DRAFT

Minutes

LEGISLATIVE COMMISSION ON GLOBAL CLIMATE CHANGE

Monday 11 December 2006
10:00 a.m.
Room 643, Legislative Office Building

The Legislative Commission on Global Climate Change met on Monday 11December 2006 at 10:00 a.m. in Room 643 of the Legislative Office Building with Representative Joe Hackney, Co-Chair, presiding. Other members present were Mr. John Garrou, Co-Chair, Senators Albertson, Cowell and Pittenger, and Representatives Harrison, Underhill, and Wilkins. Other members present were Dr. Ryan Boyles, Mr. Thomas Cecich, Dr. Douglas Crawford-Brown, Mr. Walter Clark, Dr. Dolores Eggers, Dr. Edward W. Erickson, Mr. Robert J. Glaser, Mr. Mitchell Peele, Mr. Tim Profeta, Dr. Stanley Riggs, Mr. Michael Shore, Mr. Robert Slocum, Dr. Stephen Smith, Mr. James Stephenson, Mr. Tim Toben, Mr. Ivan Urlaub, Ms. Susan Tompkins, Dr. Godfrey Uzochukwu, and Ms. Vicky Will. Staff members present were George Givens, Commission Counsel; Jeffrey Hudson, Assistant Commission Counsel; Jennifer McGinnis, Assistant Commission Counsel; Susan Iddings, Assistant Commission Counsel; Jennifer Mundt, Research Analyst; Thelma Utley, Commission Assistant and Genie Clark, Commission Assistant.

A copy of the meeting notice for this meeting, a copy of the agenda and the visitor's registration are attached to these minutes as **Exhibits A, B,** and **C.**

Representative Hackney called the meeting to order and explained the agenda. He then introduced and thanked the Sergeant-at-Arms staff, the Committee Assistants and the Counsel and Research Staff members. There were no remarks from Co-Chair Garrou.

Representative Hackney called on Mr. George Givens for his remarks and to explain the agenda. Mr. Givens welcomed everyone, announced the resignation of Commission Assistant, Mary Watson and introduced her replacement, Genie Clark. He also announced that the Environmental Review Committee would be meeting on Wednesday, December 13 and the second item on that agenda would probably be of interest to many of those present and he invited them to attend that meeting in Room 544. Mr. Givens explained that the North Carolina Utilities Commission would be reporting on the Renewable Energy Portfolio Standard Study that they had been conducting for some months. He said that some of that information would probably be presented to the Global Climate Change Commission at the January meeting if there was sufficient interest in the need to do that. Mr. Givens also announced the date of the next Commission meeting as Friday, January 12, 2007 at 10:00 a.m. in Room 544. Mr. Givens and Mr. Hackney announced that there would not be a lunch break in the present meeting.

Senator Robert Pittenger had handouts distributed entitled "The Science Is Settled" from the *Spotlight,* a publication of the John Locke Foundation. **Exhibit D.**

Representative Hackney then introduced the first speaker of the day, The Honorable Richard H. Moore, Treasurer of North Carolina and a former member of the Legislature, who then delivered a slide presentation. **Exhibit E.**

Treasurer Moore thanked the commission for the invitation to make a presentation. He first saluted the commission members for undertaking its mission. He said it was, in his view, impossible to ignore the evidence on what carbon emissions were doing to the good earth. He said he thought it was fitting that he had the opportunity to talk with the Commission at their December meeting in that last week there had been a fair amount of press coverage on the fact that China would pass the United States within the next two years in terms of carbon emissions, as they would be putting in the cheapest and most environmental damaging form of coal-fired electricity plants…one on line every nine days. He further stated that they had been at that pace for awhile and showed no signs of slowing down. Then he said that in today's *Wall Street Journal* there was an announcement stating that because there was irrefutable evidence that the earth temperatures were warmer, Allstate Insurance Company was beginning to stop writing policies in coastal areas. Treasurer Moore said that in some areas this would be of great interest from a public policy standpoint to the people of the State.

He then said that he would quickly do an overview of why he was invited to the Commission meeting and he explained what being the sole fiduciary of all the State's public pension funds allowed him to do. He explained his job description as being the State's chief banker and investment officer and stated that he handled both sides of the ledger. He said that he both borrowed money on behalf of the State and he invested the money on behalf of the State. He stated that the bulk of that money, just over $70 billion belonged to the various pension funds that whoever sat in his chair had the responsibility of investing. He added that there was always approximately $4-$5 billion of the State's actual tax revenues on hand. He explained that that's where that total figure of $75 billion shown in his hand-out came from. He said that we had about 700,000 public sector employees in the different systems and that North Carolina had a unified system and even those who were members of the General Assembly were strictly focused on the contributions made for State employees. He said that from a management standpoint, the State Treasurer ran every city and county plan as well. He added that while the General Assembly members made no financial contribution to those plans they did have some oversight responsibilities. He said he believed that everyone was aware of the Local Government Commission and he stated that his department also administered the unclaimed property program, which had doubled in size over the last couple of years. He said he had also been given some new investment guidelines by the General Assembly.

Treasurer Moore stated that North Carolina had the 9th largest public pension plan in the Unites States and the 17th largest in the world. He said that one in 8 working North Carolinians was a member of the State retirement system. He added that didn't mean that all of them were full-time, as the system included a lot of National Guard members and a lot of volunteer fire department members. He stated that was still a pretty powerful statistic of 1 in 8 state residents. He then added that he was very proud to say that the December issue of *Governing* magazine had ranked North Carolina as the number one

pension plan in the country and that about six months ago the *Wall Street Journal* had North Carolina listed as the second rated pension plan in the US…second only to Florida. He said that without trying to be partisan, he always pointed out that Florida seemed to have a history of not being able to count very well, so they might not really have all the money in their pension fund that they said they had. However he stated that he knew for sure that we in North Carolina really had what we said we had in our pension fund. He stated that the North Carolina pension fund included over $70 billion in assets for more than 700,000 active and retired members and included seven pension systems: He explained that that included teachers and State employees, local governmental employees, Firemen and Rescue Squad workers, Registers of Deeds, Legislative members, Consolidated Judicial, and National Guard members.

Treasurer Moore explained the way the North Carolina pension funds were invested and stated that it was a fairly conservative investment strategy. He said that about 58% of the funds were invested in public equities (stocks), about 35% were in fixed income (bonds) and less than 5% were invested in real estate and alternatives. He added that out of 58% that was in public equities 68% of that 58% was in either index products or in enhanced index products. He explained that meant that the Treasurer bought an index…an S&P or Russell 2000, whatever part of the market that he wanted the basic return of the market. He added that it was fairly common for pension funds as large as North Carolina's to have roughly 2/3 of the money either indexed or enhanced indexed which meant that for 2-4% of the portfolio, managers could overweigh a sector. He added that the reason that was important was because it meant that the State of North Carolina, even if the managers were asked not to own a particular type of stock or a particular segment, the State would still own somewhere around a quarter of a percent of about every publicly traded company in the country and on the face of the earth. So the State is always invested, he explained. He added that we couldn't vote with our feet, which meant that according to the old term that "if you don't like the way I run my business just sell your shares and go buy something else". He stated that this didn't apply to the State pension funds and explained that the State couldn't do that because we were indexed and we owned it all anyway.

This brought up the importance of good corporate governance, something that Treasurer Moore said that he has been very active in over the past few years. He said that somewhere between the Enron and WorldCom scandals he became mad…as mad as any other investor in the country. He said that he had seen the value of the State's holdings go down significantly and one night late at his desk it dawned on him that while he was as mad as any other individual investor that he had paid almost $100 million a year to Wall Street firms in the cost of managing the State's money. He said managers that he hired had always told him that when they owned a company that they knew everything there was to know about their company. He said that they understood the books of Enron unbelievably well…of WorldCom unbelievably well, and of Global Crossing.

Treasurer Moore said his favorite example was Tyco. He said that everyone believed that was such a great combination of companies and believed that a home alarm system company had great synergies with pet food and that those companies would work

together very well. Treasurer Moore stated that he and his staff woke up and in his view, those company combinations really weren't doing what they were supposed to do. So he said that in the summer of 2002, he came out with something called "Investment Protection Principles". He said that at the time this program was rolled out the pension funds had about $400 billion back of the principles and it was decided that the State would require more disclosure and more transparency, particularly on numbers that were put before the Treasurer. As an investor with the fiduciary responsibility he had, he stated that he didn't expect anyone to guarantee his losses and he didn't expect anyone to guarantee his profits. But he said that what he did expect for a publicly traded company was to put numbers in front of him that actually meant something. He added that in his view, that wasn't happening in the country in 2002 in the publicly traded markets. Treasurer Moore stated that the vast majority of businesses in the country and the vast majority of businesses in this state were private companies. He explained that when they needed capital they had to go to an independent third party…usually a bank and he added that we had some great banks in this state. He then stated that when those private companies needed money, they had to ask for the money and they had to prove that they were a good risk. He then stated that a publicly traded company could literally go to the kitchen table of about 58% of Americans and draw capital. He said, therefore, he believed that there ought to be some barriers in place to be a publicly traded company and he added that one of those barriers at the base, he believed, was transparency. He explained that was one of the things that the Investment Protection Principles provided and over $6 trillion was signed on to those protection principles by the end of 2002. He said that similar types of disclosures in the mutual fund area had been acted on by Congress with a result that mutual funds were much more transparent now than they were in 2003. He added that in North Carolina as of July 1, 2002, every money management firm retained by the State Investment Officer, as a condition of future retention, had to abide by a set of rules.

Treasurer Moore stated that one of the areas that the Treasurer's Department had focused on in corporate governance and transparency had been the area of global warming and from a carbon emissions standpoint he believed that it was a very simply prospect. He questioned that if someone owned stock in an insurance company or an oil and gas company, were these companies properly valuing their liabilities? He stated that from an investor's standpoint it was just that simple. He said that he was interested in knowing if the company had hidden liabilities in their balance sheet. He stated that if they did and they weren't being looked at the right way, then the company wasn't being run in a responsible manner that was going to reward the ultimate in long term share holders or public pension funds. He explained that Public pension funds were the ultimate long term share holders. He further explained that individual investors could make a lot of money in the public markets and private markets and the equity markets around the world getting in and out. But he explained that was not what long term share holders did. He said that was not what they were about.

He said that Ceres asked several of the large pension fund managers to try and get a group together and that was done on November 21, 2003 and there were 200 people in attendance in the Grand Chamber of the United Nations. He stated that there were about

a trillion dollars in assets represented. He said the group committed themselves to asking the companies that this group invested in and that the group felt had carbon emission exposure to just do a better job of disclosing those things. He said that this was followed up by a meeting in May 2005 and stated that the group had grown significantly and had made a tremendous amount of progress. He explained that this group's growth was led primarily by European insurance companies that seemed to "get" this a little more than our domestic insurance companies did a couple of years ago. He said that this was what Ceres had been up to… asking investors and environmental groups and other public interest groups to come together to work with companies on sustainability issues. He said that this represented the progress that had been made over the last few years and was specifically what companies were being asked. Treasurer Moore reminded everyone that he was not a regulator and was not an environmental policeman on the beat.

Treasurer Moore stated that the Ceres group was coming at this problem solely from a value add standpoint. He stated that in a capitalist society, we lived in the greatest nation on the face of the earth. He said that the reason this was true was that we had understood and perfected the use of capital markets better than any society ever had. He said that a dollar talked in our society. And he said that if we could quantify this particular risk, which Treasurer Moore personally thought was one of the greatest risks facing his children and grandchildren on this globe…this mother earth, if we could quantify this in economic terms we would see a real change. He added that the challenge was how we did that.

Treasurer Moore said he felt that the first step had been taken by just saying that the Ceres group wasn't telling anyone how to run their companies they just wanted to know if the companies were valuing the tremendous problem, as it was almost impossible to ignore the science that will exist 20 – 30 years down the road. He said those were the things that had been focused on and that companies had been asked to begin discussing and disclosing, both to the public in the public filings and particularly to the money managers of the world. Treasurer Moore had also asked his money managers if they rated the companies in targeted sectors on that particular issue. He questioned what had been done in terms of Corporate Governance, including letters to companies, meetings with Boards of Directors, shareholder resolutions, drafting of disclosure templates – making sure there was consistency in questions being asked and the answers given, media pressure, nominating directors, and withholding director votes.

As a shareholder, Treasurer Moore said he believed that he should not have any authority and responsibility in the terms of the day to day running of a company. He said he believed that the extension of a shareholder was the Board of Directors and believed that Board was supposed to sit over management and that anyone who owned stock in a publicly traded company or a privately held company did have a say so through the Board. He said he believed that a stockholder had a right to have input on the Board of Directors, as those people were held accountable for the day to day operations of a company, as well as, the long term and short term mission of the company. He said that much more needed to be done in that area but that a tremendous amount of progress had been made.

Treasure Moored stated that these were some of the specifics that had been worked on and that, of course, the oil and gas and insurance industries were the biggest problems. He said that those were the industries that had a tendency to question why someone thought there was a problem and to ask why they were being bothered by questions. He said that the items listed were the types of risks that the oil and gas industry were being asked to evaluate and they were being asked to put a dollar sign with each one. He added that the last item listed called on oil and gas companies to stop funding bad science on climate change. He stated that that one was particularly sensitive here in North Carolina with our great tobacco heritage and explained that when you looked at the science that was still being put out in the late 70's and late 80's stating that cigarette smoking was not bad for you, this emissions research just seemed to be replicating that same type of research. He said that it was awfully hard to make a strong case, no matter where you were on the political or scientific spectrum, to explain how this stuff wasn't making a difference. And as a shareholder, he added that he would certainly prefer that the oil and gas companies not use shareholder profits to fund science that gave them an answer that they wanted. He said they had the answer they wanted before a check was even written for the study and he stated he believed that was not healthy or good. But he said some progress was being made in that area.

Treasurer Moore said that work was also being done in the insurance industry. He stated that Swiss Re had actually been a great leader in this and said that they did a lot of the presentations at the last UN conferences held and were now saying "yeah" and were beginning to put these things into place. He said that was why it was particularly timely to see in the *Wall Street Journal* and to hear on the radio this morning that Allstate was looking at this situation too. And guess what? He said that they were seeing some things that they didn't like that were going to hurt their bottom line and that they were going to try to change behavior and change practices…once again after putting a dollar sign on it.

Treasurer Moore stated that in May, 2006 the largest of the top 30 insurance companies, AIG, had said that this group was exactly right and that AIG should take a closer look at the problem. He added that they now had a climate change policy that was directly attached to their bottom line and that they had joined the Investor Network on Climate Risk… the INCR.

Treasurer Moore stated that work was just beginning to be done specifically on carbon emissions and that this project was a part of the same group that had been focusing on proxy voting. He said that this was a way to achieve the goal of having companies have a sustainability section in their annual reports.

Treasurer Moore stated that Conoco Phillips was asked a couple of weeks ago to report on the company's efforts on renewable energy sources. He said that it would seem that if a company was making record profits and that what they used for those profits had a shelf life, why wouldn't they be churning those profits back in. He said that once again, this wasn't telling a company what to do, but from an investor standpoint, just asking for an

explanation of why something that makes common sense was not being done. He added that this problem would continue to be addressed.

