

## **Climate Change: Main Conclusions from the IPCC Forth Assessment Report**

Your Imperial Highness the Crown Prince of Japan, may I also pay tribute to His Excellency the Prime Minister of Japan Mr. Fukuda, your honorable Chairman of the GEA Mr. Saito, former Prime Minister and former Chairman of GEA Mr. Kaifu, Director-General Mr. Oki, Excellencies, distinguished ladies and gentlemen, it is indeed a great privilege for me to be invited on this extremely important occasion and to be given the privilege of addressing you on an issue, as His Imperial Highness and the Prime Minister have already reminded us, is going to be an extremely important issue for humanity and all living beings on this planet.

I am very grateful Your Imperial Highness for the reference that you have made to the award of the Nobel Peace Prize to the IPCC. May I, on behalf of the entire scientific community, and the experts who have contributed to the work of the IPCC, express my gratitude. May I also say that almost as soon as this award was announced, I received a letter from His Excellency the Prime Minister of Japan offering his congratulations, and that shows not only the importance that the Government of Japan attaches to this extremely critical area of challenge, but also the fact that the leadership of this country has a heart and a graciousness that all of us admire. I, coming from Asia from India, greatly respect these cultural attributes and thank you very much.

May I at the outset, mention that the GEA is a unique organization. It has the ability to bring together diverse leaders from all shades of public opinion and across the political spectrum, and I think that is what is needed to tackle this major challenge of climate change. We have to bring all shades of public opinion and all stakeholders together because this cannot be a problem that is solved by any isolated action. On behalf of the IPCC may I also say that the Japanese scientific society and the scientific community have contributed enormously to the work of the IPCC, and several institutions in particular have been major contributors; the National Meteorological Institute and the National Institute of Environmental Studies, of which I happen to be a member of the Board, and I must pay tribute to its Chairman Hamanaka-sensei who is here. In fact, may I say my own institute is privileged to have Dr. Hironaka on the governing council, so we have had a long Japanese connection, and enlightened advice and leadership at the top most level in my institute which I may say is one of the largest institutes in the world dealing with energy and the environment.

I am also a great admirer of the actions that Japanese society and the Government have been taking in there "cool-biz" initiative. One of the major findings that we have in the three Working

Group Reports of the IPCC, and particularly Working Group III, is the importance of lifestyle changes. This problem cannot be treated as one which requires a technological fix only. There has to be a change in human behavior and I think in this regard, I must say that Japan is setting an outstanding example.

Let me mention that the IPCC has brought out three Working Group Reports as part of the Fourth Assessment Report. The fourth report which will be the synthesis report, is due to be released next month in Valencia, Spain. And that, may I mention distinguished ladies and gentlemen, is going to be a 30 page report which I hope everybody will be able to read, because it will be the synthesis of all the knowledge contained in the three Working Group Reports brought together in a manner that makes it highly policy-relevant. And I expect this particular report will have a major input in the deliberations and discussions that take place in Bali in December of this year. In fact, at our request, the Framework Convention on Climate Change Secretariat postponed the Bali meeting by four weeks so that the delegates and the negotiators have enough time to read and absorb the material that is provided in the synthesis report.

I am going to run through what I will be covering in my presentation. Firstly, I will try to establish what we have found in the Working Group I Report, that climate change is unequivocal and therefore the scientific debate on the human influence on climate change in my view is now over, and we now therefore have to see what is to be done to change human activities and human behavior to solve the problem. I will also present before you some expected trends and impacts, and key vulnerabilities in Asia. Asia being a rapidly growing continent with the largest share of the human population located over here, clearly vulnerabilities in Asia are going to be of importance not only to those regions, but Japan as a leader of Asia, has to be concerned about them. I will also establish that mitigation is needed urgently, and I will mention some key technologies and measures by which we can bring about a change in the right direction, and I will quickly mention some success stories in Japan which could be spread and replicated in other parts of the world.

Let me first give you a paleo-climatic perspective which will tell you what human activities in the last 150 years or so have done within a much larger historical context. And here let me mention that the last time the polar regions were significantly warmer than present for an extended period, and this incidentally was 125,000 years ago. The reductions in polar ice volume led to four to six meters of sea level rise. I am not trying to say that that will happen this time also, but I think we as enlightened citizens of this planet must understand that what we are doing today, when it took place 125,000 years ago, really caused enormous havoc. It completely

altered the geography of the earth. And the warmth of the last half century is unusual, in at least the previous 1,300 years.

