

Global Climate Change Commission
February 11, 2008
Room 3 McKimmon Center
North Carolina State University

Minutes

Co-Chair Representative Pricey Harrison called the meeting to order at 1:00 pm and welcomed all members of the commission and visitors. She then introduced George Givens, General Counsel, who reminded the members to sign and turn in their reimbursement forms. He informed them that were entitled to two days reimbursement for attending the Institute for Emerging Issues Forum being held at the McKimmon Center at North Carolina State University. He also went over the schedule of future meetings.

Mr. Givens also thanked the Institute for emerging Issues, especially Diane Sherry, for making this particular facility available to the commission and making arrangements for Dr. Pachauri to be available to speak to the commission. Mr. Givens reminded the commission that they are committed to getting Dr. Pachauri back to the forum in one hour. And with no further ado Mr. Givens said that “it is an honor to introduce Dr. Pachauri to you”.

Please see the following page for Mr. Givens Introduction of Dr. Pachauri.

Dr. Pachuari:

Welcome members of the legislative commission on global climate change. I'm very grateful to you distinguished ladies and gentlemen for giving me this opportunity; to me this is like a homecoming. I'm an alumnus of NC State University and I owe a great deal to the state of North Carolina. I would say that the modest achievements that I have had really can be attributed to what I learned in this state, so thank you very much. It's a wonderful feeling to be back here and to talk to this distinguished group, which I'm sure will have much to do with the future of this state and of course the future of the world and the human race. I will run through some facts that come out of the IPCC fourth assessment report and without further ado. I will first give you a brief history of what we know about climate change. This is something that was essentially investigated by Swedish scientists more than 100 years ago, by the name of Dr. Henricus, who incidentally won the Nobel Prize for chemistry, I think in 1896, if I'm not mistaken. He calculated through a series of equations on what would happen to the climate of this earth if carbon dioxide increased in concentration in the atmosphere. And I must say a lot of these conclusions and findings have been drawn out by the realities instead. In 1988, as some of you honorable members would remember, was an extremely hot period where there was also extensive drought throughout North America. It was then that James Hanson, a very well known scientist who had been working on global climate change for a long time, appeared before the U.S. Congress and put forward the view that global warming is already happening. That created a lot of sensation, a great deal of stir all over the world and it was then that the UN General Assembly said that the IPCC should be established as a body to look into all aspects of climate change and carry out regular assessments in climate change. Fortunately this was not established to the UN body, it was established as an intergovernmental panel, where essentially decisions are taken by all the governments of the world and it's an autonomous body, even though it was established under the umbrella of the one (inaudible) organization and the United Nations environmental program. So it doesn't receive any funds from the U.N., it's not directly under the control of the U.N., it's an intergovernmental body where all the governments of the world take decisions on the basis of consensus and I must say in the twenty years of the existence of this body it's had a remarkable record of being able to reach consensus. In my view if one establishes a tradition and a spirit of doing things in a particular way, as difficult as they may be, that essentially becomes a precedent for others to follow in the future. I think that's really been the case with the IPCC. In 1992 the U.N. framework convention on climate change was agreed to and in 1997 the Kyoto protocol came into existence, though of course it was not ratified and until its ratification it only a protocol that essentially existed on paper. 2005 was the warmest year since record keeping began in the mid-19th century and this was also the year when the Kyoto protocol went into effect, with the ratification by Russia, which essentially was the last country that was required to ratify, to give it the essential numbers that were required for ratification. Now the work of the IPCC as I mentioned, is guided by the mandate which was given by the (inaudible) organizations and its role is to assess on a comprehensive, objective, and transparent basis scientific, technical and socio-economic information relevant to understanding the scientific basis of climate change, its potential impacts, and the options for adaptation and mitigation. I want to emphasize that the IPCC by itself doesn't do any research, it mobilizes the best experts and scientists from all over the world and we carry out an assessment of climate change based on peer-reviewed literature, so everything that we look at and take into account in our assessments has to carry credibility of peer-reviewed publications, we don't settle for anything less than that. So essentially it is the work of the scientific community drawn from all over the world that provides us with the material for our assessment. The writing and review processes is very robust, very vigorous, we first have experts review the first draft of the report, then governmental experts review the second draft of the report and the draft a summary for policy makers. Then finally, governments review word by word the revised draft summary for policy makers and I might mention the policy war, the summary for policy makers is something that has to be approved by all the governments literally word by word. That causes very complex job, because you have diverse interests, diverse levels of expertise and know-how, but I must say, in the end, we do manage to arrive at the consensus.

