm going to breeze through the first two and then spend a little time on the last one. We offer tradeable certificate marketplaces in various areas. So it's basically a platform where renewable generators sell their green attributes or their green tags through our marketplace.

In Texas, we have an RPS compliance registry system where our platform is used to show RPS compliance, and it allows retail suppliers to purchase green tags to meet their RPS requirements. And the last one is the generation information system. And I'm going to talk about that quite a bit in just a sec. Each of those solutions is based on the concept of unbundling, and we've talked about it a little bit today, but I wanted to touch on it again. Basically what it means is that right now in Florida you have one commodity; it's

the megawatt hours of energy. Under unbundling, it gets separated into two separate tradeable fungible commodities: The energy commodity, the actual megawatt hours, and then the environmental attributes. We call them certificates in APX's language. And a certificate is a tradeable commodity that talks about what the environmental attributes of that energy is. It talks about the fuel source, emissions, vintage, basically commercial operation date. It can give any kind of description of the characteristics that folks want to have listed. You know, in Massachusetts they have part of their disclosure regulations, and it talks about labor characteristics. I mean, it basically can cover -- it's flexible enough to cover any kind of characteristics that you want to be able to look at.

So our environmental registries are basically centralized databases that track the environmental attributes of energy. It basically helps -- I'm going to talk about benefits in one sec, but the main reason that the system was developed is that the regulators in many of the areas where we are operating wanted to figure out a way to handle a lot of those issues that I talked about before. How do you show compliance? How are you assured that folks are doing what they are supposed to be doing? How do folks verify that the green product offerings that they're putting out there are actually based on purchases that they have made?

One of the key challenges for renewables is capturing the environmental value. How do you put a dollar amount, how do you quantify what that environmental value is? It's difficult. The key benefit that the environmental registries offer is that it creates a platform for monetizing the value of that energy. It gives renewable generators access to an additional revenue stream which allows them to make their current projects more economic and also helps them to finance future projects. So the key is that that additional revenue stream goes directly to the renewable generator and helps promote more renewable projects in the future.

Just quickly, some other benefits of the environmental registries. It facilitates green power market development from a retail supplier, and I want to offer a green product in jurisdictions without an environmental registry, they have to go put together bilateral deals with each renewable generator that they want to do a deal with. Under the environmental registry, they simply go to the platform and put together the portfolio that they want to in one deal. They don't have to deal specifically -- have a contract with each generator. It also gives better access to market for the renewable generators. They can, you know, do deals with the suppliers. The transaction costs are lowered.

Also, a particular benefit in New England, the system in New England that we run allows access for every generator

that's in the region down to even a tiny PV system. So we're very happy that it offers, you know, access for the small and behind the meter generators.

A couple of examples of the registries that we currently either developed and/or run. The Texas Renewable Energy Credit Program, which I mentioned, we developed it and delivered it to ERCOT. It basically monitors RPS compliance and creates a platform of trading of the renewable credit so that suppliers can meet their requirements in the most cost-effective manner. The New England generation information system is the most robust of our systems. The Texas system just covers renewable energy megawatt hours. The New England system creates a certificate for each and every megawatt hour of generation that occurs within the region. It's used for disclosure; it's used for RPS; it's used for emission performance standards. So we track each and every megawatt hour of energy that runs in and out of New England.

One of the key features of this system is that it prevents double-counting. We track the energy from source to sink, so a certificate is created for each megawatt hour of energy. So in the beginning of a trading period, the generators have their certificates in their account. By the end of the trading period, they will do deals with retail suppliers, and those certificates will move into the retail supplier's account. And each certificate has a unique serial

number associated with it. So at one point in time, only one party can have title to that certificate. The system automates complicated issues such as line losses and pump storage and how do you handle imports and exports. And all the processes are automated within the system.