Addressing Chairman Hackney, Treasurer Moore then said that he was at the Commission meeting to let the group know how important he believed the issue of global climate change was and to let the group know what his department had been doing with the platform that was available to them by virtue of the massive amount of money the department handled on behalf of the people of North Carolina.

Chairman Hackney thanked Treasurer Moore for coming and for his presentation and asked for questions.

Dr. Douglas Crawford-Brown stated that what was being done by the Treasurer's department was promising for a start on the problem…a sort of market driven approach to the control of CO2. He asked about the size of the group the Treasurer was working with, which had been stated to have a billion or more in assets, as compared to the larger pool of public and private investments being taken in. Dr. Crawford-Brown stated that he asked that question because often what was gotten as push back from the companies was that they had to answer to their shareholders. So his question was…was the group that the Treasurer represented a significant shareholder in the minds of those companies involved with the CO2 problem?

Treasurer Moore answered that after meeting with the Board of Disney and asking for Michael Eisner to be removed, he was told that Disney had to listen to all of their shareholders and, because of the deals he had, the largest shareholder was Michael Eisner.

Treasurer Moore said that Dr. Crawford-Brown needed to go back to the numbers because it was a sizeable chunk of money…it was $5 trillion involved participation. So Treasurer Moore stated that it wasn't a matter of the tail wagging the dog. He said that he believed that the domestic public equities market was around $18 trillion. He said he wasn't sure what it was world-wide but that you could probably assume that it would be twice the domestic amount. He said that he believed that $6 trillion was a very decent amount for a group of folks to band together to begin to ask questions. He reminded the Commission that no one was telling anyone what they had to do but that the group was just asking questions of companies like "how on earth they could run a responsible business and not ask certain questions". Treasurer Moore said he believed that if those questions could be asked of companies, things like the announcement from Allstate would begin to happen with other companies.

Mr. Tim Profeta thanked Treasurer Moore for his presentation and stated that it had been extremely helpful. He questioned the Cooperate Governance information. He said he was interested in knowing not only how the companies were doing with risks but also how they were seizing the opportunities. What were their strategies for capping out low carbon and renewables? Mr. Profeta also questioned the reference about some of the Treasurer's staff looking at and rating companies' responses. He asked if the companies'

responses were public documents that the Commission could see. He also asked if the Treasurer could give any sense, as the Commission looks for opportunities for North Carolina in the transition of climate change, of what business people were thinking of as opportunities for their companies in the low carbon future.

Treasurer Moore asked Lisa Schneider, one of his staff members if the documents referred to by Mr. Profeta were public documents.

Ms. Schneider answered that she didn't know for sure but believed that some of the documents might be public but she stated there was also the concern that if some of the documents were released too soon it might stop the companies from working to make changes.

Mr. Profeta said that he didn't want anything to be done to discourage the discourse with the companies but to the extent that the information would be available publicly he stated he believed it would be interesting to see.

Treasurer Moore said that to the extent that it was available publicly under North Carolina laws, he had no choice but to share the information. He further stated that he would check to see if there was anything that was public information that would be of interest to the Commission and if so, he would share it.

Chairman Hackney then recognized Dr. Steve Smith for a question.

Dr. Smith also thanked Treasurer Moore for his presentation and said that he was curious about something. H questioned the scan of the companies that the pension funds had been invested in, and said that there surely were some companies that had a North Carolina presence. Dr. Smith was interested to know if the Treasurer had engaged any of the more local companies in a more direct way about the issues being discussed and where those companies had come down. He said that he applauded the Treasurer's leadership on these issues and just wanted to connect all of the dots and see that this was being engaged at multiple levels. He wondered if the Treasurer had given much thought to that issue and if he was aware of any engagement with companies in North Carolina.

Treasurer Moore replied in the affirmative and said that just in terms of his own edification that he had talked with representatives of both Progress Energy and Duke. He stated he was also very proud to say that in the investor network, those two companies were known as having a great reputation in that area and in being open to discussion. He said that Duke, particularly, had been the sponsor of some of the discussions on some of the issues and had pushed to have those discussions. Other than that, he said there had not been much focus put on North Carolina, primarily because while initiatives needed to be developed in the State…the entire world had better get on the same page together. He said that those high sulfur emission coal fired plants that were coming online every nine days in China were certainly contributing to the problem in a substantial way. So for that reason, on this issue, he said the focus had been kept broad.

Chairman Hackney then recognized Mr. Michael Shore who stated that since he had a pension with the State of North Carolina, he thanked the Treasurer for being responsible with that investment and thanked him for his responsibility and concern for global warming pollution. He also stated that he would like to follow up on the Treasurer's response to the previous question about what states could do. He said that it appeared that real action on global warming and pollution at the federal level was probably a couple of years away, although was very likely. He also stated that there were commissions in various other states like the one here in North Carolina and that this commission had heard a lot of discussion about economic opportunities that had come with addressing climate change. He then asked Treasurer Moore if he had any advice for this commission. In addition to the Treasurer's efforts to address the global warming issue in advance of federal action, Mr. Shore also asked what the Treasurer would suggest that the state of North Carolina ought to be doing.

Treasurer Moore replied that Mr. Shore's question was a great one and stated that there were going to be tremendous economic incentives and advantages for people and societies that began to figure out ways to lessen dependence on fossil fuels. He stated that it was just that simple. He gave an example: that if he were the Governor of North Carolina, this issue would be a part of the economic incentive package that he would want to see pushing out. He said there were a lot of things that were being developed and expanded that there was a natural network for in the State and this issue was another one. He explained that we don't have a huge in-state dependency on those traditional issues or traditional entities…we don't' have big oil and gas in North Carolina. He added that we don't have tons of automobile manufacturing in the state, and although it would be nice to have some of those things, we just don't have them. He said that should give the state some freedom to say, "Let's do some tax incentives for this, and let's see if we can create a real market place for trading in this area". It is one of those things in which Treasurer Moore stated that he believed that government should lead with. He said that he believed the State of North Carolina should, as soon as possible, in terms of its government building and its government entities begin to trade credits very much as New Mexico had done. He said the state should set the example on what could be done. He said that these were not things that cost a huge amount of money but that should begin. Treasurer Moore stated that he had made a couple of investments in the venture capital area in companies that were looking at alternative technologies here. He further stated that what was going on in some companies was very exciting. He said that he had been told that technology was just one enzyme away from being able to make switch grasses to put in cars. He said that when he went home to Vance County and looked across eastern North Carolina he saw acres and acres and acres that could be used to grow switch grasses. He stated that we knew that in a hundred years from now we would be getting around in a different way than we did today. He stressed that this was not just "pie in the sky", crazy science fiction stuff and could have huge economic payoffs. He said that was what he tried to focus the conservation on. He said that we certainly wanted to push the federal folks on things outside of our control and to go on record, but we also needed to focus back on economic incentives and economic development around this. He said that there were huge upsides, which is why everybody was talking about it.

Chairman Hackney then recognized Dr. Dolores Eggers who also thanked Treasurer Moore for being awake and aware and for managing the state's pension funds in a responsible way. She said that when she looked at the overheads that she didn't know about INCR. She asked if it was INCR or INOCR and was told by Treasure Moore that he really didn't know which it was supposed to be and that Dr. Eggers could choose. She stated that one of the overheads had a lot of bullets on greenhouse gas emissions reductions and she said that she thought of this as a bathtub situation. She said that there was a faucet, a drain, and stuff needed to be done with the drain and there was another part of it that was adaptation. She asked if something had been set up to recognize a company that was not focusing on greenhouse gas issues per se but was an adaptation company. She gave an example of a company that made special straps for houses in the coastal plains that could be used to take them apart and put them on a truck and pull them back and asked if that was something with which the Treasurer's group would be dealing?

Treasurer Moore answered in the affirmative and said that he was very careful in his presentation and that the group had been very careful. He stated that it was really a two step approach and explained that first he needed to know if questions were being asked at all from a business stand point. He said that he needed to know if companies were being asked if they were impacting the environment in a positive or negative way. He said that if it was in a negative way and the company agreed that there was some value in asking the questions then if you came back to this network, there had been a very scientific and very professional way to say that it would be great if everyone asked a specific set of questions and reported back a specific set of data.

Chairman Hackney then recognized Mr. Ivan Urlaub who thanked Treasurer Moore for a presentation that explored insurance companies and stated that he thought it was a topic to be explored further. He stated that after hearing the statistics about China's new coal power plants coming on line every nine days he was curious about what the Treasurer thought about China as an investment opportunity for North Carolina pension funds given that they had 70% of the global solar thermal hot water market and about 40-50% of their citizens used solar thermal heated hot water everyday. He stated that they had higher fuel efficiency standards than we did and that they actually had a mandate to generate a portion of their electricity nationally from renewables. He said that seemed to be in concert with a lot of the corporate responsibility requirements that the Treasurer had shared. He said that it also put a lot of the Chinese corporations ahead of where US corporations might be now. He asked Treasure Moore to speak to those points as other nations, especially in Europe as well, exceeded the achievements of the US, in those important areas.

Treasurer Moore stated that part of the Chinese culture was really very much the same as part of the United States' culture in that it had been an agricultural society and understood "The Good Earth", the title of the book by Pearl S. Buck. As an aside, he also mentioned that he would recommend the reading of that book. He stated that the Chinese understood that they had to be better economic stewards. He shared the information that he had been lucky enough to be an Eisenhower Fellow this past summer and had spent

six weeks in China and India. He said all of their goals while laudable, were directly tied to money. He stated that China was an energy starved nation which was growing very quickly and that their stated environmental goals were totally economically driven because they understood the elasticity of power costs in order to grow as they wanted. He also shared that he had spent a couple of hours with the head Environmental Minister for the Peoples Republic last summer. H said he discovered that the Chinese were awfully convenient in bending and changing their guidelines when those guidelines weren't being met. He stated that the biggest thing that he took away from his visit was that their whole environmental policy, as best he could tell from a government standpoint, was financially driven. He said that it sort of made him want to refocus his efforts to what was being done in North Carolina.

Treasurer Moore also shared that there were a couple of really fascinating things being done in China. He stated that in the new hotels that were being built in China, a room key had to be put in at the door lock for anything in the room to work. He said the places where he stayed in Taiwan were the same way. He explained that as soon as the key was removed from outside the door, everything inside the room shut off…the air conditioning didn't run, the lights wouldn't work… nothing inside the room worked once the door was locked from the outside and the key was removed. He stated that he didn't know if that was something appropriate to be mandated here but that was the type of technology that he had go to China to see, as he had never seen it here. He stated that as a young man growing up he had spent a couple of summers cleaning rooms in motels in North and South Carolina and the first thing that was done in the summertime was to crank up the air conditioning to about 58 degrees in the rooms being cleaned. He said that the technology in China made him think of all the empty motel rooms all across the State that were sitting there cranking out either hot or cold air to an empty room. He stated that that was the sort of thing that he would encourage the commission to have good discussions about.

Chairman Hackney then recognized Senator Robert Pittenger. The senator stated that he thought it was ironic, and he would like to have comments from Treasurer Moore about the fact, that China had succeeded economically with our investment capital and our markets. He further asked that wasn't it a paradox that now the United States would be considering basically unilaterally placing mandates and restrictions while China, India and Mexico went unabated. He said that they would continue pushing their economies while even sweet little North Carolina seemed to think that they could do something about the impact of CO2 emissions. China has had a very negative impact on the economy of North Carolina and Senator Pittenger wondered if good judgment was being used in how things were being done. He stated that he believed that what ever was being done should be done in unilateral fashion and that China and India and Mexico and others should also be participants.

Treasurer Moore answered that Senator Pittenger made a great point and he thought that the way he himself came out on that, after spending a lot of time thinking about it, was that if we could get from point A to point B without too much of a negative impact on our economic growth and if we could take the opportunity costs of fossil fuels out of

competitive models for our business, then what a competitive advantage we would have over the developing countries of China and India. He said that they were wedding themselves to be dependent to a cost of doing business that would only go up. He stated that we in North Carolina were not going to solve all of this but that nibbling around the edges would help. He said he would love to be running a textile company in Gaston County that had almost no power costs. He said that was the kind of things that needed to be talked about and, in his opinion; he thought that we needed to dream towards that way, with the ultimate thing of it not being pie in the sky dreaming. He said that we knew that in 1906 people could not imagine the way we got around today, which had virtually not changed any since 1926. He added that a hundred years from today, we would not get around the same way we did today and we would not power our buildings the way we did today. He said it was shame on us if we didn't think about what that would look like.

Senator Pittenger asked for a follow-up question and asked Treasurer Moore if he didn't agree that free markets were the best way to adapt to that without the government mandating those types of controls.

Treasurer Moore replied that from a public policy standpoint there was a lot more to be done by letting the free markets work and using incentives versus straight mandates. He agreed that for most of this arena there was far more bang for the buck to just use the carrot than to use the stick approach.

Senator Hackney then recognized Dr. Eggers who asked Treasurer Moore to clarify his earlier answer concerning opportunity costs and handling them better. She asked that it be explained in layman's terms.

Treasurer Moore answered that if someone ran a business there were the fixed and variable costs –the two traditional economic categories of cost, which arrived, hopefully, at profitability and that the power costs depended on what the industry was. He gave an example of Google and said that one of the reasons that Google was coming to the northeast corner of North Carolina was because we had textile and furniture mills that had gone out of business and Duke Power had the ability to crank out all these kilowatt hours and to give them away. He said that if someone ran a business that was heavily dependent on power costs, this was where they could get the biggest bang for the buck. He asked wouldn't it be wonderful if 50 years from now we had a technology that allowed a business to have 5% of their overall costs devoted to power and who were competing against someone in China and India that would be doing it 50 years from now the same way they were doing it today? He said that would probably be 50% of the cost. He said that that was the point…that was the great silver lining in doing good and doing well in this area.

Chairman Hackney then recognized Representative Pricey Harrison who also thanked Treasurer Moore for his great leadership on the global warming issue and thanked him for his presentation. She said that she wanted to follow up on the investor network on climate risks and she apologized if that topic had already been addressed. She said she

was encouraged to see that there had been a pretty significant jump in investor numbers and assets from 2003 to 2006. She said the information she was looking at showed $3.7 trillion and she thought she had heard Treasurer Moore say that there was $18 trillion in assets out there.

Treasurer Moore asked Representative Harrison where she saw the information about the $3.7 trillion and was told that it was on about the 10th or 11th slide in the presentation. Treasurer Moore answered that that number represented the participants in the network and that the bigger number was a fairly educated guess at the total liquidity of the publicly traded marketplace.

Representative Harrison then remarked that the trend was obviously going up and Treasurer Moore agreed that absolutely that was true.

Representative Harrison then asked if Treasurer Moore believed that eventually most companies were going to come around. Treasurer Moore agreed and stated that he believed that if politics were peeled away someone would sound like a complete and utter fool if they stood up and said that this was doing no harm. He said he didn't know if that was the case 10 years ago but it was just a fact that now data was just mounting and mounting and mounting that there were some climate changes happening in this country. He said that a reasonable person would not ignore this problem and that in the Treasurer's experience, most people who ran large publicly traded companies were reasonable people and most of them were pretty good people. He said that sometimes they might just need a little kick in the pants and some might say that members of the North Carolina General Assembly and those who were elected to represent the people of the State also needed kicks in the pants from time to time.