Sometimes it can be a very painful and slow process by which we get agreement, but so far we have succeeded in getting it. Just to give you some facts, the fourth assessment report to the IPCC, which was completed last year culminating in the synthesis report which was released in November of last year, required and it won 2,500 scientific expert reviews. The (inaudible) contributing authors, these are people who provide inputs on their specific expertise. There are 450 lead authors. These are the people who actually do the writing. They came from over 130 countries. So it's clearly an undertaking of mammoth proportions and great complexity, but the good news is that we've been able to find agreement and find consensus for everything that is published in the end. One major finding that we had in the fourth assessment report was what is projected before you, that warming of the climate system is inequitable, its beyond any scientific doubt and it's something that is now very clear, because it's based on observations of increases in average air and ocean temperatures, the widespread melting of snow and ice, and rising average sea levels. The melting of snow and ice is something that is happening at a very rapid rate across the globe. For instance, I've been in the arctic region myself and I've seen the kinds of changes that are taking place over there. Three weeks ago I was to go to Antarctica with the Norwegian Prime Minister; unfortunately with all the extensive travel I do I came with a bad attack of the flu and had to cancel the trip. I'm just itching to get there one of these days. I'll also be going to Greenland, where major changes are taking place. To give you a perspective over a period of time, let me mention that the warmth of the last half century is unusually increasing, at least in the last 1300 years and the last time the Polar Regions were significantly warmer than present for an extended period was 125,000 years ago. Reductions in polar ice (inaudible) 4-6 feet. I do want to emphasize however that when that warming took place 125,000 years ago the reasons were very different. That was essentially on account of changes in the position of the earth in relation to the position of the sun and that caused warming, significantly more than we have today. It's only to emphasize the fact that if we continue this warming for long periods of time, then clearly we could be facing the same risks that were faced by this planet 125,000 years ago. This is a chart of all the changes in global climate surface temperature that have taken place since industrialization began and you see these dots through which the line has been drawn, essentially to capture the changes that have taken place. There are ups and downs, as you will see, and that's largely because solar activity does influence the climate of this earth and there are some spots, the eruption of volcanoes, that has an impact on the climate of the earth, and of course human intervention through the increase in greenhouse gases in the earth's atmosphere. Now what is significant is period beyond the middle of the last century to where we are today and you will see that there has been a very rapid increase in temperature in this period. If you draw this line, covering a period of 100 years you would get a slope that gives you an increase of .074 degrees Centigrade/Celsius in this entire 100 year period, but if you look at the last 50 years you get a much, much steeper line which is equivalent to 0.128 degrees Celsius increase in temperature in this period. In other words, in the last 50 years the rate of increase of temperature has been higher than the rate of increase in the previous hundred year period. We also know that eleven of the last twelve years rank amount the twelve warmest years in the instrumental record of global surface temperature. We now have pretty firm observation, a great deal of data, on the basis which we can come to these conclusions on measurement of changes. This gives you the cumulative balance of glacier mass in different parts of the world. You will see there's been a shape decline in the size of the body of ice in these glaciers. Not such a susceptible change in the case off the glaciers in Europe and the Andes mountains, but elsewhere there's been a very rapid decline. This clearly means that if we look at the impact of this sea level rise, it can be substantial (inaudible) because all that mass of ice is flowing into the oceans and adding to sea level rise. This is a part of sea level rise and during the last century the increase in sea level has been about 17 centimeters, this is on the basis of actual measurements and our projections for this century are anywhere from 18-59 centimeters, but we're hesitant to place an upper limit on sea level rise because it's entirely possible that with rapid melting of the west Antarctic ice sheet and Greenland, these are large bodies of ice that are sitting on land, and if these were to collapse as a result of the rapid melting that is taking place over there, then we would have sea level rise of several meters. Now here again I might point out that global average sea level has risen since '61 at an average rate of 1.8 millimeters per year and since 1993