Just very quickly, in the New England system, each certificate has 42 data fields, so we cover a lot of data in each one. I just wanted to give you a quick idea of what's included. There are over 50 variations of the fuel types. Since each New England state has its own idea of what's renewable and what's hydro and what's small hydro, what constitutes biomass and everything, this system is flexible enough to accommodate each of those state requirements. We cover emission levels on eight pollutants, including the ones listed there. We also cover, as I mentioned, vintage, commercial operation date, the location of the generator, RPS compliance, is this fuel type eligible to participate in the RPS in each of the various states.

Just quickly, this is what you would see if you went to the Web site for the system. If anyone is interested in looking, the URL is nepoolgis.com. There is some public information on the Web site that you can take a look at if you want. Most of it is password protected for folks that participate, but there are some reports that will be publicly available.

And last slide, I just wanted to mention quickly some activity regarding certificates that's going on in the other areas. Recently, NARUC issued some resolutions regarding certificates, calling for a certificate training type system to be set up or implemented as part of FERC standard market design activities which we are very pleased to see come out. So they are calling for a certificates-based system such as the New England that we run to be part of standard market design.

APX and also a lot of other folks are working in other jurisdictions around the country. I've been working quite a bit in New York and PJM and Ontario recently in their efforts in all those areas to implement certificates-based systems. And somebody already mentioned that the national RPS is currently being debated and that RPS language calls for a national tracking system. And that is it. If anyone has any questions.

CHAIRMAN JABER: Thank you.

MS. HOUSTON: Oh, I just want to mention that I had brought copies of my presentation, but I didn't bring enough. So if anybody would like one, please let me know.

CHAIRMAN JABER: Thank you, Ms. Houston.

Commissioners, do you have questions? If you can send -- I didn't get a copy of your presentation and Commissioner Bradley did not either so --

MS. HOUSTON: Okay. I will certainly do that.

CHAIRMAN JABER: Thank you. Our next presenter is Roger Clark, Clean Energy Funds Network.

MR. CLARK: All right. It's a pleasure to be here. What I want to talk about for a few minutes is not so much renewable technologies but how we get those technologies into the market, how we move from a 10 kW demonstration project here to a few little examples there into a real energy system that's significantly cleaner and healthier and friendlier to our planet than what we have right now. I work with a group called the Clean Energy Funds Network which is an organization designed to interface between the 14 or 15 or 16, depending on how you count them, states that have established sustainable energy funds out of system benefit charges. I also work part time with the Sustainable Development Fund in Philadelphia, which is one of those funds in southeastern Pennsylvania.

What I want to do is give you a little introduction about these funds and some other strategies, but first, I want to leave you with the idea and the recognition that good ideas don't always sell themselves. It's not enough for us to say, well, these technologies are cleaner, they don't require fuel, they're, you know, blah, blah, blah, reliable. That's not enough. They are not going to happen unless certain elements come together. And another theme related to that is what Clayton Christensen called the innovator's dilemma and disruptive technologies. And if anyone doubts that renewable

energy is a disruptive technology, you just needed to sit through the presentations of the utility companies this morning. Very, very, you know, well-meaning people, no doubt about that, but you could over and over see the discomfort and the confusion of an old technology and an old market trying to figure out how to deal with these very, very different animals. So disruptive technologies require a different approach to bringing them into market.

James Moore, "The Death Of Competition," talks about how creating markets really requires a lot of cooperation among different groups, change agents and so on to develop new relationships. And that's really what I wanted to talk about with these -- with clean energy funds, with the Public Service Commission, with the companies that are marketing and trying to develop these renewable technologies, and with our existing utility companies.

These are the states that have these clean energy funds or system benefits charge funds. Most of them have restructured their electric marketplace, though not all of them. Wisconsin is up there, for example. Before I go into them, I do want to say there are plenty of state efforts that will reinforce and build a renewable market outside of restructuring.