If we look at the picture of global temperatures, what we find is something that should cause us concern. This is a plot of temperatures going back to the middle of the 19<sup>th</sup> century and you would observe that in recent years, this rate has accelerated. As a matter of fact, what is extremely significant is the fact that 11 of the warmest years in instrumented history have taken place in the last 12 years. And you can see from the slope of the curve, it is becoming steeper and in the last decade or so, it has been the steepest of the entire period. So we are accelerating the rate of climate change on this planet.

If we look at what has happened in the past, global average temperature has increased in the manner that is shown over here. Global average sea level rise has also increased and the Northern hemisphere has lost snow cover. Just to mention some figures, in the 20<sup>th</sup> century, the average warming of the earth was 0.74 degrees Centigrade and sea level rise was about 17 cm, and you can see the Northern hemisphere snow cover has declined quite appreciably.

Nearing the 20<sup>th</sup> century, glaciers and icecaps have experienced wide-spread mass losses. And this is the way that loss actually looks in different parts of the world. Europe and the Andes have had relatively stable masses, but of course in recent years there is a perceptible decline that we have noticed. In the case of other regions of the world, there has been a very sharp reduction in the cumulative balance of the glacier mass. And coming from my part of the world, the Himalayan Mountains are particularly sensitive to temperate increase and therefore there has been a very rapid reduction in ice cover in the Himalayan range. We have projected that this can have major implications for water supply in the river systems in the northern part of the Indian sub-continent such that something like 500 million people would be affected as a result in South Asia and 250 million people in China. So that is a large section of humanity that is going to be affected in terms of reduced flow of river water in that region. And new data confirmed that losses from the ice sheets have contributed to sea level rise over the period of 1993-2003.

If we look at the observed impacts of climate change, let me mention that in the high latitudes, precipitation levels, that means rainfall and snowfall, have actually been increasing, but in the lower latitudes and in the Mediterranean region they have actually been declining. What is worrisome in particular, is the fact that extreme precipitation events have been increasing and are likely to continue to increase. That means that we will get large quantities of rainfall in short periods of time. And I know from my own country in Mumbai, recently we had a massive

downpour of water within a period of 48 hours and two years ago there was a much worse situation when within a period of 24 hours we had a major cloud burst and most of the city was underwater. All the traffic came to a complete halt. As a matter of fact most people were stuck in their cars, in their buses, in their transport vehicles overnight. And may I mention what was very tragic was the fact that several people actually suffocated to death because today's automobiles don't give you the option of rolling down the windows and the water pressure was so high, that particularly people who were weak, let's say women, who did not have the strength to open the doors were not able to get out. So I want to highlight the fact that extreme precipitation events can lead to a major loss of life and property, not to speak of the impact that it is likely to have in terms of floods and drought. We would have more intense and longer droughts, and this is already happening. Widespread change in extreme temperatures, that means heat waves are likely to become more frequent and more intense. As a matter of fact, you might recall in 2003 there was a major heat wave in Europe, as a result of which something like 30,000 to 35,000 people died, and most of them were in the area of Paris and its suburbs. We will also have increasing intense cyclone activity, so overall these extreme events are likely to increase and therefore we have to be prepared, and we have to be able to adapt to some of these changes.

Now if you look at global atmospheric concentration of greenhouse gases, these have increased very sharply in recent years and those of you who have watched the film "an Inconvenient Truth" might recall sharply in recent years and those of you who have watched the film "An Inconvenient Truth" might recall that former Vice President Al Gore, when he is showing the shape of the scale, actually does it on a very wide screen and gets on top of a mechanical device that rises to the top of this scale, only to dramatize the fact that recent increase has been very sharp indeed. And in 2005 the concentration of CO<sub>2</sub> exceeded by far the natural range that has existed over 650,000 years. So I trust from this, distinguished ladies and gentlemen, you would accept the fact that what we have done in a very short period of time, really is dramatic in terms of what has happened over a long, long period of time in human and planetary history.