at 3.1 millimeters per year. Just to make the translation from metric numbers to the foot/pound system I mentioned that during the last century sea level rise has been 17 centimeters, that's pretty close to a foot in terms of increase, I would say about .75 or $\frac{3}{4}$'s of a foot in terms of increase in sea level. There are other changes in climates that are taking place which are well documented, for instance the extreme precipitation events. This is happening around the globe. You find that you get a large quantity of rain or snow in a short period of time which clearly causes some serious problems. There's been an increase in heat waves and of course the worst example, which I'm not (inaudible) human induced climate change, was what happened in 2003 in Europe, when around 20,000 people died in Paris and the surrounding areas. There have been changes in cyclonic activity and certainly an increase in drought as well as floods. If you look at the causes of change, there's been a substantial increase in the emissions of greenhouse gases, carbon dioxide being the most prominent and also therefore as a consequence, a substantial increase in the concentration of these gases. The atmospheric concentration of carbon dioxide in 2005 exceeds by far the maximum rate over the last 650,000 years. You might ask how do we tell what happened in this entire period of 650,000 years, fortunately science has reached a stage where through the drilling of ice cores in these large quantities of ice in the Antarctic region and elsewhere, we're able to pinpoint exactly when the ice was formed. We see air trapped in those little pieces of ice, that air, when analyzed, can tell you exactly what the carbon dioxide concentration was at that point in time, because when you get snowfall over perhaps millions of years, all that snow keeps coming down and newer layers keep mounting on it over a period of time. So it's relatively easy now for scientists to tell exactly to drill deep and to be able to pinpoint exactly the period when that ice was formed historically. Also, global greenhouse gas emissions have been on the increase in recent years due to human activities and their influence since pre-industrial time, substantially with an increase between 1970 and 2004. Now I just want to make an observation. I lived in this part of the world in the early 70s and I recall in 1973-74 when oil prices quadrupled worldwide after the oil price spike. As some of you distinguished ladies and gentlemen would remember, that one had to stand in line early in the morning and get \$3 or \$5 worth of gasoline and I think all of that really had a major impact in bringing about major improvement in automobile efficiency. In fact I don't mind confessing to this distinguished audience, I had this youthful desire to buy a nice large luxury car and I bought a Rolls Royce for almost a song, it cost me nothing and I drove it for almost a year and that's the only time when I've had an inefficient car to drive all over the place. The point I'm making is that soon after that there was a major worldwide effort to bring about improvements in energy efficiency and that carried on until about 1985 or so, but then oil prices crashed. As a matter of fact, I wrote a book which was published by Johns Hopkins University Press in 1985, in which I had projected an increase in oil prices in the future, but almost a week after the book was released oil prices crashed, with it the sales of my book. My only consolation was that I wasn't the only one who was wrong; there were several other, much bigger people, who made the same mistake. The point I'm making also is the fact that somehow we've lost sight of the whole issue of energy security and all the other benefits that go along with it and we've been continuing to increase our emissions in the last 3 1/2 decades. Now most of the observed increase in temperatures since the late 20th century is very likely due to the observed increase in natural background greenhouse gas concentration. Now this is a significant finding that we have come up with in the IPCC fourth assessment report and when we use the term "very likely" it represents the probability of over 90%. So in other words the warming that is taking place, since the middle of the 20th century is most probably the result of human induced climate change. And CO₂ annual emissions grow by about 80% between 1970 and 2004. So while greenhouse gas emissions have grown 17% and carbon dioxide has been growing even faster, which means that we've been continuing to burn more and more fossil fuels. Now, if we look at causes of change, what you see over here is the result of climate models, which are very sophisticated, they run on very powerful computers these days and what began as a result is this grouping of projections for the past using only natural forcing. In other words only natural factors like solar activity, the eruption of volcanoes and so on, but if we run those models using both natural and anthropogenic forces, both natural as well as human factors, this is the kind of plot that we get for the 20th century. Now, if we were to compare this with the actual observations and this is

what we end up with. So the point I'm trying to make is that fortunately climate modeling is now reached a level of reliability, where we have a very high level of confidence in what we are saying and what we are projecting for the future. Observed (inaudible) patterns of warming are only observed by models which include anthropogenic forces, so in other words, if you were to leave off the human factors and the human drivers of climate change, then I think we would be total wrong in coming up with projections of the future. We now know that continued emissions of greenhouse gases at or above concentrate to cause further warming and induce many changes in the global climate system during the 21st century and this will very likely be very larger than those observed during the 20th century. Now if we look at projections for the future what you find in this diagram is different shades of warming that we could project. For instance the darker shades represent high levels of temperature increase and the lighter shades are somewhat at the other end. It's interesting to observe that the highest warming is going to take this in the upper latitude of the northern hemisphere, that's where you'll get the darker shades. This is brought on by facts; even today the Arctic is warming at twice the rate of the rest of the globe and if you look at projections for the future this trend remotely intensifies. Now that again is going to cause problems because the Arctic region is going to lose a great deal of ice. I might also say that they might be other forms of tensions that would arise because shipping in the Arctic region will become almost an annual business. Its lot would be confined to two or three months of open sea routes and therefore it is likely to be a lot of competition for the resources in that region. The honorable members would know that some months ago Russia planted it's flag at the bottom of the North Pole which signifies the fact that they would want to get the resources over there but 25% of the hydro-carbon resources that have not been found yet in the world are supposed to lie in that region. So there's a lot of competition that's going to increase as a result, because shipping will become much easier. This clearly means that climate change is not going to be uniform, that there are some parts of the world that are going to be effected far more than others and I'm only talking about temperature changes at this point in time. In actual fact there are several other impacts that I would get into. Our projections for the future, for the end of the 21st century are that at the lower end of the scenarios that we can project we get a best estimate of 1.8 degrees Centigrade and at the upper end, about 4 degrees Centigrade, at the end of the 21st century. Now in the last century, and I just want to mention the exact temperature increase was about 0.74 degrees Centigrade. So if you were to combine that with even the 1.8 degrees Centigrade increase that would take place at the lower end of the scenarios, that gives you a total temperature increase of over 2.5 degrees, which is pretty serious. We also know that there could be a front of irreversible impacts. Partial melts of ice sheets from polar lands would imply several meters of sea level rise and this really means Greenland and the rest of Antarctic ice sheets. We've assessed a number of species in the IPCC and our assessment is that 20-30% of the species are likely to be at risk of extinction. Increases in warming exceed 1.5 – 2.5 degrees Centigrade. In North America, warming in western mountains is predicted to cause decreased snow pack and reduce summer flows, excavating competition for over allocated water resources, increased number, intensity, and duration of heat waves allow potential for adverse health impacts, and coastal communities and habitats will be increasingly stressed by climate change impacts interacting the development and pollution. So the coastal communities are particularly vulnerable to the impacts of climate change. One worry is that there are several populations which are going to be very vulnerable. The four (inaudible) that are more dependent on climate sensitive resources. The four in the world really don't have irrigation, they are dependent on rainfall. Their soil conditions cannot be improved through artificial means and they are therefore are dependent on that and a lot of their food, fiber and fuel comes from harvest and biomass. One vulnerability in Asia, Africa and Latin America is aggravated by other particle stresses and within other areas the poorer, modernized communities (inaudible) are particularly at risk and I might mention that even though I'm not connecting Hurricane Katrina with human induced climate change, the impacts of that particular event were particularly sever for the poorest communities in New Orleans for instance. Because they just didn't have the means by which they could have withstood this terrible happening and therefore what I'd like to emphasize is that the poorer, in a (inaudible) way they live, it could be poor countries or prosperous countries, they are certainly at a disadvantage. Now the fact that the Norwegian