I come from Pennsylvania. You've probably been to NARUC meetings and heard the Pennsylvania Commissioners brag

about the vigor of the Pennsylvania market and so on. I think that they will be doing a little bit less of that as Pennsylvania's market is slowing and other states are taking over. But I support the restructuring concept, and I think it's made a big change in many of these states. But there are other things even without restructuring. One is to create mechanisms for financial support. You have that here in Florida, for example, with the Florida Solar Energy Center and its work with the photovoltaics. Wisconsin and the Wisconsin Energy Program is another big example. Public education, I think, is a huge piece. That's been mentioned here this morning.

For over a century, electricity has been an abstraction to most people. We don't understand where it comes from. All we know is we have to write a check every month to pay for it. So getting people to understand how it is generated, that it produces more pollution than any other industrial activity in this country, what its impact is on all of the environmental problems that we are facing in this world, and what the alternatives are and what the costs and the characteristics of those alternatives, very, very critical. And I would urge you to be vigorous in your public education recommendations.

Other small policy things that underlie this market, net metering, interconnection, RPS, especially now with the RPS

when you add that with the renewable energy credits like Texas has done, probably the strongest example of a good RPS right now. Other things, tax breaks, codes, government purchases, you know, leadership through your own activities, there are many ways, I think, to get the word out that these technologies are important and we want to see them grow. I think part of the excitement about these clean energy funds comes from the fact that they simply are going to have and already now have a lot of money. Someone earlier mentioned that over the next decade we're talking over $3 billion. That's more than the federal government is going to be spending on renewable energy. In these figures, and this is coming from an Electricity Journal article that some of us co-wrote with some folks from Lawrence Berkeley Labs, this is not the conservation funding. This is funding for renewable energy. So it's over $4 billion over the next 10 years, quite a hefty group.

COMMISSIONER PALECKI: Now, that slide said as a result of utility industry restructuring that $4 billion will become available or 3 billion. Could you explain that?

MR. CLARK: Yeah. Much of it is restructuring, but not all of it. In Pennsylvania, for example, we got the majority of our money out of a merger case, a settlement agreement in a merger case where we -- in Pennsylvania, there's a law that says for a utility to get approval for a merger, you have to show it's in the public interest and has an economic

benefit. One of the principles that we've established in several mergers now in Pennsylvania is when you have public benefit, often that goes back to people as a rate reduction. What we've done in at least two of these cases is say, let's take some of that public benefit and return it to the people in the form of environmental improvements. We got $20-some million in one case, and the first energy Duquesne merger was about $20 million as well for environmental improvements. That's how some of the dollars get flowed back. But most of these did come about.

Small elements in the transmission distribution tariff is usually what is financing most of these funds but not all of them. Some of them have simply been block awards in settlements. Some of them have been as the generation was divested, then dollars from that went and financed some of these funds.

COMMISSIONER BRADLEY: Could you summarize though? I still didn't quite get it. I mean, what's the relationship between restructuring and $3 billion for renewable energy? I need about a three-sentence answer.

MR. CLARK: The honest answer is simply the politics. When restructuring came about, the quid pro quo part of the deal of bringing the stakeholders together is saying, well, if we're going to restructure this market, let's establish some rules in this new marketplace that work towards moving our

generation to a cleaner system. And so the price of restructuring was often in most cases stranded cost recovery for power plants but also the creation of some funds and some other policies that had a green flavor to them.

COMMISSIONER BRADLEY: Okay.

MR. CLARK: That's, I think, the story. There is individual stories in each state, but that's the general thing. I'm not going to go through these numbers, but this gives you the size of some of these funds. There's a huge variety. California, of course, leads it all in terms of its $135 million a year down to $1 million a year for Delaware.

Some observations. One of the things I think is most interesting is that many of these funds have a very different management structure. Some of them are managed by state agencies, the department of, or the New York State Energy Research and Development Authority or something like that. In some cases, the utilities still have a very active role. In New Jersey, they're doing all of the customer-sided funding work and so on. But a number of them have created independent non-profit organizations. The fund that I work with is one of those. And I would highly recommend that, because what that does is, it creates my second bullet there. An organization has a single focus on clean energy. They are not trying to balance clean energy with all of their coal activity, or they are not trying to balance clean energy with all the rate stuff

and everything else or the other environmental issues. They're focussed on how do we build the clean energy market. And I think that gives a much more powerful advocate in the marketplace.