Chairman Hackney then thanked Treasurer Moore for coming to the meeting and for his presentation.

Chairman Hackney announced that further business aspects of global climate changes would be discussed. He said the Commission had heard a lot about the Chicago Climate Exchange in meetings to date. He shared that he had told his committee co-chair about having just attended a meeting of the Fall Forum, the national conference of state legislators. One of the presentations there had been by the Iowa Farm Bureau, and they stated they were getting their farmers ready to participate in trade on the Chicago Climate Exchange. He added that this might be something that the Commission might want to investigate further. He then introduced and welcomed the next speaker, Dr. Michael J. Walsh, the Senior Vice President of the Chicago Climate Exchange.

Dr. Walsh thanked the group for his invitation to speak to them and announced that he had had to get up at 4:30 a.m. on a Monday morning in order to attend the meeting and he didn't know how advanced the commission was until he looked over some of the documentation on his flight here. He announced that he would be giving a Power Point presentation, and that he was somewhat unfamiliar with the equipment that he would be using. **Exhibit F.**

Dr. Welch then stated that he was very impressed with the commission's efforts and with the day's agenda. He also said there were some powerhouse leadership folks in attendance and mentioned Mr. Tim Profeta and Mr. Tom Castin, who had been working on those issues, with progress, for quite a long time. Dr. Walsh said he wanted to particularly acknowledge their participation.

Dr. Walsh stated that the concept of using markets as a tool for precisely and cost effectively managing air emission issues was no longer just a concept. He said he had to make note of that because he had started to work in 1996 to try to build from the bottom up, a "greenhouse gas emissions reduction in trading" approach. He said that the reason it was decided to start with the private sector was the sense, at that time, that governments would have a very difficult time working forward with that issue. He further said that what was needed was already known and understood at that time. He said the tool was available and feasible then. He stated that in 2000 the focus was more intently put on a research and development process which was funded by the Joyce Foundation. The proposition was that society would want those emissions to be managed. Dr. Walsh stated that there was real risk to the planet and society would want gas emissions reduced as affordably as possible to get the maximum bang for the buck. He stated that further, while there were some unknowns as to the exact scale of the risk, it was clear that the risk would get managed and that the market was the right way to go about doing that. He said that at that time anyone who would listen was gathered together and the lines were kept open to anyone who would like to call and the process of designing a market mechanism was begun. Dr. Walsh said that he could report that North Carolina was involved in the market now and although it might not be known or seen on a day to day basis it was happening all around. He stated that there was a price for carbon in Europe and in North America and that there was opportunity here and also that there were new financing tools available for things like sustainable energy, sustainable agriculture, and renewable energy and taking good care of the land.

Dr. Walsh stated the reason that market mechanisms for the environment were attractive was because in many cases there were lots of tools available to address the issue and each of those could contribute to the solution. Dr. Walsh said that in the case of greenhouse gases, problems could be solved using cleaner fuels, lower carbon fuels and things like biomass and more efficient use of technology through vehicle and building efficiency. He also mentioned things like capture and reuse as an energy source; such as methane obtained from agriculture and landfills. He stated that many of the members of the Chicago Climate Exchange in the technology sector such as IBM, an example of a North Carolina presence and a member of the Exchange had found it very inexpensive to reduce greenhouse gases that were not carbon dioxide but were gases used in the cleaning of semiconductor chips here in North Carolina. He said that similarly there were lots of ways to capture and remove carbon dioxide from the air, many of which were very attractive things to do socially, such as planting trees, better management of farmland and potentially taking carbon from industrial processes and burying it. Dr. Walsh stated that some of these things were going on now in North Carolina as a part of the Chicago Climate Exchange. He further stated that those things were happening today as a result

of an organized rules based market. He said there were lots of ways to manage these emissions and it didn't matter where it was done as long as it was done and it didn't matter why it was done as long as it was done but more of it needed to be done, according to what the top scientists in the National Academy of Sciences were saying. Dr. Walsh questioned that if there were so many options and each of them contributed to the solution then what should be done to get the maximum bang for the buck. He stated that that was where the pricing mechanism came in… so that the price was used to ask where the next mitigation option was that had the most value to society. He said that the market could be used to orchestrate and optimize the system so that it became a tool to harness the existing tactics. He stated that that was the rational for emissions trading and he listed three points.

- 1. Greenhouse emissions were a common pollutant problem and reducing greenhouse emissions anywhere would be a good thing for the atmosphere everywhere.

- 2. This was a proven tool and took advantage of flexibility to find the least cost way to specify an environmental goal.

- 3. The third point was the most important point, according to Dr. Walsh. He gave an example of putting a penny of gasoline tax on a gallon of gas and hoping that that would reduce emissions or maybe putting on a nickel a gallon tax or even a dollar a gallon on a gallon of gasoline and hoping it would reduce emission but not knowing how much emission would be reduced. He said that emissions trading relied on specified, quantified emission budgets. He said that worked because businesses knew how to manage to a budget and often would find lots of good things along the way in managing toward a budget. He stated that once account was taken for an external effect, then the market would begin to start to make problems much smaller than people made them out to be.

Dr. Walsh then summarized by saying that clear incentives must be provided… dynamic efficiency and incentive, so that someone could come up with a better invention knowing that they would get paid through the carbon market for doing better by society.

Dr. Walsh stated that President Bush proposed a CO2 cap in trade programs for the power sector and added that there was lots of legislation currently being proposed.

Dr. Walsh stated that North Carolina had approximately 150-200 million metric tons of CO2 equivalent. He then gave an estimate of heavy industry greenhouse emissions in North Carolina as being about 100 million tons a year. He then said that of about ¾ of that power sector probably another 25 million tons would come from heavy industry. He referenced the number of 100 million metric tons a year because that was the kind of cap in trade system that was in place at the present time in Europe and in the United States…primarily the heavy industry parts.

Dr. Walsh stated that the door had also been opened to universities and to cities and governments and other groups to participate in the Climate Exchange program and added that he would love to see a university such as NC State become active in the Exchange program.

Dr. Walsh stated the supposition that there were about 100 million tons of CO2 and other industrial greenhouse gases in North Carolina and he then asked how those emissions would be managed. He answered that he had been privileged to help launch a group of exchanges that were focal points for market machinists for environmental protection. Dr. Walsh stated that the Chicago Climate Exchange was launched in an atmosphere of no regulations. He stated that, therefore, the environmental parameters, the regulatory and the audits and the trading parameters had to be built into the system. Dr. Walsh further stated that in Europe there was a different model and that although the Futures Exchange in London had captured a leading share of the market, in Europe they were simply a transaction platform. He stated that some of the companies in North Carolina were in the European system and he named Michelin and IBM.

Dr. Walsh said that the Chicago Climate Futures Exchange had a Futures Exchange with sulfur dioxide emissions allowance trading to give a low cost transparent mechanism. He stated that the Exchange also had a joint venture in Montreal to activate a carbon market in Canada, should that emerge, and had similarly announced the intention to support, through an organized, transparent inexpensive market, the Northeastern State Emission Trading Program, if that came into existence.

Dr. Walsh then stressed that the organization had to be involved with the entire world and stated that he, too, had recently been in China and India and he was there to help get even more Chinese and Indian participation, although there was already a large amount of participation from those countries. Dr. Walsh explained his belief that that was where the 21 century economy was. He mentioned that people in rural India were talking about European Climate Exchange carbon prices and he said he believed that in some ways those countries were ahead of the United States.

Dr. Walsh then gave a quick update on where the global situation was by saying that a lot of business leaders agreed that society wanted them to get the job done and agreed to use a market universally.

Dr. Walsh then explained one of his slides and stated that the vertical scales told how much of emissions were under the cap and trade systems in the various regimes around the world. Dr. Walsh then said that there were two primary markets underway…the European Union and the Chicago Climate Exchange. He said that the green bars showed the markets that were live and were now running. He stated that Germany included, like most of the European countries, about half of the total emissions of about a billion tons a year. He stated that about half of those emissions were in the cap and trade system and represented heavy industry, power, oil and gas, chemicals, pulp and paper and metals, etc. He stated that the other half of the emissions would have to be managed in other

ways, such as by vehicle efficiently standards, technology standards, incentives, and by buying international credits if the government chose.

Dr. Walsh stated that all of the 25 members of the European Union system had activated their systems according to the green bars shown on the graft. He stated that the second highest green bar was a market here in America…the Chicago Climate Exchange, which included about the same amount of emissions that the United Kingdom included in the European System. He stated that the Chicago Climate Exchange included around 250 million metric tons of CO2 equivalent emissions in their cap and trade system.

Dr. Walsh said that if the Northeastern States Program, just for the power sector, came to life, it would include somewhere between 110-130 million metric tons of CO2 depending on whether or not other states would join the group. He stated that he had been told that there were no significant legal hurdles so that market would activate but he said he wasn't convinced that it would happen. However, he stated that if that market would start up that would include somewhere between 110-140 million metric tons or about half of what California now included. He stated that California was talking about a 2012 start date, however, emissions trading was not explicitly included in their legislation and that it had taken some further reinforcement action. He said that if those markets got going in the next 3-6 years they would still be rather modest in scale.

Dr. Walsh then stated that if North Carolina heavy industry was 100 million tons, then this state was bigger than most of the European countries in terms of what would be included in the cap and trade system. He reinforced that this state would not be a trivial footprint by any means.

Dr. Walsh said that if Canada got going that they would be a sizable market. However, it remains to be seen if Australia would get going.

Dr. Walsh stated that the second biggest market in the world was a voluntary driven market. He said that the Chicago Climate Exchange was a voluntary program and that they had no regulatory authority unless a contract was signed to legally commit emissions to their emissions reductions schedule that had been hammered out in an intensive negotiations process.

Dr. Walsh stated that the members of the Exchange had agreed to forget about national borders and since the world was a NAFTA world it had been decided that the Canadian and Mexican borders were not critical and said that therefore the Exchange members decided to bring in emissions standards from Canada and Mexico and after that was done, Brazil was also included.

Dr. Walsh explained the background process of the Exchange by saying that some world famous people had been brought in to get the Exchange going. He said that one of his favorite people was one of the leading energy experts at the TOTA Energy Research Institute in India and was a graduate of NC State with a Ph.D. in agricultural economics and who now headed up the primer global scientific organization where many American

scientists got together to try and figure out where the would was going. Dr. Walsh gave this example to say that if someone were to say that one person or one state couldn't make a difference, he liked to give that example.

Dr. Walsh then showed the slide that listed the members of the Chicago Climate Exchange and called attention to the fact that the group was global and was very diverse. He also called attention to companies that had North Carolina operations. He stated that the list he was showing wasn't complete, as there were several other Brazilian corporations that were signing up, especially in the forest product sector and in biofuels. He also pointed out that American Electric Power was the very biggest power generator in the country and was a member of the Exchange

Dr. Walsh stated that universities had also gotten involved with the exchange and he said that the universities wanted to learn what it was all about as it was a future economy. As an example, he explained that farmers would benefit from the program as they learned about financing methane collection and the carbon market. He added that universities could learn about the Exchange and pass on that information to the farmers in their areas.

Dr. Walsh said that governments could also benefit from the Exchange program and that Illinois and New Mexico had expressed aspirations for managing carbon and were including their state government operations.

Dr. Walsh also noted that DuPont, IBM, and Waste Management were cutting non CO2 gasses with co-benefits, which meant that they were saving money as well as reducing emissions. He stated that all emissions weren't CO2 and some could be reused for fuel.

Dr. Walsh stated that Amtrak was a member, as well as, Safeway grocery stores with a chain of 2,000 stores around the country.

Dr. Walsh also said that those businesses who might want to participate in the program by agreeing to offset their modest emissions at their businesses were allowed to join the Exchange as associate members.

Dr. Walsh also mentioned other groups which were members of the Exchange and mentioned the Rocky Mountain Institute, the World Resources Institute and said that one of the original investors was the Jesuit community of Santa Clara University. He said that group was managing a big endowment fund for cemetery space for Catholics in the Bay Area. He said that the Jesuit community even lent money to the Exchange for start up costs and then they converted the debt to equity.

Dr. Walsh stated that the financial sector needed to be involved in the Exchange, as well as, the agricultural sector. He said that he couldn't sign checks with individual farmers but worked through state farm bureaus who contacted farmers who were doing conservation tillage, tree plantings or doing methane collection on live stock operations and turning those into credits.

Dr. Walsh mentioned that all contracts had to go through a rules process and all had to be independently verified. He stated that the traders of the world were the folks who were going to make the Exchange idea another add-on to the capitalist system. He stated that there were about 225 members of the Exchange and that Blue Chips were signing on that would be announced in the near future. He said that these Blue Chip groups wanted to get in the market and get leadership opportunities by being part of the group and getting involved in a global scale in order to get ahead of regulations and drive the regulations. He said that many of those organizations faced real risks. He stated that American Electric Power was the biggest coal burner in the western hemisphere and it really mattered to them how the emissions trading systems for carbon worked. He further said that by getting and organizing focal point carbon emissions, a company would get really good at focusing on their fuel consumption and energy efficiency and would learn how to save money while reducing the emissions.

Dr. Walsh summarized by saying that there were a lot of reasons to invest in the Exchange, such as strategic reasons, reputational reasons, and the fact that lots of investment money was being funneled to those businesses that seemed to be doing the right thing because it would be a good business opportunity. He said that voters wanted carbon emission reduction and it was going to be something that would be coming. He also said that some companies questioned that if they didn't participate in the program, were not being proactive and were not seizing the opportunity they might not be meeting their fiduciary responsibilities to their shareholders.

Dr. Walsh mentioned that some of the government bodies that had gotten involved viewed participation in the carbon trading system as complimentary to their political and public policy goals. He said he believed that this would be the preferred tool of the 21st century for managing a lot of emissions. He said that was the reason that several governors had gotten involved and had asked their staff members to get up to speed so that if a policy needed to be pushed, the staff would understand what it would mean in the market context for their state.

Dr. Walsh explained that the core of the system was not all that different across the emission trading systems, depending on the pollutant. He said that the Exchange was begun with a four year commitment and the members agreed to cutting emissions by 1% per year to get to a point that by 2006 they would be 4% below their base line. He explained that the base line was the average of the emissions included during the years of 1998-2001. He said that all the members of the Exchange have had to include all of their major emitting activities in the United States. He added that if there were some small things, such as a vehicle fleet within a big power company, the vehicle fleet could be included if there was sufficient data, but the focus would need to be on the big things first. He said the important thing was that there must be entity wide participation.