nobility decided to give the Peace prize for 2007 to the IPCC and former Vice President Al Gore in some sense signifies the link that they saw between climate change and threats to stability in human security. Climate change could impact adversely basic human needs, access to food, access to water and stable health conditions. Coastal dentures are particularly vulnerable. This is a picture of most dentures in different parts of the world that would be highly vulnerable. The red ones are extreme cases, the brown dots are high cases and black dots are medium vulnerability. The most effected would be the mega-dentures in Asia, which includes cities like Shanghai, (inaudible) which have very high concentrations of populations, a great deal of property and infrastructure, all of which would be highly vulnerable in the case of coastal flooding. So these are areas that obviously would have to take some steps to adapt to this threat of climate change and their risks are expected to increase rapidly by coastal settlements (inaudible) increased risks above sea level rise. Agricultural activity at low latitudes are likely to suffer severe losses because of high temperature, drought, flood conditions, soil degradation. I can tell you on the basis of research that's been done in several developing countries, there's already a perceptible decline that's been measured, in years and productivity as a result of the impacts of climate change. Now this has implications for food security worldwide. Now our assessment is that there's a possible year reduction of 50% by 2020 in some African countries and these are countries that are already stressed with malnutrition and burdens of food supply, 30% possible year reductions by 2015 in Central and South Asia, 30% reduction by 2018 in Latin America. More significantly crop revenues could fall by 90% by the end of the century in Africa. Now when that happens, these communities will really have no choice but to move away from there and that represents a threat to security and peace in that region. So they would really not be able to carry out any of the agriculture with this drop in revenue that is likely to occur. Water availability is also likely to be affected, because of changes in precipitation factors, increases in (inaudible) of ground water, and glaciers melting, which would decrease river flows. The rates of people exposed to increased stress have been projected anywhere from 120 million to 1.2 billion in Asia by 2020, as early as that, 75-250 million in Africa by 2020, 16-24 million in Europe by 2017. Human health would be affected with these deaths, disease and injury, due to heat waves, storms, floods, fires and droughts. Increased frequency of cardio respiratory disease at higher temperature, increases in malnutrition and consequent disorders, increase (inaudible) disease, excavation of abundance and/or toxicity of cauldron. In general I might mention that (inaudible) diseases will increase because with higher temperatures a lot of organisms that carry disease will be able to thrive and perhaps multiply. Now may I submit that if one wants to look at the impacts of climate change in any area, it's absolutely essential that one carries out a study of the impacts specific to that particular region. In the case of North Carolina there's need to look at what might happen to coastal settlements, mountain ecology, human health, agriculture, and water resources, because if this research would be carried out in the next 2-3 years, I think this distinguished body would be in a much better position to recommend the kinds of adaptation that would be required. Because on a (inaudible) basis it's absolutely essential that adaptation has to be taken and even if you were to stabilize the concentration of greenhouse gases at current levels, climate change and it's impacts will continue for several decades and therefore there will be no choice but to adapt to the impacts of climate change over a period of time. For instance, if you were to stabilize the concentrations today, for the next two decades there would be a change in temperature of about 0.1 degrees Celsius over a decade. There's also a certain inertia in the energy system because you have power plants, you have a whole lot of infrastructure where you really can't bring about radical changes in the way you use and consume energy and therefore are locked into emission intensive infrastructure in developmental (inaudible) and therefore one has to plan out how one can bring about a transition, if we have to mitigate the emission of greenhouse gases. Choices about the skill and timing of greenhouse gas mitigation and I'm talking in the global level, involves balancing the costs of emission reduction against the (inaudible) delay. If we delay taking mitigation measures, then clearly the impacts of climate change would become more severe over time and leading to balance against what would be the implications of mitigation, that means producing greenhouse gases today. Now here is an important table and I'd like to draw your attention to the first row over here, which says that if you want to stabilize these greenhouse gas concentrations say between 445-