The other interesting thing is, many of these funds aren't simply grant agencies. They are not just throwing out grant Frisbees. They really are trying to operate in the context of a market, having a mission at one hand but also market on the other, and the creative tension between those two, I think, is very important. Our fund, for example, the Sustainable Development Fund, it has a very modest grant component. We've awarded about $200,000 a year in grants. But we're making investments. We're doing loans. We're doing subordinated debt. We're taking equity share as royalty deals and so on and so forth. We really want to make the fund itself sustainable.

Connecticut is another one taking that approach. Oregon is heading in that direction. It's not just grant Frisbees. And so that's -- so I think in terms of how you can think of these in terms of what sort of capital they require and how do they grow over time, that market approach is critical. They also are focussing on building markets at state and regional levels where the real markets operate, not the national level. So I think that's a little bit different. The federal government and DOE are certainly strong partners in

this, but they aren't calling the shots. The funds are now, because of their funding and their state and regional approach, I think, able to have a major impact.

And there have been some mistakes. Connecticut, for example, began thinking of itself as essentially a renewable energy venture fund. It swung a little bit on the other way and then kind of is trying to figure out what its identity really is. Many of these are new organizations. They're dealing with management structures or boards and trying to work out just what their essence really is.

COMMISSIONER PALECKI: I noted on the slide where it had the level of funding that some of the funds were very small on a per capita basis.

MR. CLARK: Yes.

COMMISSIONER PALECKI: Are any of the funds completely funded by voluntary contributions by customers, a certain dollar amount, on each monthly bill?

MR. CLARK: I'm not aware of that. There are projects that have been funded that way, but I'm not aware that the funds themselves are supported that way. The Pennsylvania funds are also raising additional capital beyond what we're getting out of the PECO energy payments. We're looking at individual investors in our fund. We're also looking at the foundations under what they call program-related investments. If they are saying, if we invest in a wind project, which we've

done several times in Pennsylvania, and we can pay a modest return, that's a PRI possibility, and we're working with some foundations on that. But no, I'm not aware of sort of a checkoff that says, if you want a dollar, you know, this month to go to your clean energy fund, that can happen. That's an idea, though.

COMMISSIONER PALECKI: Well, $5 a month would be a contribution of $60 a year, you know, from a family, and it seems like a lot of people would volunteer for that.

MR. CLARK: That's right. It just reminds me of a point. We've seen a lot of literature and studies saying people want to contribute and so on, but the marketing results, the reality in the marketplace for these green power suppliers is, the environmental folks aren't the ones who are buying green power. They mistrust the system too much. The customer for green power, for the Green Mountain and other companies is the middle and upper middle class soccer mom who switched their phone company, who wants to do the right thing, who's willing to, you know, move to something other than the mom -- you know, the basic utility company. It's not the environmentalist. The Sierra Club, no offense because I'm a member of the Sierra Club, but the Sierra Club mailing list is worthless for those marketers. It's just a reality. So the people saying, yes, I would do it, many of them may in fact when it comes down to it say, well, how do I know that their money is working --

CHAIRMAN JABER: Let me just tell you that Mr. Ryan is saving all of his comments until the end.

MR. CLARK: I have to offend both sides with this situation here just to be fair. I don't have time. I'm not going to go through these. It's in the materials, but I did want to just point out that these funds in different states are addressing all of these issues. And for each one of them, I list some of the strategies and approaches that they have been taking, some of them pretty interesting.

Niche market analysis, for example. Markets don't develop, you know, where they don't make any sense first. They develop where they make economic sense, where it's a value proposition now. So for PV, why are we putting 1 kW systems on individual homes? Maybe there are other applications of photovoltaics that have much, much different economics. You've seen the highway road signs. That's an example of it having good economics. So we're beginning to look at the marketplace for these different technologies and figure out, let's be smart about where we want to invest first. Ideally, down the road we'll get to every residential roof, but right now, let's start where it makes an economic case.