Dr. Walsh stated that whenever anyone joined the Exchange, whether industrial enterprises, universities, cities, etc. they must quantify their missions. He said that they must look at their fuel burn and must use the World Resources Institute calculation tool and go through a grueling audit. He stated that some groups didn't have good data on

their energy consumption and that more than half of the emissions included was already reported to the US or Canadian authorities. He said the Exchange relied on a lot of existing high quality data from continuous emission monitors so when someone joined the Exchange they got an emissions baseline and were audited and given a batch of tradable permits. He stated that if someone joined in the first four years and had a baseline of 100 tons they were given a four year strip of tradable allowances. He explained that if a member had 100 tons the first year and was able to drop them down to 97, they were to give back 97 allowances and that would give the business 2 tradable allowances that could then be sold to someone else in the system. He said that those extra allowances could also be held and banked to be used in later years if needed. He stated that if the member didn't bring their emissions down to their budgeted amount then they had to buy a credit from someone else in the system. He explained that would be someone who had made an extra cut and registered and verified an eligible emission offset project such as a farm, forest, or renewable energy, etc. He further explained that a member would either make their goal or beat their goal or if they didn't meet their goal they would have to buy some credits. He stated that all the members were audited each spring and added that there was also an important feature of a quantitative safety valve involved. He said there was a limited amount of pain experienced in the process. Dr. Walsh stated that for the years of 2005-2006 the cap on exposure was 3% above baseline and added that the most that anyone would have to buy in terms of credits to reach their annual compliance in the year 2006 would be 7% of their baseline. He said they would be expected to cut 4% and they would have to offset 7% of their baseline. He stated that when this program was designed and the provision was established, people said that they were really glad to know that they wouldn't have to buy more than 7% of their baseline in 2006. He added that members of the Exchange have said that this program was working and wanted to extend the program by going 2 more points by 2010 or 6% below baseline. He said, however, that some members were concerned that they were getting too far ahead of legislation, which wasn't calling for such an aggressive target. Dr. Walsh then stated that the European Climate Exchange operated an environment that had very similar reduction goals and said that their goals this year were about 3 or 4% below baseline.

Dr. Walsh stated that the market had been extended but. if someone were to join on now, they would get to catch up. He stated that the members believed that it was better to grow the market and get more people budgeting and more people auditing and more people managing and to let them catch up.

Dr. Walsh than gave an example of North Carolina industry. As an example, he suggested that North Carolina industry had 100 million tons of baseline and became a member of the exchange. He said the worse case scenario would be if the state couldn't find its own internal emission cuts and would have to buy 4 ½% of its baseline or offsets. He said that the maximum recognized increase is 3% above baseline but the goal would be cut by ½% because they would be a new member of the Exchange. He stated that in that scenario, North Carolina industry would be on the hook to buy 4 ½ million tons of offsets from someone else in the system. He said that would probably be $4.00 a ton or so at current prices. He stated that would be $18 million a year and the next year it would

become 6 million tons at $24 million a year statewide. So he said in order to get audits going, baselines going, quantifications going, a price on carbon in the first 2 years of the program would cost the state approximately $2-$3 a citizen. He asked where that $18 million would go and answered that it would go to the sellers who made the extra cuts. He said it could go to North Carolina hog operations with methane recovery or to North Carolina farmers who were doing conservation tillage or to North Carolina foresters or other North Carolina industries or renewable energy providers or other people who could be on the sell side of the market. Dr. Walsh said that he didn't know if getting into the world of carbon markets-the 21st century markets would be worth the worst case scenario of $2-$3 per citizen per year to the state of North Carolina. He said he knew that this was certainly not a trivial amount of money and something that would have to be up to the state to think about and decide. Dr. Walsh then said that in addition to state involvement that universities and cities within the state could also get involved in the program. He said that he would love to have NC State, UNC, East Carolina and A&T become involved. He said that with all that knowledge it would be great to have North Carolina universities involved and he said that students loved the Exchange because it was a lot of excitement and a lot of fun. Dr. Walsh stated that the amount of money talked about to participate had been blown way out of proportion.

Dr. Walsh said that the upside of this was that the European market had an annual carbon crop value for 2008 that exceeded the crop value of the United States' soy bean market plus the United States' corn market, plus the United States' wheat crop so the EU carbon crop in 2008 would be bigger than the US agricultural crop. He said that this was going to be big but would not be all that painful for any particular entity because the dollar's amount was just not that significant. He asked if $2 or $3 dollars per capita per year to take a serious step to the frontier on this would be too much. He also stated that this would go up over time. He said the yield carbon crop was 2.2 billion tons of allowances allocated currently, trading at about $20 for 18 yields a ton. He said that came out to a value of about $45 billion a year of allowances allocated a year. He said that the US corn, bean and wheat crops weren't quite worth that.

He was asked about trees and said that Europeans didn't really care for trees that were said to pull carbon out of the air. He stated that the Chicago Climate Exchange was a fully integrated environmental audit and electronic trading system. He said that members got a registry account that was a bank account recording of all of their emissions that had been audited and all of their allowance trading, etc. He said the Exchange was a commodity market trading screen. He said that they traded their European allowances on the screen and their US allowances and their North American allowances and their US sulfur all on the same screen because it was a commodity market.

Dr. Walsh said that it was also very important to supplement not only what industry could do but what people outside of industry could do to bring those into the carbon market. He said that they didn't have the luxury of saying that they could only pick one country or one section to be included. He stated that every mitigation option in every possible location needed to be built out as soon as possible according to what the very best scientists, The National Academy of Sciences folks were saying. He said the best

scientists were saying that we needed to get going in every sector, in agriculture, in forestry and the way to do this was to encourage folks to do projects that mitigated those emissions. He stated that those projects needed to be identified and the door opened to new ones. He said that farmers could grow corn and soybeans above the ground and grow carbon below the ground and they could get a few bucks an acre a year if they were one of the eligible farmers.

Dr. Walsh stated that the offset concept was to bring in reductions from low cost sectors to provide some economic development opportunities in those other areas that needed to be built out and to broaden the participation base. He said those things were defined in a very conservative way and everything had to be verified and there was no cherry picking and people were encouraged not to go backwards. He stated the importance of this and added that there was a lot of opportunity and added that major opportunity was to mitigate these emissions through farm and forest. He said this would provide cleaner water, and give rural income and economic development possibilities. He said that a farmer could make money on methane collection…real money. He mentioned the methane lagoon covers that cost a $100 thousand and another $100 thousand if power generation was added. He said that if the NC government wanted to subsidize a few of those here to get some renewable energy and to reduce some odor problems and if they wanted to get carbon credits from that, there would be no problem as long as the pollutants were being removed from the air. He said that was also a supplemental financing source and, in fact, carbon finance had come full circle to do what it was supposed to do. He explained that the farmers would be raising money to invest in methane recovery operations at livestock operations knowing that they would be getting carbon credits from the Chicago Climate Exchange and would be able to pay back their debt with those carbon credits.

Dr. Walsh said that the market had been rather slow to get the thing started with prices of $1.00 or so per ton but they weren't concerned as long as all the checks cleared…and they had all cleared. He said that about 10 million tons had been traded this year and the price had been in the $4.00-$4.50 a ton range. He explained that meant about $2.00 an acre per year for a no till farmer. He added that that wasn't a bad shot in the arm if your real estate taxes were about a $1.50 an acre a year.

Dr. Walsh again stated that this was a complete system with an open-door policy. He said that anyone who wanted to get in and was willing to take the audit and take the commitment and live up to the commitment was certainly welcome. He said the goals had been achieved and members had beaten the reduction requirements. He added that some have had to buy credits to get to their yearly goal but they did that and that those were a very small piece of the overall Exchange.

Dr. Welsh stated that not everyone who had been invited to be a member of the Exchange had joined the Exchange. However, he said he felt that they had educated far more than just the members who were now a part of the Exchange. He said that now when he visited someone interested in joining the group he was amazed that there was a night and day difference. He explained that now people were getting it as a part of their business

and said that people were finding free savings on money that was previously going out the door that they wouldn't have captured if not for the Exchange program. He said there were significant side benefits taking place.

Dr. Walsh then stated that the Exchange was an apolitical enterprise and didn't lobby for or against legislation. Nevertheless, he added, anyone who tried to do something about global warming would attract some comment…and not always positive. He said that some people didn't want this to happen but some real leading thinkers had been very nice and that was much appreciated in a bipartisan context. Dr. Walsh mentioned some US legislators who had gotten involved in the program and had found the program to be another income source. He mentioned Senator Luegar, currently the Chairman of the Senate Foreign Relations Committee, who had brought his farm into the Exchange to demonstrate that carbon credits could be achieved in agriculture as another income source.

Dr. Walsh then asked for comments or questions and stated that when it came to emissions trading there was no such thing as a dumb question.

Representative Hackney said that he would ask the first dumb question and then asked about China and asked if they were paying attention to global climate change in spite of making some mistakes. He asked if they were trading or participating and how they were impacting the world market.

Dr. Walsh answered that China was very active and was, in fact, the leading participant in the international market under the Kyoto Treaty, where developing countries could undertake migration projects within the country, such as a methane recovery or fuel efficiency, etc. and be able to sell those credits internationally. Dr. Walsh said having just been there, that the Chinese wanted to sell in every market they could participate in. He said that he had met some incredibly innovative technical specialists on energy reuse, on blast furnace gas recovery, and on some other things. He said they were participating in every market that was available to them. He added that developing countries at this time do not have reduction requirements but he said he thought that they were probably smart enough to know that this was coming and they wanted to get up to speed. He said that he saw incredible knowledge being built every day by participating in the carbon market in China and in India and he said he was concerned it was more so in many cases there than what he was seeing in the US.

Chairman Hackney then recognized Dr. Uzochukwu, who asked about the cost to become a member of the CCX.

Dr. Walsh answered that it depended on what kind member would be involved. He explained that a really big emitter in a heavy industry would have dues levels in line with being a member of an industrial association. He added that an individual trader, and there were a lot of them, who came from the Board of Trade would pay $1,000 a year to join and then there was a processing of their application involved and there were regulatory requirements and that was another $1,000 fee per year to be a member. He

said the cost would range from $1,000 just to be a trader or an offset provider, up into the $10,000 range for a heavy industry where the audit expense would be more significant.

Chairman Hackney then recognized Dr. Crawford-Brown who asked about the 2 ways that people might go about this problem. He said that one would be to take the easy measures and improve efficiency and so forth but there was also another goal which was to stimulate the development of new technologies. He stated that in Europe the sense seemed to be that even though they were well above us in terms of the dollar amount per ton that they might have to drive up to a hundred or so in order to eventually stimulate technologies. He asked about Dr. Walsh's sense of how rapidly the dollar amount needed to evolve in the US to really start causing big changes.

Dr. Walsh answered that he was very bullish that the numbers were far lower than many people thought. He said that he was stunned at the number of calls he got from innovators who were very excited at the prospect of $4.00 or $5.00 a ton. He added that these things took time and were not overnight technologies or innovations. He said he believed there were enormous supplies well below $50 a ton CO2. He said that with significant cuts in emissions at realistic price ranges the cost hit to the economy was in the range of 1-2% of energy prices. He explained that that was 1, 2, or 3 cents a gallon for a really big reduction in emissions in realistic price levels. He stated that 1, 2, or 3 cents a gallon moved every day at the New York Mercantile Exchange so it was a dollar amount that was probably imperceptible as an economic hit but was a big incentive for new innovators. He said the economic hit and the notion of substantial industrial dislocation was completely off the mark because of the ability to innovate and respond. He said this was seen at universities here in North Carolina and was seen at the best university systems in the world and that some of the greatest technical innovators would respond at $5.00, $10.00 and $15.00 a ton. He said he thought that issue was just a "tempest in a teapot" and was just not that expensive a problem to solve. He said that the benefits would be cleaner air, and cleaner water and lower energy bills that went along with it at far lower than $100 per ton.

Chairman Hackney then recognized Representative Wilkins who said that according to Mr. Walsh's presentation that he saw three levels of membership but that he didn't see how the levels differed.

Mr. Walsh answered that the members were the emitters. He explained that they would take on emission reduction commitments of their 4% by 2006 and 6% by 2010 and that they were industrial entities that had sufficient emissions, such as power, pulp and paper, metals, and chemicals. He further explained that the associate members were really white collar organizations that had an office and flew around in airplanes and who had a small amount of emissions that they had agreed to completely offset by buying credits each year. He said then there were the sellers such as the farmers and the foresters who did forest and farm projects and sold those into the Exchange through an Iowa Farm Bureau or a North Carolina Farmers Union, etc. if they wanted to do that.

Chairman Hackney then called on Mr. Michael Shore for a question.

Mr. Shore said that he was asking his questions as a member representing an environmental organization and he said that he actually had two questions. First he asked about the major utilities in North Carolina wanting to expand their fossil fuel capacities, such as Duke Energy, which was proposing a new expanded coal fired power plant west of Charlotte, and he asked about a hypothetical situation in which Duke Energy were to commit to expanding that new facility by being carbon neutral and buying carbon offsets and by buying these credits from someone such as the state's swine industry which could have carbon credits to sell. He questioned the differences of those two entities working together to work out some kind of deal versus going through the Chicago Climate Exchange and wondered if there were some kind of advantages for the Exchange to be a broker in that scenario. He said his second question was that since there were renewable energy credits available, such as states that have renewable portfolio standards and a trading mechanism with that, then how did the renewable energy credits and the carbon credits interact with each other.

Mr. Walsh answered that both those questions were very good ones. He said he first wanted to be clear in stating that the Exchange was classified by the Commodity Futures Trading Commission as an exempt Exchange under the Commodity Exchange Act so they had a status as a regulated entity with NASD serving as an external regulator and that was a far different context and that their fees were set on a flat per ton basis. He added that, therefore, the term "broker" was not an accurate one as the Exchange was an exchange mechanism and brokers did participate in the Exchange.

Mr. Walsh further explained that there were folks around the country who were doing things along the lines that Mr. Shore had mentioned. He said there were people who were striking up their own deals and were fixing up their own rules and were making up their own side agreements. He said the Exchange's view was that whatever started people going in that area, such as pricing, auditing, base lining, quantifying, and setting goals was a good thing however it was being done. He stated that was what the planet needed more of and if there were people who wanted to do it on their own they were very likely to find what many folks had found when they did things that way – that it was really tricky to set the terms. He said groups could spend two or three years going back and forth with their lawyers or the groups could just adopt a set of structures and rules that were already in place. He mentioned that there were rules on the Exchange's web page and added that the bottom line was that if groups chose to go that route then so be it and that it would be up to those involved to decide. He said the Exchange had a member effect and was an organization that was already in place and which had taken quite a number of years to build the infrastructure for. He said that in terms of renewable credits that it was very complicated and it would be difficult to start from scratch to organize and to convert carbon credits into renewable energy credits. He said there was a provision that did allow, under very limited circumstances, for someone to convert a renewable energy credit into a carbon credit. He said that to a degree they kind of reflected some of the same things. However, he added that was a very difficult and technical area that he didn't want to dwell on at great length with the Commission because no one had actually done it yet. He said that maybe the Exchange's rules were too conservative or too

demanding for someone to make that kind of conversion. However, he said that the Exchange wanted to bring those markets together in some fashion.

Chairman Hackney then called on Representative Pricey Harrison who said she thought that her question was probably one of the dumb one and. Mr. Walsh responded that he had been waiting for one of those.

Representative Harrison stated that she wasn't quite sure that she understood what was going on in that Mr. Walsh had stated the Exchange had emitters that had voluntarily agreed to reduce their carbon emissions by 4% and then there were some folks who had joined in to sell their opportunities to reduce the emissions. She asked if that was basically how it worked with the Exchange and Mr. Walsh agreed that was a great summery. She questioned the companies' motives and asked if they were just altruistically minded or did they see an economic opportunity because it was inevitable that they would eventually have to cap and they wanted to take advantage of it now.