490 parts per million of CO2 equivalent, this will limit temperature increase to between 2 and 2.4 degrees Celsius, but if you're going to do that, then on the basis of our assessment CO2 emissions will need to peak by 2015, beyond which they will have to decline. But even with that, on account of global expansion alone, we would get sea level rise of 0.4-1.4 meters. So we're talking about roughly 1ft-4ft of increase in sea level as a result of thermal expansion alone. This doesn't take into account the melting of ice bodies at all. Now this is a pretty simple calculation. There are no uncertainties at (inaudible), because if you get this level of warming, then the oceans will become warmer. At the moment they haven't become warm all the way down to the lowest depths. It takes a long time for the oceans to warm, but when that happens then we get this level of sea level rise due to expansion alone. So mitigation efforts over the next two-three decades will have a large impact on our opportunities to achieve global stabilization. Hence if you want global stabilization levels in the future it's imperative that we start mitigation actions today. No looking beyond the (inaudible) the emission target to limit warming to 2-2.4 degrees Celsius would require developed countries to significantly reduce their emissions below 1990 levels or roughly 10-40% by 2020 and 40-95% by 2050. Developing country emissions need to deviate below their projected baseline within the next few decades. This means that developing countries will necessarily have to deviate from the path of growth of emissions that has been established by the developing countries, creating a very different future. However the good news is the cost of taking these actions is not high at all. We have assessed that if we look at the last line over here, to stabilize at 445-530 parts per million of CO2 equivalent, the costs to the world in 2030 will be less than 3% of the GDP, which amounts to 0.12% per annum and in 2050 it will be about 5.5% of the GDP. If we want to debate these two choices, let's say (inaudible) GDP without mitigation and assuming a steady rate of growth, this is what we would get. But with the stringent mitigation measures, this is the way that line of growth would actually deviate. And what does this amount to? This essentially means that the level of prosperity that the world would attain in 2030 would at best be postponed by 7 or 8 months or a year at the most. This is the price, the highest price that the world would have to pay, to avoid the impacts of climate change, which naturally could be substantially higher. This is the kind of choice that we need to grapple with. Stringent mitigation would postpone GDP growth of one year at most over the median term. There are a lot of co-benefits of mitigation, co-benefits from reduced air pollution, because when you, for instance reduce fossil fuel burning, there's also a benefit in terms of improved air quality at the local level, which has substantial health benefits. There would be increased energy security, much more rural employment, because perhaps one would deploy more decentralized systems for providing energy. There would be increased agriculture production and reduced pressure on (inaudible) ecosystem due to increased troposphere ozone concentrations. The co-benefits of mitigation are therefore offset a substantial fraction of mitigation costs. So while I talked about the 3% loss of GDP in 2030 if you really count all the other benefits that go with it then 3% would be easily wiped out. So in other words it could turn out to be a win-win situation because of higher energy security, local benefits in terms of lower pollution and therefore larger health benefits and so on. Now we've also found that all stabilizations, or stabilization levels assessed, can be achieved by department portfolio of technologies that are currently available or are expected to be commercialized in the upcoming decades. So we really don't have to wait for any major breakthroughs in new technology development. We can start this action of reducing emissions of greenhouse gases through mitigation with technologies that are already available to us. But this assumes that investment (inaudible) and technology transfer and incentive are in place for technology development. So you need a policy framework which would drive producers and consumers in that particular direction. What other kinds of policies and practices are required? Appropriate (inaudible) infrastructure developments, research development and demonstration, changes in lifestyle management practices, I recall I was teaching in the summer here when President Jimmy Carter came up, I'm sorry that wasn't in the summer, no it was in the winter that time, when he appeared at the Carnegie and I loaned double stacks and appealed to all Americans to do that. Now that's a change in lifestyle which I don't think represents any great loss of benefit but I want to give you a little anecdote which I'm sure I could share in confidence with this distinguished group. Three years ago I was invited to (inaudible) Leadership poll, by the Secretary of the