Let me look at projections for the future. If you see the scenarios that we have accessed, we have come up with two sets of best estimates. At the lower end of the scenarios, the best estimate we get is an increase of 1.8 degrees Centigrade by the end of this century and at the upper end of the scenarios the best estimate that we have come up with is 4 degrees Centigrade. Now the reason that we have this variation is because it is very difficult to predict how the economy of the earth is going change, how technologies will change, how human behavior will change and I would like to clarify that these scenarios do not take into account any policies at

mitigation, that I hope will be put in place rather quickly, particularly as we come to the end of the first commitment period of the Kyoto Protocol. The effects on poor regions are something that obviously must concern all of us because there are some regions that are going to be far more vulnerable than others and have in fact been far more vulnerable. And may I say that the Nobel Prize Committee has clearly shown that there is a direct link between climate change and the maintenance of peace on this planet, because you can imagine that if malnutrition grows, then clearly that is going to affect the stability of societies, and therefore that would have a harmful impact on peace in different parts of the world. In some countries, yields from grain-fed agriculture could be reduced by up to 50% by 2020 and increased water stress will be imposed on 75 to 250 million people by 2020 in Africa. Food and security, and loss of livelihood would be further exacerbated by loss of cultivated land and nursery areas for fisheries by inundation and costly erosion in low lying areas of tropical Asia. So as far as one can see, food availability and therefore nutrition are likely to be major casualties as a result of climate change.

There would also be serious impacts on natural ecosystems. Climate change will reduce biodiversity and perturb the functioning of most ecosystems. And it will compromise the services they currently provide. I would like to mention that the poorest people in the world derive a number of services from the ecosystems because they do not have access to goods and services that are manufactured, that are produced and marketed, let's say in the developed world. And if these ecosystems are affected adversely, this clearly affects the livelihood of the poorest people in the world. We have assessed that 20-30% of plant and animal species are at risk of extinction if increases in global average temperature exceed 1.5 to 2.5 degrees Centigrade. That is a very serious threat to all living species and some ecosystems of course are more vulnerable than others, and this includes coral reefs, tundra, forests, mountain and of course the Mediterranean regions.

Coastal settlements are most at risk. Several mega-deltas in Asia are particularly vulnerable and this includes cities like Dhaka, Calcutta, Shanghai and others, and you can see in this picture, the large red dots include those areas which are going to be at the highest risk, and the yellow dots indicate those at high risk, and black ones are those that would be faced with medium risk. So really speaking, there are several locations around the world that would be affected by the risk of coastal flooding, but certainly the mega-deltas in Asia which have very high population density and are very, very vulnerable to sea level rise and coastal flooding are clearly the ones that we have worry about.

Impacts in Japan, enhanced extreme and annual precipitation will take place, an increase in

annual temperature. There is a danger of decrease in rice yields up to 40% in irrigated lowland areas by the 2050s and 4.1 million people are at risk of coastal lowland located below high water level in large cities, Tokyo, Osaka, Nagoya, particularly if sea level rises above one meter. And there could be a disappearance of 90% of the suitable habitat for the dominant forest species that is the Beech tree, by the end of this century.

Poor communities are of course at the highest risk and these are really vulnerable to climate change. This is also because they have very limited adaptive capacity. They do not have the infrastructure, they do not have the institution strengths and they do not often have the skills to be able to take care of the impacts of climate change.

In the case of coastal areas as I mentioned, flooding the residences of millions of people could take place in South, Southeast and East Asia. And significant losses of coastal ecosystems could affect agriculture industries, particularly in heavy populated mega-deltas.

Human health is also at risk. There would be endemic morbidity and mortality due to diarrhea diseases in East, South and Southeast Asia, primarily associated with floods and droughts. I can tell you, in South Asia for instance, every time there is flood, policy makers and government officials go through a nightmare in making sure that diarrhea diseases do not break out on a large scale. Because after floods take place, there is a huge increase in diarrhea disease and the biggest challenge is not only to rehabilitate and take care of the lives and homes of people, but to ensure that they do not succumb to illness of various kinds, particularly diarrhea. And exacerbation of abundance or toxicity of cholera is also likely to take place with increases in coastal water temperature.