Mr. Walsh answered that both those things were true. He said some companies could see both opportunity and risk so that they needed to get going to correct things and he also stated that some companies were altruistically minded. As an example he stated that one CEO of a European company, who was a grandfather, said that this was an important issue and he didn't run the numbers and didn't ask if he was a buyer or a seller or otherwise but just felt that this was a very important issue. Mr. Walsh said there were companies that were worried about lawsuits or about shareholder resolutions and values and that there were also some companies that could see the upside and could see that they could make those things that reduced emissions and wanted a price on those things. He stated that there was really a wide range of motivations.

Representative Harrison than stated that she was starting to understand the agricultural component of this and she wondered about the how big a component conservation tillage was.

Mr. Walsh answered that there were several million acres enrolled in the US and several million acres enrolled in Canada in the Exchange program. He said that, unfortunately, the extent to which farmers currently did what the Exchange required of them year after year… low disturbance, was extremely rare. He said that fact was one of the reasons the Exchange believed that conservation tillage was a highly attractive activity and was a best in class and therefore was a credit. He said the upside was that there was such a lot of potential for this in this country, although it was a pretty rare practice. He said that at the present time that was a pretty modest part of the Exchange although they would really like for it to be more and it was certainly good for the land and for the water.

Chairman Hackney then called on Dr. Edward Erickson for questions and Dr. Erickson stated that Representative Harrison had basically already asked his question.

Chairman Hackney recognized Co-Chair John Garrou.

Mr. Garrou stated that because the Exchange was a voluntary organization one would expect that the price of credits would be less than was the case with the EEU, for example, because the Exchange members were self selected and probably included people who planned to make carbon reductions anyway. He questioned if that was a problem and if that was a problem that would continue forever or if Mr. Walsh thought the prices would tend to converse over time.

Mr. Walsh answered that that was a very thoughtful question. He said that if Mr. Garrou would go to the Exchange's web page and look at their annual environmental compliance report he would see that there were significant numbers of firms that had to buy credits, in fact, had to buy the maximum required under the Exchange rules. Therefore, he stated that it wasn't exactly as cut and dried as might be thought. He asked Mr. Garrou that with that information, did Mr. Garrou think that those facing a high price tag to be a member of the Exchange had come flooding to the Exchange with phone calls. He then answered that no, that was not the case. He said that it was certainly easier to bring in a seller than a buyer so one might make the conclusion that the prices would be different in a different kind of system. He said that he didn't know if the system would go on indefinitely. He said that the Exchange might be put out of business by a Federal program and that would be good news for him.

Chairman Hackney then recognized Mr. Thomas Cecich, who asked how long a company would be contractionally a member of the Exchange once they had signed on.

Mr. Walsh answered that the first phase had been four years and there were some people who were now saying that it had been great but that their business was far different or the company executives were different from when the company had first joined the Exchange and they had chosen not to participate further in the Exchange after those first four years. He stated that the Exchange had a market for the years from 2007 – 2010 and that most enterprises had renewed for another four year commitment and that new ones were being added for that second phase of the Exchange.

Chairman Hackney then called on Dr. Stanley R. Riggs who stated that is wasn't clear to him how the hog lagoons could represent credits. He said there were hog lagoons all over the place but they were scattered out …one or two or three here and there, etc. He said the efforts to try to utilize those as a source of gas had not really materialized because of the collection problem. He asked how that could be counted as a credit. He asked if there was a potential innovation that could be expected to come down the pike or where did that problem fit.

Mr. Walsh answered that the collection of gas from hog lagoons was happening now. He said that it might not be happening in North Carolina as much as he might like but the technology was proven and there were a number of both lagoon cover with gas flaring in power generation facilities and manure digestion systems that were in the market at the present getting credits and cash. He said that if that methane was not captured it would otherwise be going up into the air. He stated that when the methane was burned off that was a big chunk of forward progress. He added that the Exchange didn't give as many

credits as some other systems did…they were pretty stingy about it. He said, however, that it was a financing source.

Dr. Riggs then asked why North Carolina wasn't doing that sort of thing already and Mr. Walsh answered that he really didn't know and that was why he was here to welcome as many North Carolinians to participate as would like.

Dr. Riggs asked who was doing that sort of thing at the present economically in the country.

Mr. Walsh answered that a number of dairy operators in Minnesota, Wisconsin, California, and Illinois were members of the Exchange. He said that dairy management practices tended to be more suitable for that type of thing. He said that Premium Standards Farms was a member of the Exchange and they had some methane capture systems that had been brought in…mostly swine operations in that particular case. He stated that that sort of thing was happening and that it was happening like gangbusters in places like Mexico and Brazil and China. He again stated that the methane capture was a new energy source and that it reduced pollution, and was better preparation for using it as a nutrient and hopefully it caused less water damage. He said this was a win-win situation.

Chairman Hackney then recognized Mr. George Givens who stated that he was aware that there was at least one company now trying to market lagoon covers in North Carolina and that one of the selling points they were using was the methane capture and the generation of credits through the company's membership in the Chicago Climate Exchange. He said that anyone using this product would be generating credits and, hopefully, the revenue from the credits would offset the cost of the cover.

Chairman Hackney then called on Dr. Eggers who asked if most of the participating companies were just capturing their methane and flaring it or if they were doing something else with it.

Mr. Walsh replied that that was a good question and answered that the first level of environmental benefit could be realized even if the methane was just flared because a 21-23 potency greenhouse gas would then be brought down to a 3 of CO2 that comes out of the flaring. So, he stated, that was not a bad thing and it was credited by the Exchange. He said that he didn't honestly know the breakdown of the agricultural sites or the landfill sites as far as the flaring was concerned. He said that even at some waste water treatment sites at municipal treatment facilities the flare was being reused for electric power or for heat generation and although he wasn't sure, he thought it was more than half. He also stated that could change over time as there could be a system to just control the gas and flare it and then power generation or steam generation could be added later.

Chairman Hackney thanked Mr. Walsh for educating the Commission about the Chicago Climate Exchange and thanked him for getting up at 4:00 am to come here and he stated that he hoped Mr. Walsh would have a pleasant trip back home.

Mr. Walsh said that it had been an honor to speak to the Commission and wished the Commission good luck in carrying out their work and stated that he wanted everyone to know that they had friends in Chicago who were willing to clarify any further questions or ideas. He stated that the Exchange was in a growth mode and a learning mode and he very much appreciated the opportunity to be with the Commission.

Chairman Hackney then told Mr. Walsh that the earlier flights to and from Chicago were usually on time and the later ones in the day were usually late and he advised Mr. Walsh to try to come and go early.

Mr. Walsh responded that he had had a difficult dressing challenge as he had to bring a coat even though it had been fairly warm when he had left Chicago because when he left Raleigh he would be off to Montreal to speak on the same issue. He stated that the Canadian government was maybe not as far along as the North Carolina Legislative Commission was on the issue

Chairman Hackney said the group would move on to a discussion of combined heat and power as a method of reducing greenhouse gas emissions and increasing energy efficiency and then introduced Mr. Thomas R. Casten, Founder and Chair of the Alliance For Clean Technology and Founder and former CEO of Trigen Energy and Primary Energy Ventures - **Exhibit G.** Chairman Hackney thanked Mr. Casten for being a speaker for the Commission.

Mr. Casten introduced himself by saying that in about 1975 he had become convinced that Global Warming was the biggest problem we were facing and he had spent the last 30 years trying to find ways to profitably reduce climate change. He stated that in 1998 he had written a book called "Turning Off the Heat" and he said that he would be giving a copy of his book to Chairman Hackney. He said he believed the book was still somewhat relevant. He said there was also another book that would be coming out that had been edited by some folks at the National Labs called Thirteen Energy Myths and there was a chapter in it entitled "Are Worldwide Power Systems Optimal?" Mr. Casten also mentioned that that book was available on the Alliance's website.

Mr. Casten said that if he understood the Commission's mission, it was to reach a consensus on what North Carolina could do to elevate or to prepare for the effects of climate change. He said he believed that the Commission was doing a wonderful job of soliciting ideas from experts and he said he believed the Commission should take advantage of economic opportunities. He stated that he was probably out of sync with most people who talked about the problem of climate change and said that they couldn't afford to deal with the problem. He said he didn't think that we could afford not to deal with it as we were currently spending much too much money buying fossil fuel which was wasted. He said everyone would be much better not spending that money and improving the job climate instead. He said that was an opportunity. He stated that the actions taken by the Commission would shape the North Carolina economy for decades to come. He said that one of the problems being dealt with was that the energy decisions tended to be fifty or seventy year decisions and once the decisions were made the state

would be stuck with them. He said, for instance, if a big new coal plant were built, it wasn't going to be shut down next year. He stated that his presentation summery was that he would tell the Commission that the central generation of electricity was no longer optimal and that it really hadn't been optimal for the last 45-50 years and everyone was just kind of stuck with it because of conventional wisdom. He said there was a much better option of local generation that recycled energy waste. He said he would be asked that if that idea was so good, why it wasn't being done. He stated that it faced regulatory barriers and it was denied most of the benefits that it created because there was a whole system set up to move forward with central generation, which had started being done in 1910-1920. He said that system had been outgrown. He said that he had recently helped to form a group called The Alliance for Clean Technology, which proposed a suite of ideas to encourage clean technology which the group believed would profitably reduce climate change problems. He said the Alliance believed that governments could profitably mitigate climate change with what the group called a "blue box" energy policy. He said he was pleased to see, coming in the door to the building, that there were containers to recycle paper and glass, etc. He said there was vastly more opportunity to recycle energy and it was simply not being done. He said that after his presentation that he hoped the Commission would understand what he was talking about a little better.

Mr. Casten then talked about the Alliance and explained that it was a coalition of local power developers, World Wildlife, Greenpeace, Sierra Club, Suzuki Foundation and a lot of environmental groups but amazingly there are also members who represented lots of union workers who were concerned about the loss of jobs. He said there were also members who were gas and electric distribution utilities that were concerned about the rules that prevented them from doing what they knew to be a better job. He said the mission of ACT was policies that induced deployment of clean technology to profitability reduce greenhouse gas emissions. He said that ACT wasn't trying to go all the way at the present but in order to get there a lot of things that cost money would have to be done. He said he was sure that was going to happen but why not go get the "low hanging fruit" and boost the economy up first and buy some time for some other technologies to improve. He said he believed those policies would reduce pollution, improve industrial competitiveness, would preserve good jobs, and most importantly of all would lower the societal cost of heat and power. He said he had used the word "societal" because energy was the most subsidized commodity on the planet. He said that nobody paid the actual cost of energy. He stated that when a commodity was subsidized people used more of it, spent less money on conservation and they just didn't get the signals.

Mr. Casten gave an example of a massive study done in Ontario that was very well done and peer reviewed, which indicated that the health and environmental benefits of every kilowatt hour of coal fired power was 12.3 cents. He said that Ontario sold the power to their citizens at about 6 – 8 cents a kilowatt hour and then there was 12.3 cents of health benefits. He said these health problems were not "pie in the sky" numbers but were things like emphysema, emergency room visits, premature death, pulmonary problems, as well as, environmental damages. He said that the market numbers were used in the study on carbon.

Mr. Casten said that in "An Inconvenient Truth" Al Gore described global warming as an inconvenient truth and by that Mr. Casten said he took Mr. Gore to mean that global warming was a reality that people would rather not face. Mr. Casten than asked why was it something people would rather not face and why was it inconvenient. He answered that it seemed inconvenient to 99.9% of people because we were locked in conventional wisdom. He said he hoped that if the Commission took one thing from his presentation that that fact should be that conventional wisdom was the enemy. He said all the other stuff was simple but it was getting over the conventional wisdom that was the tough part. He said that wisdom assumed that the markets worked very well and he said that as a capitalist and an environmentalist, he believed that markets did work but that they churned on the signals that they received. He said they didn't work magic but worked against whatever numbers they were given. He said that with the most subsidized commodity in the world, markets found a way to cause people to use a whole lot more of it or to be a whole lot more wasteful with it. He said that it was assumed that they were working optimally with it without realizing that there were problems of barriers, regulations and price signals and it was automatically assumed that anything that was done to mitigate climate change would increase energy costs.

Mr. Casten suggested that the Commission check an article in *Foreign Affairs* and look for a little paragraph in an article by Lord Brown addressing British Petroleum, not a small company, which decided that they would, on their own, go after the Kyoto targets and that they would lower their carbon footprint back to the 1990 levels. Mr. Castin stated that Lord Brown then said that British Petroleum found that it actually cost less than they had thought and that it was done in two years. Mr. Castin said the article stated that the company claimed to have created $600 million a shareholder value. He said that he had spoken with Lord Brown's assistant, a good friend of his, and asked if that meant that after taking account of the capital cost and the cost of capital the company had created an additional $600 million in net present value. Mr. Casten said his friend affirmed that statement. Mr. Castin said that he was very familiar with a lot of BP's operations and knew that they hadn't scratched the surface in what had been done, their big profit opportunities. But Mr. Castin said still it was thought to be inconvenient and asked why that thinking was wrong. He answered that the energy system was no where near optimal. He said that electric generation efficiency peaked 45 years ago and 38% of carbon emissions in the United States came from electric generation. Therefore, he stated that if people were going to go after that problem they must go after electric generation. He said that nothing else was of that magnitude.

Mr. Castin asked if the Commission could think of an industry that had not improved its efficiency in 45 years and was still functioning today. He said that wouldn't require a lot of thinking because there was only one…electric generation. He presented data from 1960 and said that it was also the 2003 data and stated that electric generation was the only static industry around. He said if there were a big power plant sitting somewhere remote and 1,000 units of fuel was thrown into that power plant, then a great deal of waste heat would come out the top. He said only so much fuel energy could be converted to power. He said there were also long transmission lines where another 7 ½ - 9% on average, and up to 25% during the peak of energy, would be lost. He said the end user

would get 33 units of electricity for every 100 units of fuel. He stated that the power going to the light bulbs in the Commission meeting room represented 1/3 of the fuel used to generate it and that that had not changed from when he was graduating from high school.

Mr. Castin then talked about a chart that he was presenting and stated that it represented fabulous work that had been done by his friend, Robert Ayers and explained that it was a picture of the past 105 years. He explained that the top line, the blue line, represented the conversion of potential energy to deliver electricity. He said it started out at just over 3% back in 2000. He said the graph showed that for the past 60 years there was a nice, good steady improvement, improvement, improvement. He said that by that time there had been monopolies so long and the competition had become so deadened and there were so many rules in place to block anyone from doing anything different and the reward structure didn't reward efficiency that the industry had not gained one percentage point improvement in the ensuing 45 years. He explained that the red line on his graph showed the delivered efficiency. He stated that electricity didn't do anything for anyone but what were needed were useful energy services. As an example, he explained what was needed in the committee room was the electricity and the air conditioning. He said that that number hadn't improved either. So, he said, the chart showed the reason there was a problem. He said that as the country had grown and economies had developed, efficiency hadn't kept pace. He said there were better electricity generation options available. He stated that local generation, which wasn't originally wanted because it was dirty and noisy, etc., now had technology that had gotten to be beautiful and yet we continued with 1910 policies.