D.O.A. in Washington, D.C. I flew in that afternoon and there was a long line at immigration and by the time that I could get out, about an hour and a half had elapsed. There was a car that had been sent to receive me and this gentleman said "I thought you hadn't turned up, it's been a long time." I said "Well the immigration took a long time." He said "well, I've got a car for you, lets walk down there" we went along and this was a hot sunny day and I went there and I found the engine running and the air conditioner running. So I said "My God! Why did you have to do that?" and he said "Well I wanted you to step into a comfortable car." I said, "But you know, you probably had the engine for two hours. Was that really required?" So that's the kind of change in lifestyle that I'm talking about. It just means some attitude shifts, which when put together will really make an enormous difference. And that's what saying when (inaudible) practices, but what is absolutely critical is to provide an effective carbon price signal. None of this is going to happen unless we have a price on Carbon. If we had a price on Carbon, then the world would be invested in research and development, consumers would go in for a low carbon technologies and I think you can bring about a shift in the economy quite effectively. What I want to emphasize is that the world is moving towards a low carbon future. I mean you've heard some of the proposals that the European Union is considering, Japan is going to follow suit and this will happen in many other parts of the world, even in this country you have some states which are clearly taking proactive measures. Now the world therefore is going to be a low carbon world. Companies that they believe will meet with success in both business and society contexts and those that don't lag behind will suffer from losses in the market place and loss of reputation, because we'll be living in a globalize the world and I think that if we read the writing on the wall, then I think it would make a lot of sense to invest in those technologies that are going to lead to a low carbon future. Some countries have been smart, they are already doing that. I know for a fact that (inaudible) spoke today and he's a good friends and I didn't have a chance to say hello to him today, but you know he's investing in nuclear imagination, but he believes, as he said, "I'm investing because green is green" it means you have green bucks because you are investing in green technologies. DuPont has made a major commitment and there are several other such companies in the world, because they realize that is where business interests will lie in the future. (inaudible) nations that show commitment to the growing global consensus would also be interesting in the future. Everyone wants to be part of the global consensus and I think leadership in these areas would carry a great deal of prestige. And those that (inaudible) would certainly lose very little power and influence globally. So I think that these are realities that we must understand and finally on a philosophical note I think all of us have to understand that we as human beings are part of nature. As Chief Seattle said "Man did not weave the web of life, he is merely a strand in it. Whatever he does to the web, he does to himself." I think we need to understand that and if we do, then clearly all these actions are really going to be in support of the ecosystems of this planet and to the benefit of the conservation of natural resources on this planet. So with this I'd like to stop and take questions. Thank you very much.

FEMALE CHAIR:

Thank you Dr. Pachuri and thanks again for making the trip. We'll take questions if I could just invoke the chairs prerogative on (inaudible) presentation to address the skeptics reaction to the fact that developing nations that haven't yet achieved a level of industrialization that we have, and I'm wondering also were they fit into the 445 parts per million, if that calculates in there already take in some level of industrialization. If you could address that please.

Dr. Pachuri:

I think that's a very valid question, but I do want to point out a few facts. If you look at the developing countries and then look at their terms, they have substantially lower levels of emissions. I mean ranging from something like one ton per person per year, which compare to 20+ tons per person per year in North America. It's also true that there are 1.6 billion people on the face of this planet that really

don't have access to modern forms of energy or electricity and I think that developing countries, politically there's a huge challenge, you really cannot say that we will cut down on the growth of emissions without serving these communities and these societies. It's also unfortunate, but true that every human being living in a developing country is so overloaded by the dream that is so much a part of let's say the American way of life. Everyone wants to buy a motorcar, everyone wants a refrigerator and how do you thwart their aspirations and ambitions and say "Look you guys can't have this, that's only meant for the developed countries" So it's a real dilemma, but having said so I must emphasize that in the developing countries there is a need to deviate from the path that's been pursued by the developed world. But how does one bring that about? I think there's a need for much greater technology (inaudible) there's also need for practicing what you preach. And I think some major (inaudible) and some measure of action to bring about improvements in efficiency, some reduction in emissions, and therefore fossil fuel use in these countries is vitally important. Otherwise there is this growing suspicion in the developing world and I talked to one of the leaders over there, that the developed countries don't want to do anything. I talked to the Chinese and they tell us "Look, we're supplying all the supermarkets, and all the department stores in the U.S. with goods and services that are being produced over here, obviously we're going to emit more." Now that's a very (inaudible) kind of argument and I do realize that it's a one-sided argument. On the other side, I mean China is now so focused on creating economic growth and development. I've been traveling to that country since 1981 and I can't recognize the place. In 1981 everyone used bicycles; everyone wore Mao suits, drab grey clothing, which had no style or elegance about it. May General Mao's soul rest in peace if they ever did, but the result was that they are now embarked on a path of development which is a clear explanation of what's being done in the developed world. You can't go around anywhere on the streets of Beijing because it's a parking lot. There are so many cars over there and they're flooding the market with millions and millions of cars. So it's a real dilemma and I don't know what one can do about it. I think we really have to work together. I think we need to come up with some clear result to bring about change in the developed country and perhaps work and assist the developing countries to move on a path that is distinctly different from what has been established in the developed countries of the world.

FEMALE CHAIR:

Thank you. I realize that our country has to play a much greater leadership role than we have in the past. Thank you for that. Mr. Chair do you have a question?

MALE CHAIR:

You have told us about the work of the IPCC today, in the fourth assessment report. What can you tell us about where the IPCC is going in the future?