Wind, biomass, again, you can read through all of these later. Public education, all of them very strong on public education. The Clean Energy Funds Network is working with half a dozen of these funds in the Northeast on

essentially a joint project of public education. How do we create a brand for this? What words do we even use to talk about it is something we're trying to figure out. And that's not something that changes when you get to the border. That's something that ought to be a nationwide brand, kind of a Got Milk? type campaign. And so we have been working with some very strong folks in putting together some budgets, that sort of cooperation. We don't all need to, you know, reinvent the wheel. Let's pool our resources and do it together.

Green power, green buildings, market -- just for fun, that's a 1892 ad for a solar water heater. Talk about product development. Conservation. Okay. Let me just finish up then. A little bit about us, there are a handful of staff people working with the Clean Energy Funds Network. We're funded by the clean energy funds themselves, also some foundation support. Our goal is to just increase the deals flow to get good projects before each of these clean energy funds to increase the commercialization of these technologies. Ten kW systems are great, but that's not a market. You know, we've got to really increase the deal flow, and that's what we're really trying to do.

As I mentioned, our joint public education work, we just completed a big study for the energy trust of Oregon on best practices, looking at all of the funds and different ideas both in terms of the technologies but also their administrative

setups, what makes sense and what's creative and what's been pretty effective. Market niche analysis, I talked about that with the solar that we've done. Fuel cell buyers group, looking at ways of reducing costs by saying, look, I want to do fuel cells in Pennsylvania. You guys want to do them in Florida. New York wants to do them. How many can we buy if we jointly pool our resources? And could we then go into the market and say, we have orders over the next five years that will guarantee of 1,000 fuel cells? What's the price? And see where we get with that.

Financial tools and practices. Some of these organizations aren't used to finance. They don't quite understand how you can structure deals in different ways and give you a return, a modest return. We're not out to be a venture capital firm, but we want to be sustaining. So some training about all that. Evaluation. Are we doing a good job? What's your goal? What's your mission? You know, what are our benchmarks? How do we think about that? The day is coming where we will be called forth before the Public Service Commission and others saying, okay, you have had all this money, what have you done with it? So we're working to make sure that the metrics for that question are feasible and make sense for us.

Homeland security, another quick one. I applaud Florida's work here. This is Jacksonville, the electric

company that did the schools. One of the things we're thinking about is, well, a little PV system on a school is great for educational purposes, but since schools are where people normally gather during emergencies, let's make that system large enough so it can power the radio system and some communications at that facility so it doesn't go dark. I don't know if your projects do that, but that whole issue of energy security is something where renewables have been a real strength.

And there we are. I apologize, I had a glitch and wasn't able to make copies for everybody. The www.cleanenergyfunds.org is the Web site for the network, and this presentation will be up there in a couple of days, so you will be able to download it.

Okay. Any questions?

CHAIRMAN JABER: Thank you, Mr. Clark.

Commissioners, do you have any questions?

Okay. Thank you.

MR. CLARK: Thank you so much.

(Transcript continues in sequence with Volume 2.)

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STATE OF FLORIDA)

: CERTIFICATE OF REPORTER

COUNTY OF LEON)

I, TRICIA DeMARTE, Official Commission Reporter, do hereby certify that the foregoing proceeding was heard at the time and place herein stated.

IT IS FURTHER CERTIFIED that I stenographically reported the said proceedings; that the same has been transcribed under my direct supervision; and that this transcript constitutes a true transcription of my notes of said proceedings.

I FURTHER CERTIFY that I am not a relative, employee, attorney or counsel of any of the parties, nor am I a relative or employee of any of the parties' attorneys or counsel connected with the action, nor am I financially interested in the action.

DATED THIS 12th DAY OF SEPTEMBER, 2002.

Tricia DeMarte

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