Mr. Castin stated that ACT had a convenient truth which was that energy recycling would ease all the problems. He said that recycling industrial waste could generate 20% of US electricity. He said he believed that to be a staggering number just from capturing the waste that was thrown away by industry. He stated that industry used energy only once He said that where there wasn't wasted energy then heat and power generation should be combined because whenever fuel was used to make power there would always be heat left over. He said that heat could then be used, or more fuel would be bought to burn to make the heat that had just been thrown away. He said that was exactly what was done. He asked that the Commission imagine a side of beef that had tenderloin in it, which would be equivalent to electricity, and also brisket and hamburger in that side of beef which would be equivalent to heat. He explained that many years ago the world figured out a trade called butchering and the butcher very carefully would take the expensive stuff...the tenderloin… out of the side of beef and would sell it to one customer and would take out the cheaper stuff…the brisket and hamburger…and would sell it to another customer. He said that a butcher was needed in the electric industry today because what was done now was to buy sides of beef, burn the fuel to get the tenderloin and then throw all the rest, the heat, away. He said the equivalent would be that a nice steak house bought a side of beef, cut out the steak, and then threw the hamburger away. He said, however, that wasn't done. He said that another restaurant like McDonalds would get the hamburger. He stated that recycling waste energy would improve the US competitive position and would have many benefits. He then explained the term

"recycled energy" as being useful energy that was derived from exhaust heat from either power generation or from industrial waste. He explained that it was tail gas that would otherwise be flared. He said it could come from places such as chemical factories, refineries, and steel plants. He said that it was a pressure drop in steam or in any gas. He used the Legislative Office Building as an example and said that he had noticed that the building was on a steam system so there must be a central system and the pressure drop in that steam system would make electricity.

Mr. Casten stated that promoting energy recycling was what he would call a blue box energy policy and believed that it was imminently politically possible to do energy recycling. He said the public understood the concept of recycling as something that would make them feel good and was also good for them.

Mr. Casten then explained his next slide and stated that the power plant shown was smaller and represented one of many power plants. He said that the same 100 units of fuel would be put into the smaller power plant. He explained that there were very short wires shown because the power plant was located right at the automobile factory or whatever factory it was that needed some thermal energy. He said that instead of throwing the heat away, it would be recycled and boiler fuel was displaced so that it stayed on the site. He said the net result was that the user would still get 33 units of electricity but they would also get 33 units of thermal energy. He said that was not a particularly good CHP plant. He stated that one of the ones that his colleagues had built was 97% efficient over all. He said that many would go up into the 80-85% range. He said that was what would happen if there was no waste heat. He said that an even better case would be if there was waste heat. He explained that there were many industrial plants in North Carolina that were in this category. He said this meant buying electricity and processed fuel and producing finished goods and waste energy. He said a plant could be put in to take the heat that was being thrown away and turn it into electricity, steam and hot water. He said that would be a savings of electricity purchases and of fuel purchases. He said there would still be the same amount of finished goods and no laws of physics had been violated and the waste stream leaving the plant had been lowered. He added that would also mean a cutting of costs.

Mr. Casten explained his next slide showing backpressure turbine-generators. He said that normally steam was made at high pressure to pack into a pipe and then when the point of use was realized, a pressure reducing valve was used to lower it down to the pressure needed. He said that was a spinning pressure reducing valve and it produced electricity at about 84% efficiency or better. But he said that in order to do that, local generation was needed and also needed was a set of rules that would allow that to happen and to capture some of its benefits.

Mr. Casten stated that the next slide showed a bigger example and said that of the 275 projects he had been involved with in the last 30 years he was probably proudest of that plant. He said that the plant was in northern Indiana, showing Chicago in the distance. He explained that there were 268 coke ovens at the plant that turned metallurgical coal into blast furnace coke. He explained that that was baked for 48 hours, which changed

the structure and all the bad stuff went away and hot exhaust came out of the top of the stacks. He called attention to all of the little stacks sticking up and to a car shown in the slide to show how huge this operation was.

Mr. Casten then said that the company, of which he had been chairman, made on average, about 65 mega lots of power and about 400,000 pounds of steam an hour out of nothing. He said there was no incremental fossil used and no incremental carbon pollution was created. He said that it was about 1.6 billion kilowatt hours of clean energy a year. He stated that in 2004 the solar collectors that were connected to the grids in the world generated 1.7 billion kilowatt hours of clean energy. He said that the plant shown in his slide generated almost as much clean energy as the solar collectors. He said some other differences were that the plant had cost $165 million as opposed to about $5 billion for the solar collectors. He said that the plant provided about 20 million dollars a year in savings to the steel company and that made that company a little more competitive. He said that markets didn't work.

Mr. Casten then said that he was showing the same chart he had just shown but that the scale had been changed and he said that it was the most important chart he would be showing. He said the scale showing electric efficiency that started at 3% and went up to 30% had been changed up to 100 and the reason was that these were some samples of the 275 plants that he and his colleagues had been involved in over the last 30 years…about $2 billion worth of plants. He said the worst of them was trice as efficient at making electricity, net of the heat credit, as the central generation. He said that he wasn't cherry picking and people might not understand how that would effect a country or a state so he gave an example. He said that Denmark was a rather low lying country and had been a little concerned about ocean rise, maybe a little earlier than some other localities, although North Carolina also had some pretty flat coasts. He stated that Denmark was approaching 60% efficiency and that 52% of their power came from local generation. He said that if someone might be thinking about costs in markets, that they should instead be thinking about the savings if their policies had driven them up to that kind of efficiency. He said instead what had been done was 45 years of sleepwalking.

Mr. Casten mentioned the recycling effect on the grid and stated that there were big problems with the grid now and that every day and every week, more money was being committed to it. He said that everyone was going to pay for this, that they were guaranteed by everyone unless someone didn't want electricity. He said that local generation reduced the grid. He stated that all power didn't have to go through long wires. He said that the power shown in the slide with the steel company didn't travel more than a mile and that it stayed right inside the steel company and lightened the load on the transmission grid and the line losses. He said it also stabilized the voltage and reduced the vulnerability to extreme weather and to terrorism. He said that it wouldn't be surprising if one of the next acts of terrorists was to blow up 5 or 6 transmission lines on a real cold day. He said then we could watch the country reel for months and months afterward. He said that most transmission lines were protected and had chain link fences around the outside. But he said that one 3 odd 6 armor piercing bullet would blow a transformer out and it would take 3 weeks to get it repaired. He said if there were lots of

sources of generation, vulnerability would be lost. He stated that only local generation could recycle energy. He said the waste heat simply wouldn't travel very far. He gave an example of putting hot water in a pipe and sending it 100 miles the end result would be ground temperature water, plus it would cost a lot of money to move it. He said that the exhaust heat from the coke ovens in the Indiana plant couldn't be moved 100 miles up the road or even 2 miles up the road. He said it had to be done right there on site. He said that people had to move out of the conventional notion that electricity was something that was made somewhere else and it had to be made where people worked.

Mr. Casten then addressed economies of scale and stated that skeptics claimed that local generation had some advantages but that big plants were just cheaper to build. Mr. Casten stated that big plants were absolutely cheaper to build and when that point was understood, then the rest of his presentation would be understood.

Mr. Casten stated that the International Energy Agency estimated that the average cost of central generation in the world last year was $890.00 a kilowatt. He said that his internal numbers from all that he had done said it would cost at least $1,200.00 or maybe even $2,000.00 a kilowatt to build local generation. He said that was the point…it would cost $310 extra dollars to build local plants. He then said that was a very good answer to the wrong question. He said that it shouldn't matter what the cost was at generation but what should matter was the cost of generation and delivery. He then said that if the delivery costs were added to the generation costs it turned out that transmission distribution in all the stations cost more than the generation. He said that $1,380.00 per kilowatt was the number from the most prominent study he had found and that several studies showed numbers in the same range. He said that local generation only needed 10% of that much and maybe only 5%. He said that would be quite a savings. He stated that a new kilowatt of central generation and wires could be built for $2,270.00 or a local generation plant could be built for $1,300.00 and he said that was a very big savings. But he added that the story was not over because when central generation was built it had to be built for the losses on peak and the losses on peak were above 20%. He said the average was 9% but on peak when more generation was needed, maybe it was a very hot day in July, the lines were like toaster wires and they would just bleed power. Secondly, and he said that was a little complex, but when there was a system based on a few large plants, there had to be much more capacity for redundancy than if there was a system based on many small plants. He said that academic studies had indicated that about 18% redundancy was run with the current system but if there were small systems they could be run with 5% redundancy and there would be the same reliability. So, he summarized that when all that information was combined, central plants of 1.44 kilowatts could be built or local plants of 1.07 kilowatts could be built and when the whole thing was done, it proved that more than 200% more than should be spent was being spent on electricity. He said that he predicted, with absolute certainty, that North Carolina would make decisions in the next 3 or 4 years to continue to do the same things as had been done in the past. He said that would mean authorizing new transition lines and the building of new central plants. He said there were many reasons for that, not the least of which was that if the politicians ever allowed the public to not have power then the politicians would be out of power so

they would always take the path of least resistance…the one that had worked. He said that unfortunately we needed to think a little more creatively.

Mr. Casten gave options using his next chart which showed the efficiency and the cost. He said that the bottom of the chart showed units per unit instead of BTUs per kilowatt. He said that the coal fleet in the US used 3.3 units of coal for every unit of delivered electricity. He said that up the side of the graph was the cents per kilowatt hour. He said the 5.5 cents was the amount paid by industrials and he said that he was concerned about raising that number because that would drive them offshore. He said the 8.1 cents was what consumers paid. He said he would like to show the options available today because the business had totally changed. He said that old plants were no longer grandfathered in and clean air was being required and scrubbers were being required on the coal plants. He said that it turned out that building a new coal plant would require about 10 cents a kilowatt hour. He said those numbers wouldn't be seen from the utilities because they would tell you at the bus bar but he said, once again, why would anyone care what the cost would be at the bus bar. He said people cared what the cost was at their homes or at their factories.

Mr. Casten said the new combined cycle gas turbine could be seen to be much more efficient and was just a little over 2 units of energy per unit of delivered electricity but because of the cost of the natural gas, it cost the same as coal. He said that everyone was talking about coal/gas figation or combined cycle gas turbines. He said they were very capital intensive. He said it did improve efficiency so from a point of view of if there were only two choices…an old coal plant or a new one…then put in the new one but know that prices would be jacked up to everybody. He said there would also be the concern of not being able to do all the other things needed to be done and the prices would go right up and industry would continue to leave.

Mr. Casten then said there were some other options. He said if renewable were installed, such as renewable wind, those costs would be something on the order of 10 or 11 cents. He said that people seemed to think that wind was being greatly subsidized but it was about the same price as a new coal plant. He said that coal gas with CO2 sesqusegation, which people think is a coming thing, would add another 7 cents to the cost so that would bring the cost up to 17 cents a kilowatt hour. He said that maybe down the road that needed to be done but in the meantime why not get the low hanging fruit, which was the recycled energy. He said that was balanced combined heat and power. He said it was putting in a gas turbine at some place, like maybe the legislative complex, that needed heat and cooling that would make electricity first and then combine the generation of heat and power. He said that would be more than 50% efficient and it would be able to sell, at a profit, at about the range of the current industrial price. He suggested that even better, if places could be found to recycle industrial energy the cost could go down to 2-3 cents and there would be negative fuel. He said that in the coke plant he had mentioned earlier, they had started with no fossil fuel but had taken the back end of the steam generated to offset more fossil fuel in the boilers so that negative fuel was credited to electricity. He said he believed those options to be the ones that should be pursued. He said that as a Commission, that was where 38% of the CO2 was and that was what needed the focus.

Mr. Casten then talked about the comparative deployment of combined heat and power around the world and our trading partners. He showed the US back at 7% and Canada at about 10%, because of their pulp and paper. He showed Portugal, China, Japan, Poland, and Germany at close to the 20% range and Russia, which had done a lot of combined heat and power, was even higher. He mentioned Finland, the Netherlands and Denmark, which was up at 52%. He said that the Alliance for Clean Technology suggested that the goal of the United States should be 30% combined heat and power and that that goal should be met as soon as possible. He said that there was no reason that the US couldn't reach that goal. He said that other nations had already done it and he mentioned that we didn't hear about the Danes not having a good life as they had the same kind of standard of living that we in the US had. He said the difference was that the Danes were just doing a smarter job.

Mr. Casten then called attention to where North Carolina was in terms of recycling energy. He said that graph showed the capacity in megawatts per capita per million people. He said that North Carolina was 22nd in the US and that meant that the state was about in the middle of the pack. He said that North Carolina should be better because the state was much higher than 22nd in terms of industrial output and that recycled energy should match industrial output. He said that other states had already done it and that North Carolina could move over in those directions with correct policies. He said recycling potential was in the steel industry with blast furnace gas and exhaust pressure drop and in refineries and chemical factories. He said that someone driving by a refinery at night would see a flare, which didn't look all that big because it was usually off in the distance. However he said marshmallows could be toasted at about 30 yards from those things as they were releasing enormous amounts of energy which was just going up into the air. He said that natural gas pumping station exhaust was another option. He said that North Carolina was crisscrossed by natural gas lines coming from the south going north to compressor stations and virtually every one of the compressor stations, powered by gas turbines, generated 1,000 degree exhaust and that exhaust was being thrown away. He said this was because the commissions and the electric utilities and others couldn't figure out how to take that 8-10 megawatts and put it into the grid…fossil fuel free. He said the rules in the state prevented it from happening. He spoke about pressure drops of gas from delivery points. He mentioned the city gate where the gas came into North Carolina and said that another megawatt of power could be made by taking the gas out. He mentioned glass, fiberglass, exhaust, sewage gas, landfill gas, and biomass, hog farms, things that Mr. Walsh had already mentioned. He stated that in Nepal there was a methane generator that handled one family and one water buffalo and provided enough methane for the cooking, the light, and to eliminate the wood gathering. He said that all process thermal users could do the CHP.