Dr. Pachauri:

I think what we're doing is currently carrying out a detailed debate. As a matter of fact I've drafted a paper which I have sent to all the governments of the world, to all the authors of the fourth assessment report, and the (inaudible) of the IPCC, to carry out a detailed discussion and debate which will be culminated in April when we meet in the city of Budapest, to see what the IPCC should do in the future. We would be very sensitive to what governments feel we should do, because I think we've reached a stage where we need to look at our record in the past and what the expectation of the world are for the future and then come up with a plan of action. So I expect in the next few months we will have much greater clarity in response to that question.

Mr. Wilson:

Thank you madam chair. You mentioned several key areas where North Carolina could study our vulnerabilities to climate change. One of the frustrating things for us as state climatologist, my role is to provide some kind of guidance on this, that the global models don't do a very good job of simulating the climate in the past of in the Southeastern general part of North Carolina in particular. So it's very frustrating to give good guidance as to what might happen in the future. Given that, what strategy would you recommend for us to identify our vulnerabilities and give good guidance for the global models?

Dr. Pachauri:

I think that there are now quite a few regional models which with some adjustment of data can be used within a regional context. I would submit that in three or four models could be used one can come up with the consensus on what is most likely to happen. Of course having lived here, I know North Carolina is a very varied set of ecosystems reaching right from the coastal areas to the agricultural regions and of course the mountains. So one would have to see what the impacts would be on each of these ecosystems. My own belief is that in the next two years or so one could come up with a fairly comprehensible assessment of the impacts, at least enough to give us some policy prediction and guidance. But this means mobilizing some of the academic and research communities in the state and perhaps even outside rather quickly, to come up with results as soon as possible.

Dr. Eggers:

Thank you so much for being here. One thing that's frustrating to me when I see presentations like this for example, with your slide on economics is that it only went out to 2030 and I think many things about that; if we have a globe stabilizing greenhouse gas emissions and greenhouse gas concentrations in the atmosphere that's in the neighborhood of 500 or 700 parts per million, we're really condemning future generations to a life beyond understanding, in terms of the suffering that we are committing as (inaudible) and I hoping you're nodding in agreement to that, and so its frustrating to me to see that 2030 number and not see it go up 100 or 200 years for the correlation of what concentrations of greenhouse gas that would result in because if we are willing to condemn future generations and not (inaudible) them, I think we have impoverished the art of understanding already. Now I think this commission has a very profound responsibility and I think that as an environmental science professor that to talk about decreasing emissions and we need to talk about going carbon negative, if we're really going to be responsible about being stewards of the future and I wonder if you could talk about whether you think that's important and what we might do for that.

Dr. Pachuari:

First really, I submit that we've carried out assessment of tragedy is right to the end of this century and to be quite honest to go beyond that is really increasing the range of one's certainty. The reason why we focused on 2020 is because we feel that the global community must understand the urgency of action in the immediate future and also accept the fact that it's not expensive. I think our 2030 figure clearly establishes that. We also know that for the next 10-20 years irrespective of what scenario you pursue the increase in temperature would hardly vary, but where you really start seeing a difference and major deviation between the major scenarios and based on how much you stabilize that, it becomes much, much larger. Therefore I think it's critically important, and I agree with you entirely m'am, that we need to look at scenarios beyond 2030 and incidentally the fourth assessment report, perhaps for the first time, we've come up with a clearer linking and a clearing identification of temperature increases and the impacts that would occur with respect to water availability in terms of ecosystems, root security, so in other words its for the global community to decide whether 2 degrees centigrade is good enough or should it be lower. Now it really, and I always put this forward as a question, we thought more dangerous levels of climate

change were dangerous for whom? If you talk to the small island developing states, they tell you they've crossed that dangerous threshold, if you talk to people in Bangladesh, a country with a huge coastline and so low in terms of height of above sea level, that a single cyclone, a single storm surge causes a enormous devastation, thousands of people die, so much property is destroyed in a densely populated country, so if you talk to these communities across the world, they'll tell you that we're living in a state of fear. We cannot accept temperature increase of even two degrees Celsius, that's a bit much. So I think we really need to look at our responsibility, not merely to future generations, I would say this very generation, because climate change is happening today, it's not something that's science fiction in the future and therefore what I would submit is that we should look at the cost of actions that we could take and those actions are really not all that expensive. I believe that it is well within the capacity of human society with the economic, the technological path that we have to bring about a transformation. Some countries that were protected and are a very modest example of (inaudible). They have taken very proactive steps to world renewal in forms of energy, they haven't lost terms, they have added terms as a result. The economy in the last two or three years has been doing much better than it ever did before. So it really in a sense provides you with opportunities and then by doing all this you will be able to bring down prices of oil in the global market; much of the huge money that is going into other parts of the world, which if I may say so within the confines of this room, is not really being used for human welfare in any part of the world. In fact it's being used in several cases to create dangers that they are all subject to. So I think there is a much larger focus in bringing about a major transformation and unless we start doing that today, we're going to really compound out problems into the future.

FEMALE CHAIR:

We have time for a couple more questions, but I did want to recognize a couple of distinguished guests we have in the audience today, Martin Riggor, who is the (inaudible) General in Atlanta. Thank you for coming and we have our distinguished Speaker of the House Joe Hackney with us today, former chair of this commission.

Dr. Smith: Dr. Pauchari, I appreciate you coming here with us. This commission has struggled with what we can do at the national level and state level. You have a global perspective on this and you put up some slides about part of the reduction goals for reduction. Can you talk about for just a minute to us about the importance of what we should be doing at a state level and possibly (inaudible) state level goals that are concurrent with what we need to be doing at the national level.

Dr. Pachuari:

I can only come up with some suggestions because I would really need to study the situation at the state, which was my home coincidentally, before I could come up with something specific, but first thing I must mention, is that we must understand the impacts of climate change. I think the sooner we do that the better, because to create the infrastructure, to create the institutions, and the mechanisms, by we might be able to reduce the risks to life and property the better it will be. Secondly I will submit that this being an agricultural state it would make a lot of sense to look at options by which you could use large quantities of biomass to produce energy. Of course, also, we have to be very careful that it doesn't in any way, infringe the ability of the state to produce food and food grains, because that in my mind would be a great mistake. For there are several other technologies that the state could work on that would really provide win-win solutions. Finally, I think it's worth the while of legislature and the executive branch government in the state to look at means by which you could place a price on carbon. Now I do realize that its very difficult for one state to take such a step, because you have to compete with the rest of the world, but there might be means by which you could bring about a transition by gradual, because over a period of time actually speaking, it would give the producers of goods and services in the state and enormous advantage to be, to get the first advantage of moving in that direction. One would have to clearly see which industries are likely to be hit by such a measure and therefore you certainly don't want to have them run into serious problems but creating a signal by which they innovate, by which they start moving in that direction. I think one needs a set of fiscal policies by which you can move the state towards a lower carbon pattern of production and consumption. Finally, maybe worldwide thinking of some industries where you might even lay down some benchmark standards and regulate them. I mean the building sector is one sub-sector. In my old institute I didn't have a chance to go and do that as constructive building, one of which is a trading complex that uses more power from the grid. We've designed a building in such a way that the demand for energy is 1/3 of what it would be in a conventional building and all of it has been linked to what it would take and a biomass gasifier that generates power and they use the energy in the earth, where four meters below the surface of the earth the temperatures are uniform throughout the earth. So we've designed four (inaudible) through which it (inaudible) comes into living spaces that gives you cooling in the summer and heating in the winter. So you know, I think the building sector is one area where one can bring about changes in terms of benchmarks, in terms of building codes, and some rare conditions by which you can shift to a much more sustainable future. So I think these some of these measures, if one could evaluate them, provide a pretty strong program of action in this field.

Mr. Buffet:

Thank you Madame Chair. Thank you Dr. Pachuari for your clear answers. I want to ask the question and I only want to ask an analytical approach (inaudible). You put up the mitigation targets for the developed world in your slides, those create a range of debate both in the United States and (inaudible) and in this commission significantly strived for this goal for the state of North Carolina about what is enough for us to do? Each of those targets are 10-40 by 2010 and 40-95 by 2050, we have legislation in the United States Senate now that's in the middle of that. Some think it's not enough and so those of us who are trying to set goal and inspire some independent thinking about when do we act and when do we wait for a possibly even stronger program in the future? What would be your analytical approach here; what would be enough for this country to do in terms of action (inaudible)? How much do we need to act in the short term trying to wait two-four years and wait for a rosier picture.

Dr Pachuari:

I think that the U.S. has to be part of the next agreement, which is supposed to be is supposed to be finalized by the end of 2009. I would be very proud if this country took a leadership role. If the rest of

the world is going to accept a part of lets say 20%, then the U.S. can be brought to a new percent. I think that the county cannot lose as a result, because as I indicated earlier, if the world is really going to be a low carbon world then the U.S. is really has to be able to forefront, not only to provide model and political leadership, but also to take advantage of market opportunities that will grow in the future. I can assure you that let's say the world agrees to 20% carbon in the next agreement by 2009 it's entirely possible that four or five years down the road people may come up with more stringent topics. So you really need to lead by example and I would say that the legal (inaudible) from the U.S. administration have to engage fully in what is happening in the (inaudible) natural process and I'm glad at least that they are now part of (inaudible) natural process, because a year or two ago there was a kind of disdain or contempt for what was happening under the U.N. framework convention in climate change and I hope it changes even more in the future. So I think the U.S. has to be a part of the next agreement.

Co-Chair Representative Harrison asks if there any more questions. Representative Thomas offers a motion: "I would like to make a motion that essentially is as follows: that this body adopt a basic premise for future work that, number one, Global Climate Change is indeed real, and further, that human activity is a factor in that change, and with that, we can move forward on addressing some of the issues that we have discussed here today and in previous meetings."