Mr. Casten then stated that clean technology needed to be defined and he said that people assumed that clean technology was renewable, which was true but he said there were also other kinds of clean technology as well. He said that ACT had defined clean technology, although it was arbitrary. He said it had been decided that clean technology was over 57% delivered efficiency. He said that PERPA required 43%. He said that ACT also

said that greenhouse gas emissions less than equivalent to burning one unit of coal per unit of delivered electricity. He said these requirements wouldn't be made using a coal plant but that some other kinds of fuel would need to be used. He said there were no limits on size, technology, fuel, or location. He said it was a performance standard that said the future should be made with cleaner technology and then gave a definition of it and stated the reason the definition was so important was because once there was a definition then there could be policies put forth that would encourage the market to go build the stuff. He said the reason the market didn't already do this was because there were two very major barriers to clean technology and they had been built in and there were huge vested interests that wanted to keep those barriers. He said that first of all there were all kinds of barriers to local generation such as the interconnection costs and hassle involved. He said that ACT said that if a new load was going to be put in, the utility would be hooked up and would get paid for overtime in the rate base, but if a CH2 plant were going to be put in and needed to be hooked back to the utility, the assumption was that it would be for the benefit of the new plant and that plant should pay all the costs. He said that study after study had indicated that the new CHP plant had a net benefit to society and the benefit back to the grid was 3 times the cost of the grid to serve it. So he said that was one of the hassles involved. Then he said there would be standby charges on top of that which would knock the money down. He said that could be fixed but he said there was anther part of the problem which was more less talked about but was very important and that was that many of the benefits of clean technology created were simply not available to the people who developed it. He said as a developer of clean technology plants he could say that those benefits could not be obtained. He said the Climate Exchange was welcomed because at least there was a way to go get $4.00 a ton for carbon, and some of his projects were a ton per megawatt. So he said that was an extra $4.00 per megawatt or 4/10 a cent per kilowatt hour. He said that T & D were then avoided. He said that when new central generation was built it would cost somewhere between 3 ½ and 15 cents to move that power to the user. He said that would be 15 cents for a very dense city and that 3 ½ was the average number. He said that when a plant was put in downtown Raleigh no credit was given and there was the same offer for power as if the same plant were located way out in the boondocks. He said this was done because of the assumption that everyone would need a wire. He said there was line loss avoidance when his type plants were put in…the line losses went down immediately but that there would be no payment for this.

Mr. Casten reminded the group that he had talked about Canada being 12 cents a kilowatt hour. He questioned if the numbers were half of that, which he said he really suspected would not be the case, but if so, that was still 6 cents a kilowatt hour and nothing got paid. He said that ACT proposed that to spur clean energy there were several things that could be done. He said that distribution utilities could be required to interconnect anybody who qualified as clean technology and tell them to put in rate base. He said this was a benefit to the public so why not socialize it and put it into the rate base. He said this would eliminate all the augment about the arcs and sparks and the fact that it couldn't be done. He said the utilities knew how to do the inter-connect and they knew how to stall a co-generator for two years by auguring about the dangers that would happen. He said just eliminate all that and put it in the rate base. He said there should be no stand by

charges. He said if power was needed it should be paid for at the same rates but there shouldn't be a special standby charge which was only there to prevent local generation.

Mr. Casten then said that changes in regulation should also be addressed so that the utilities wouldn't be as biased as they usually were. He said he wasn't trying to kill utilities but the rules just gave them a throughput bias. He said if those rules weren't changed the utilities would have to behave in the way the money led them. He said they were responsible to their shareholders too. He also said that clean technology should be permitted as pollution control. He said if a clean technology plant were to be put in, there could be a 6-18 month process of applying for a new source permit to put it in. He said if it was clean technology and if it were called a clean technology devise, it would be a very different permitting scheme and a lot more would get built. He said a state-wide standard offer for clean technology should be set up to satisfy the expected load growth and retirements. He said it should be expected to fill every bit of electricity needed in the state with clean technology and only build something else when there was no other choice. He said there should be no size or time limits involved. He said not to make the mistake of saying that a plant was 5 kilowatts or 5 megawatts or 10 megawatts or that it would only be good until the following August. He said to just put it out there. He said if a refinery could build a 400 megawatt plant that was clean technology then that was a good thing and should be encouraged. He said if someone else put in a 40 kilowatt little micro-turbine and it met the standards that should be encouraged too.

Mr. Casten said that ACT suggested that the wholesale price for power should be paid and to let it float…not to lock it in at all. He said that half of the calculated benefits that the clean energy produced should be paid. He said that included health effects, T & D savings effects and he said that if half those benefits were to be paid, then every developer in North America would be setting up offices in Raleigh and trying to do business in North Carolina. He said that would be bringing in private capital, creating construction jobs, etc. He said that people got what they paid for in this world. He said developers were not going to come in and lose money to create benefits that they weren't going to be paid for. He said if the benefits were split then the public would win and climate change would be mitigated.

Mr. Casten said that if the best was to be stimulated, which would be the recycling of waste heat, a standard offer wouldn't work. He said the problem was that there was a risk involved. He gave an example and said if a developer came to a plant and built it based on the heat coming off the silicone making process and if the initial silicone plant went out of business then the developer would be left with an expensive bunch of spare parts so there would be a risk for him to build. He said that there would also be a risk for the state. He said he would suggest that the state set up a mechanism to insure the risk of industrial shutdown. He said that Wall Street wouldn't finance plants. He said the reason there were 65,000 megawatts of untapped industrial recycling was that Wall Street was afraid to go and provide the money needed, and he said that because if the plant shut down it would be a non-insurable risk. He said the way to solve the problem was to provide a limited loan guarantee for new industrial energy recycling facilities that stated it would be payable only if the host factory ceased production for a certain period of time

and then the developer could put that plant with the state and ask for the depreciated book value. He said that would cover the risk of industry ceasing and it would create a virtual cycle. He said that the weakest industries couldn't get funding to do the recycling so it wasn't done. He said they would have the extra costs so that made them uncompetitive and finally the factory would shut down. He said if funding was provided, the factory would remain competitive and more people would be hired and more money would be earned to pay more income tax. He said that could trigger an industrial boom and although there would be some fail, there would be cost offsets because of the extra taxes and benefits that wouldn't have to be paid to unemployed workers, etc. He said that the benefits of encouraging both kinds of recycled energy would be that a lot of new investment would happen, a lot of new jobs created and that new revenue streams for industry and improved industrial competitiveness, and public sector gains from taxes would occur. He said that convening the Commission was terrific and that the state could become a real leader. He said the convenient truth was that energy recycling could solve multiple problems. He said that North Carolina could mine industrial waste energy and could create or add revenue streams for industry and could recycle to provide affordable clean energy, but he added that conventional thinking would have to be overcome and that was the hardest thing there was to do. He said the barriers to efficiency would have to be removed and every barrier protected some vested interest. He said that part of the T & D would have to be paid and the health care savings included in order to have this thing come forward and that would cause some accounting problems because it would come out of different departments. He said that the beauty of the Commission was that it could look broader than the Health Department or the Energy Department.

Mr. Casten said the last slide showed that Denmark on the left in 1985 looked just like North Carolina except for the shape of the map. He said there was a handful of very large power generating facilities. He said that in 20 years Denmark had moved to the map on the right just by changing their policies and encouraging combined heat and power plants and plants that recycled energy and wind. He said Denmark had created a boom in their wind industry and had created industrial things. He said the US bought product from Denmark because they were now better at it than what could be gotten here because they had a big enough market to have developed it. He said that North Carolina could be turned into a sort of a mini-industrial center for recycling energy by being a prime mover.

Chairman Hackney thanked Mr. Casten for his presentation and asked for questions.

Representative Harrison thanked Mr. Casten also, and said she had a couple of quick questions. She asked if other states had pursued the barrier removal avenue and asked for examples.

Mr. Casten answered that there was barrier removal activity going on in probably half the states. He said that Connecticut had eliminated the standby charges and was providing a $450.00 grant for new power to help built desperately needed new power lines. He said the northeastern states had an ISO that managed the grid and that group had said there was a locational benefit and new plants would be paid between $40.00 - $80.00 per

kilowatt per year to build new plants which would get to start with the new barriers. He said that New York had done extensive work to try and eliminate the inter-connect and FURK had held very long hearings to bring everyone to the table to try and come up with a standard interconnect. He said that the interconnect had been absolutely disastrous for his industry. He said that in Colorado the utility had five months to respond to a new design and if one change was required the utility had to make the change and then the state had five months to respond again. He said it usually took at least three of those cycles before an inter-connect was approved. He stated he believe that everyone doing it had gotten it wrong because there really wasn't a standard inter-connect. He said that it was just complicated and what happened was that there were Commissions made up of lawyers, political scientists, etc. who would argue with utility guys who were electrical engineers. He said that approach just didn't work. He suggested that the inter-connection be socialized by telling the utilities to put it in a rate base and then money could be earned from it. He said that California had done standard offers and was absolutely the most successful state in encouraging cogeneration. He said that many people all over the world were having the same problems and were all chipping away at the issues. He said this Commission had a chance to chip away at the whole batch at once. He said that ACT didn't propose a Chinese menu.

Representative Harrison then asked if the plants required new source review or would trigger new source review.

Mr. Casten answered that what had happened over the past 30 years was that the environmental policy had said they would grandfather everybody who existed at their point of permitting and assumed that it would be like automobiles and that 11 years later they would be gone. He added that after that time everybody new would be required to come up to the current technology. He said that was a disastrous mistake. He said that that had given power plants immortality because the plant would just keep renewing the permits forever. He said that unlike automobiles, power plants could be run for 50 years. He said that what had happened was that if a new plant was put in now, 2006 standards would have to be met and then the power would have to be sold in competition with some other plant that was meeting no standards. He said that was finally changing. He said the Clean Air Interstate requirements were making all the power plants dump money on and many were now spending more money for pollution controls than the plant had cost. He said in the meantime, a clean plant still had to go through an environmental review, announce that it was a new source etc. and go through a long complicated expensive process and it made small plants uneconomic because the transaction costs were so high. He said if it was clean technology then it should be called a pollution control devise, and a hearing should be held and everyone should be asked if anyone objected to putting in a pollution control devise. He said if that was done then 30 days later there would be a permit for the plant.

Representative Harrison stated her belief that the source review was implemented at the state level so maybe there would be some flexibility there.

Mr. Casten stated that most of the rules were at state level.

Chairman Hackney stated that here were still two more presentations and he asked that any further questions and answers be kept brief and he called on Senator Pittenger for a question.

Senator Robert Pittenger thanked Mr. Casten for his presentation and then asked about a business plan for the businesses that Mr. Casten had discussed. He stated that if they were to embrace what Mr. Casten had outlined then wouldn't they be very successful? He said if that was the case, based on models such as Denmark's, then why would there be a requirement of guarantees to go to Wall Street to find capital, if those business models had so much upside potential? He asked why not just let the free market help them go find the required capital?

Mr. Casten replied that he would love to let the free market do it but the rules didn't let the benefits flow through. He said that companies typically wouldn't do that, that it wasn't their core competency because they were looking to outside third parties. He said the outside third part would look at the plan and would have to make a bet as to whether that company would be around for a long time to come. He said the fact of the matter was that out of about 80 thousand megawatts of potential, 10 thousand had been built and 70 thousand hadn't been built. He said he believed the reason that 70 thousand hadn't been built was because of the risk issue.

Chairman Hackney then called on Dr. Eggers for a question.

Dr. Eggers then asked about the term "inter-connect" and asked if that meant a new plant coming online.

Mr. Casten answered that inter-connect was the connection made to the grid. He said that nobody wanted to stand alone. He said that if plants went down, there needed to be backup and plants wanted to be able to buy and sell and go back and forth. He said because electric utilities were monopolies they had the ability to say that no one could inter-connect except by their standards.

Dr. Eggers asked about a reference by Mr. Casten of a study done in Ontario that did a full cost accounting of prices of electricity.

Mr. Casten answered that he couldn't give that reference off the top of his head but that he would get that information to Dr. Eggers and to the Commission.

Dr. Eggers next asked if there was some policy group that could provide some help on wading through the ocean of details that it would take to straighten out some of the policies in North Carolina.

Mr. Casten stated that the Sierra Club had agreed with him at the Clinton Global Initiative that the Club's main activity would be to promote ACT and that ACT had already engaged with the Sierra Club on that issue. He also mentioned that World Wildlife, Environmental Defense, and Greenpeace were all looking at those things and he

believed that any one of those groups would be happy to help. He said that they were all supporting combined heat and power.

Chairman Hackney then called on Mr. Ivan Urlaub.

Mr. Urlaub said that he could appreciate Mr. Casten's comments about the vulnerability of the grid. He asked if Mr. Casten could talk about the state of the US grid. He said that a lot of benefits had been discussed but that there seemed to be an 800 pound gorilla in the closet that no one had talked about, either here or in the southeast which was about the cost of keeping the grid up, must less about expanding it for new facilities.

Mr. Casten responded that the grid was enormously vulnerable. He said that most of the power for the country's big cities came through two or three 500 MVA transformer stations and they sat around the edge of the cities and they couldn't be rewound or repaired locally, they had to go off to a factory and they could be taken out with one armor piercing bullet. He said that was a way that terrorists could destroy our economy and not have to commit suicide. He said the lines that went back and forth were an intense web of lines and if a couple of those lines were dropped going across a river at a time when loads were peaking, especially in the winter, inordinate problems would result because most of people's heating systems wouldn't run without electricity. He said even if the heating units were oil fired, they still needed electricity. He said that even without the terrorist problem there had been 250 outages in the US since 2000 that had affected more than 5,000 people. He said everyone knew about the big outage that blacked out 50 million people. He said the rest of the blackouts tended to be ignored because they were considered to be "acts of God". He asked the question that if a tree branch dropped on a line and the system failed was that because of the fallen tree branch or was it because the system was so under-built and so over taxed? He said there was a problem in making the lines better because it was just getting harder and harder and harder to get the necessary rights-of-way to build transmission. He said that was the one thing that was absolutely going up in price and would continue to go up in price. He said if things weren't done about any other problems we would strangle ourselves trying to continue to have a system that could go through the grid. He said he didn't see a technical fix for the problem except for moving the power generation closer to the users.

Chairman Hackney thanked Mr. Casten for his provocative report and for coming to speak to the Commission.

Chairman Hackney stated that the Commission had heard about co-generation and those possibilities and that the next speaker had been doing that successfully for some time. He then introduced Mr. Raymond E. DuBose, the Director of Energy Services Department at the University of North Carolina at Chapel Hill. **Exhibit H**

Mr. Dubose thanked Chairman Hackney for his introduction and stated that his presentation would be a shorter one. He restated that he was the Director of the Energy Services Department, which was responsible for all of the energy supply and the utilities on the UNC-Chapel Hill campus. He said he had given similar presentations around the

country at various conferences and he said that he had known Tom Casten for several years. He stated that it was a personal and professional thrill and an honor to give his presentation about what was being done in Chapel Hill to such a distinguished group.

Mr. Dubose said that he would be giving an overview of the energy supply systems at UNC-Chapel Hill. He said he would talk about that cogeneration facility, which was the kingpin of the combined heat and power system at the university. He said that he would also be talking about the university's chilled water system. He said that chilled water was just that … cold water. He said the cold water was made in central plants using refrigeration equipment and it was not too dissimilar from a refrigerator or a window air conditioner. He said that cold water was then pumped around campus and was used to air condition the buildings. He said he would also be speaking a little bit about combined heat and power performance.

Mr. DuBose stated that a district energy concept was used at UNC-Chapel Hill and explained about that concept. He said district energy was when thermal energy, in addition to electrical energy, was distributed throughout the system. He said there were central plants for the production of steam and there was an underground steam distribution system which reached all the buildings on central campus. He said there was also a central chilled water system. He explained that there were five central plants, which distributed water to large underground piping and then to the campus buildings. He said that an important factor was the fact that the university owned its distribution system and that it was an integral system with generation but they also purchased from Duke Energy. He said the campus facility generated about a third of the power used on campus and the remaining two thirds was purchased from Duke Energy.

Mr. DuBose said that he would use the terms cogeneration and combined heat and power interchangeably. He said that cogeneration was the term he had grown up with when he first went into the energy business back in the mid 70's. He said cogeneration was a term that was coined back in the Jimmy Carter days when the county was going through the energy crisis of the 70's. He said, however, the term most commonly used in the present time was combined heat and power. He stated that the meaning of the term at UNC-CH was the simultaneous generation of steam and electricity. He said the reason that was used at UNC-CH was that it had a very high thermal efficiency and he said he would go into that in a little more detail later in his presentation. He also said there was a low environmental impact from that usage.

Mr. DuBose restated the information given by Mr. Casten that the average US power plant had a thermal efficiency of about 33-35% at best. He said the combined heat and power system at UNC-CH had a thermal efficiency of about twice that amount or about 70%, which meant that their system got about two times the amount of usable heat from a unit of fuel burned.

Mr. DuBose said that on the UNC-CH campus, the combined heat and power concept had to do with the close relationship of steam, electricity, and chilled water. He said steam

was used to generate electricity and that it took electricity to generate steam and that chilled water could be generated using either steam, electricity, or both.

Mr. DuBose stated that the high pressure boilers in the UNC cogeneration facility generated steam. He said that steam went through a turbine and a turbine turned a 28 megawatt generator. He explained about the 28 megawatts by saying that the UNC campus peak demand for electricity last summer was about 80 megawatts. So, he said, the 28 megawatts was about a third of the peak campus demand. He said that electricity went out onto the campus grid and combined with the two thirds of the electricity which was purchased from Duke Energy. He further stated that the boilers generated high pressure steam and that the steam passed through the turbine and rather than condense it as utility power plants would do, the UNC-CH facility extracted the steam from the turbine and used it for the heating and cooling of all the buildings on the campus. He said hot water was generated for the residence halls, such as water for bathing, and also the steam was used to sterilize surgical instruments in the hospital and used to sterilize laboratory equipment in the research labs. He added that the steam was also used for cooking and for dish washing in the dining halls.

Mr. DuBose said that from an aerial view of a co-generation facility, as Mr. Casten had stated, the perception was that power plants were dirty and noisy. However, he said that the UNC-CH facility was in a very quiet neighborhood in Chapel Hill. He said that although there had been some problems with noise, about 99% of the time the facility was extremely quiet and was a major energy facility operating very successfully in a quiet neighborhood.

Mr. DuBose said that coal was primarily burned in the UNC-CH facility and that in the past 12 months, 98% of the fuel requirements had been met with coal. He said that natural gas and oil were also used but only as backup fuels. He said the UNC-CH boilers didn't do well by using only gas or oil.

Mr. DuBose stated that the UNC-CH facility used a technology that called for circulating fluid out of bed combustion to burn coal or CFB combustion that reduced the Nitrous Oxides (NOx) and Sulfur Dioxides (SO2), which was the purpose of the technology. He said Nitrous Oxides were reduced by controlling the furnace temperatures and he explained that the UNC-CH furnace temperatures operated at about 1500 degrees Fahrenheit, where typical coal combustion was done at about 2300 degrees Fahrenheit and above. He said that Sulfur Dioxide was also reduced in the university system by adding a sorbent into the combustion chamber with the coal. He said the sorbent was typically limestone and was a high calcium carbonate material which caused the calcium and the limestone to combine with the SO2 from the coal combustion process to form calcium sulfate, which precipitated with the ash from the coal.

Mr. DuBose again stated that the university facility was a very clean plant and was operated under the new source performance standards that were promulgated back in 1986. He said the university had been very successful in compliance with those

standards, which called for at least a 90% reduction of the potential SO2 0.6 pounds of NOx per MMBtu input and it had limits for opacity in particular.

Mr. DuBose stated that the next thing he was showing was a viewport into the combustion chamber. He said the orange glow was the coal actually burning and the orange color was indicative of the 1500 degrees Fahrenheit. He said that low temperature combustion meant that the material had to be held in the combustion chamber for a much longer period, so the plant was relatively tall at about 12 stories or 120 feet. He said the reason for the height was primarily the combustion chamber which had to be large enough to hold that coal burning for some period of time.

Mr. DuBose talked about the five central chilled water plants, two of which used steam to generate chilled water. He said the chilled water was then distributed through very, very large bore underground pipes and was pumped all over campus to air condition the buildings. He said that to do that either electricity or steam could be used.

Mr. DuBose said that he was next showing a picture of the university's north chiller plant in the Bell Tower parking lot. He said there were about 50,000 tons of chilling capacity in the university's central plants. He said there were about 7500 tons of steam absorption chillers and the chiller plant shown had about half of that steam absorption capacity.

Mr. DuBose then mentioned that one of the university plant's efficiency tools was the thermal energy storage system that was just completed earlier in the year. He said that he believed there was a similar one under construction just down the street from the Legislative Office Building. He said the university's tank was very large, about 130 feet tall by 80 feet in diameter and that it held over 4 million gallons of water. He stated that the water was cooled at night when the electric prices were low and then the cold water was used during the daytime to air condition the campus buildings. He said the tank had been operated very successfully last summer. He said the Gary Tompkins chilled water operation center was in the foreground of the picture he was showing, with the thermal storage tank in the background. He said the chillers in that particular plant were purchased and matched very well to the charging requirements for the tank.

Mr. DuBose stated that the UNC-Chapel Hill power plant purchased power from Duke Energy on a real-time pricing rate, which meant that Duke sold the university plant their power at Duke's cost so that the pricing varied. He said the cost could be high during the day and relatively low at night. He said that was the economic advantage for the operation of the university's thermal storage system. He said that it was not just the thermal storage but it was the overall ability to provide immediate response to pricing signals that allowed the university to use that purchase rate to their advantage. He said it was a combination of the steam absorption chillers and the thermal storage. He stated that the past summer the university power system was able to clip about 10 megawatts off the peak load using just the thermal storage system. He said it was, of course, the cogeneration of electricity.

Mr. DuBose then discussed the CHP performance. He said a recent study that a consultant had done showed that the value of the university's electric generation operation or combined heat and power performance was about $6 million in the year of the study. He said the value of the electric rate the university power plant was on, due to the operation of the generator, was about $2 million a year over and above the next best rate that the university might operate on if it weren't for their combined heat and power system.

Mr. DuBose stated that the UNC-CH power plant had been recognized several times by the EPA's Energy Star combined heat and power program for their combined heat and power system. He said the award was a certificate of recognition that was received for superior environmental performance of the university's combined heat and power system in the year 2000.

Mr. DuBose said that in 2003 the UNC-Chapel Hill power plant received the Energy Star Award for combined heat and power and that award was for significant fuel savings. He said the UNC-CH system wasn't competitive but that they were beating the criteria that the EPA had set. He said that the university plant had submitted 12 consecutive months of operating data and had qualified for those recognition awards from their actual performance data.

Mr. DuBose added that last year the UNC-Chapel Hill power plant had received a Combined Heat and Power Partner Greenhouse Gas Reduction Report award for the fact that the plant had produced about 230 tons of carbon equivalence less than separate heating and power plants. He said that was equivalent to about 1600 acres of forest or about 1100 automobiles.

Mr. DuBose said he was very proud of what the UNC-Chapel Hill power plant facility was doing and that they were only about 25 miles down the street so he welcomed the Commission members to come and see his facility and said he would be glad to give tours of the facility. He then asked for questions.

Senator Janet Cowell asked about one of the later power points showing the overall value at $6 million per year. She wanted information about the amount of capital investment in the plant and how that was calculated with the operation value.

Mr. DuBose answered that the plant had been built in the late 80's. He said construction was begun in 1988 and the plant was taken over from the contractor in January 1992. He said the cost was about $10 million for the generation equipment and the overall project was a $99 million project that built the boilers and some electric substation equipment and some chiller plant absorption chillers…the steam absorption chillers at the North Chiller Plant in that project. He said there was an additional $10 million or so invested in the higher pressure that was needed to generate power…making it a total investment somewhere in the neighborhood of $20 million out of the $99 million project. He said he believed he could answer Senator Cowell's question by putting it in perspective. He said studies in the mid 80's showed there would be a pay back for the cogeneration option of

about 5 years. He said that didn't happen and it was calculated that the system wasn't paid back that quickly but that it had taken about 10 years instead. He said that in the mid 80's the projection was that electric rates would increase and, of course, electric rates from the late 80's into the 90's actually stayed about the same because electric utilities were trimming back due to the threat of deregulation.

Chairman Hackney asked if the UNC-Chapel Hill power plant had investigated selling credits on the Chicago Climate Exchange.

Mr. DuBose answered in the negative and said that it was probably a good idea.

Chairman Hackney said it sounded as though there were some credits that could be sold. He then called on Dr. Stephen Smith.

Dr. Smith said he would like to know how many CHP operations there were in the State of North Carolina and if an analysis had ever been done to show the potential there could be for the state.

Mr. DuBose answered that he was not aware that any such study had been done. He said that as Mr. Casten had stated, most of the facilities were industrial. He said he had seen, at one time, that there were 50 plants which used combined heat and power technologies.

Chairman Hackney then asked if any other universities were doing what UNC-Chapel Hill was doing.

Mr. DuBose answered that most of the larger universities around the country were doing it.

Chairman Hackney asked specifically about North Carolina.

Mr. DuBose answered that he wasn't aware of any other North Carolina university that was doing it.

Chairman Hackney asked for other questions and said he was sure that some of the Commission members or guests would be showing up at Mr. DuBose's door to get his promised tour and he thanked Mr. DuBose for his presentation.

Chairman Hackney introduced the final speaker, Mr. Michael Cogsdale, President of the North Carolina Council of Churches and Rector of St. James Episcopal Church in Lenoir, North Carolina, who delivered the remarks as set out in his prepared statement which was distributed to the member of the Commission and which is attached to the minutes as **Exhibit I**

After the conclusion of Reverend Cogsdale's presentation, Chairman Hackney thanked him and asked for questions or comments.

Dr. Stanley Riggs congratulated Reverend Cogsdale and the NC Council of Churches for embracing the earth and said he had a question. He said that with respect to the Council of Churches and the position that Reverend Cogsdale had just presented he wondered if Rev. Cogsdale might be in contact in any form or fashion with the more conservative and more fundamental religious groups in North Carolina, who might not have the same attitudes.

Reverend Cogsdale answered that the short answer to that question was probably not.

Dr. Riggs then said it seemed to him that it was very critical for everybody to buy into this. He said it was everyone's earth and that Rev. Cogsdale represented 1 ½ million people and Dr. Riggs stated his belief that Rev. Cogsdale was in a very prime position to help open some doors. He said that Dr. E. O. Wilson, one of the world's great ecologists, had just written a beautiful book on the Creation and on the rate of lost of species on the surface of the earth. Dr. Riggs stated that Dr. Wilson had written the book as a letter to the fundamental preachers of the country. Dr. Riggs recommended that Rev. Cogsdale read the book. Dr. Riggs stated his belief that it was absolutely essential that everyone had a responsibility of trying to reach the rest of the religious community with respect to educating them about the earth. Dr. Riggs thanked Rev. Cogsdale for having the position that he had on the issue.

Rev. Cogsdale agreed with Dr. Riggs and thanked him for his remarks.

Chairman Hackney then called on Ms. Susan Tompkins.

Ms. Tompkins thanked Reverend Cogsdale for being willing to attend the Commission meeting and present his remarks. She then asked what people of faith should practically be doing, except maybe changing the types of light bulbs they used and carpooling.

Rev. Cogsdale answered that people should get involved with groups such as the Commission and should educate themselves and make their voices heard in terms of what their concerns were in their local communities. He said people should educate themselves about the problems and about the issues and involve themselves in the legislative process.

Chairman Hackney again thanked Rev. Cogsdale and announced that the normal agenda had been concluded except for Commission discussion and announcement and asked if anyone had any announcements.

Chairman Hackney stated that Mr. Givens had already announced the date of the next meeting as being on Friday, January 12 at 10:00 a.m.

Chairman Hackney recognized Dr. Stephen Smith, who said he wanted to briefly update the Commission members on the fact that at the request of the Commission Chairs, he had drafted a letter in response to the provisions about energy efficiency and renewable energy at the federal level for agriculture and forestry. He said that he had gotten the

letter to them late last week and that they hadn't had time to review it. He said that would continue to be deliberated upon. He said that he also wanted to engage anyone else on the Commission who might be interested in seeing the letter in draft form. He said that he would make sure that Bob and Mitch received a copy of the letter. He said that he would, hopefully, have something for the group to review by the next meeting in January.

Chairman Hackney said the Commission would also be talking about recommendations and all suggestions, particularly those pertaining to win-wins that would create jobs and reduce greenhouse gases and save energy, etc. He asked the group to be thinking about that and to feel free to circulate anything that needed to be circulated prior to the next meeting.

The meeting was adjourned at 1:40 P.M.

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Representative Joe Hackney	Genie Clark
Presiding Co-Chair	Committee Assistant

EXHIBIT A	Meeting Notice
EXHIBIT B	Meeting Agenda
EXHIBIT C	Visitor's Registration
EXHIBIT D	Copy of "*Spotlight*" article entitled "The Science Is Settled" by the John Locke Foundation.
EXHIBIT E	Copy of presentation by North Carolina Treasure Richard Moore on the responsibilities of the State Treasurer's Department, a summary of the state pension fund, information about Ceres, Investor Network on Climate Risk (INCR), Corporate Governance approach to problem of climate risks and available tools and projects, information on how insurance companies were dealing with the problem of climate changes, information on what was being done to encourage companies to cut down on carbon emissions and to report results.
EXHIBIT F	Copy of presentation by Dr. Michael Walsh, Senior Vice-President of the Chicago Climate Exchange. This showed the options for reducing greenhouse gases, rationale for emissions trading, the growing CCX family, size of possible greenhouse gas markets, an explanation of the CCX and its members, reasons for becoming members of CCX, CCX market architecture, CCX registry, CCX trading screen, CCX emission offsets program and concept, defining CCX offsets: principles, stable, predictable offset rules contributing to successful GHG mitigation financing, CCX price and volume history. CCX progress, conclusions, and views.
EXHIBIT G	Copy of presentation by Mr. Tom Casten with the Alliance for Clean Technology and the Founder and former CEO of Trigen & Primary Energy. This presentation included the Commission's mission, introduced the Alliance for Clean Technology (ACT), an inconvenient truth, conventional central approach data, US electric efficiency 1900-2005. better electric generation options, ACT's "convenient truth" of energy recycling, explanation of recycled energy, decentralized generation option of combined heat and power, industrial energy options, backpressure turbine-generators, industrial energy recycling, energy recycling impact on the grid, economies of scale, future generation options, comparative deployment of combined heat and power in 2004, installed recycled energy capacity per capita, NC industry recycling potential, ACT definition of clean technology, barriers to clean technology, ACT proposals to spur clean technology, stimulating

	recycling of industrial waste energy and benefits, and changes in Denmark.
EXHIBIT H	Copy of presentation by Mr. Raymond E. DuBose, Director of Energy Services Department at UNC-Chapel Hill. This presentation discussed energy supply systems, cogeneration definition and concept, chilled water systems, thermal energy storage, and CHP performance
EXHIBIT I	Report presented by The Reverend Michael H. Cogsdale, President of the North Carolina Council of Churches, and Rector of Saint James Episcopal Church, Lenoir, North Carolina.