Water resources are likely to be effected. Glacier melt as I mentioned, will increase flooding, it will increase rock avalanches and would affect water resources within the next two to three decades. The salinity of groundwater especially along the coast will take place due to increases in sea level and over exploitation. One of the things that we have highlighted in our report is the fact that the small island states have already small length of fresh water in the center, but that length is going to shrink because with sea level rise, the incursion of seawater will take place much further onshore and the small island states do not have a very large area. With the incursion of that water and with the intrusion of that water from the sea, that little length that you have of clean and drinkable water will be lost completely. So a number of these island states will have to set up desalination facilities if they want to survive and they need drinking water. Now that certainly increases the demand for energy, and several of them really have no

choice but to use diesel and petroleum products for their electricity production and other energy uses.

There would be a decrease of fresh water availability in Central, Southeast and South Asia affecting more than a billion people by 2050. Now this again, may I highlight, shows the link between climate change, and peace and stability, and I trust the Nobel Prize Committee has taken some of these factors into account. We already have several areas of the world where there is intense competition for water resources. If these become scarcer, then the danger of conflict obviously will increase substantially. Agriculture and food supply are also quite vulnerable. There are decreases in crop yields up to 30% in Central and South Asia by 2050 that have been projected. I can tell you based on evidence that we have in India that the wheat crop is already suffering as a result of climate change. And typically what happens is even with a temperature increase of 1.5 degrees, during a particular point of the growing cycle there is a sharp decline in the productivity of wheat. So it is really a question of temperature increase taking place at the particular point of time during the growth cycle to which wheat is extremely sensitive and therefore we can expect that productivity will go down.

Let me just take a minute to highlight the fact that the world is already facing some problems in food supply. In the last seven years, surpluses of food grain stocks have actually been going down and this is a result of increased population, higher income, a shift to consumption of greater animal protein, and when you produce more animal protein either as poultry products or as meat, you need much more food grain. And all of that food grain gets diverted to the production of meat protein and therefore obviously there is going to be a reduction in the availability of food grains in the future.

There are also uncertainties as to how climate change will impact food supply and demand because in the temperate regions there would be an increase in output as a result of higher carbon dioxide and temperature increases, but in the sub-tropical and tropical regions, there would be a decline. And this is where you have the largest concentration of population on the earth.

I would also like to highlight the fact that there are over 50 nations in the world who cannot produce their own food for their own consumption. They are dependent on imports and some of these include the poorest countries in the world, and with food prices going up these countries will find it very difficult to import their requirements of food. So overall, food security is something that could be affected by climate change, and the risk of hunger is projected to

remain very high in the developing countries.

Now all of this means that mitigation is required rather urgently. We cannot allow this runaway climate change to continue the way it has been projected. We, as responsible citizens have to find a way by which we limit the temperature increase, and that can only happen if we limit the increase and the concentration of impacts because I would also like to mention that the impacts of climate change will continue for a long time to come, even if we are able to stabilize the concentration of these gasses today. It will continue for decades, if not centuries. Particularly sea level rises because of the slow warming of the ocean, will take a long, long time perhaps up to a millennium. And therefore, the world has no choice but to adapt to climate change which is the result of past emissions of greenhouse gasses. However, adaptation alone cannot cope with all the project impacts of climate change. And the costs of adaptation and impacts will increase as the global temperature increases. So, there is a need for a mix of strategies, including adaptation and mitigation of greenhouse gas emissions.

Now I would like to bring to your attention, Article II of the UN Framework Convention on Climate Change. And this is a key provision of the Framework Convention, which says that the ultimate objective of this convention and any related legal instruments, is essentially the stabilization of greenhouse gas concentrations in the atmosphere at the level that would prevent dangerous anthropogenic interference with the climate system.

Now the world has not been able to decide what is dangerous. This of course is a value judgment, I think people have to decide what represents dangerous. If you look at it from the point of view from the poorest small island state, they would give you a very clear view that the danger threshold has already been reached. If you talk to perhaps someone in Siberia, they would imagine the danger is far away, they would probably feel that they would benefit from climate change and perhaps in the short term they would, but over a period of time, there is hardly any place on this earth that would benefit from climate change. So I think one critical challenge for the negotiating committee and the community of global nations is to define what represents dangerous. And once we are able to do that, we have to come to a decision that we will not allow the concentration of greenhouse gases to go beyond that particular, dangerous level. Now science can only assist in providing knowledge, providing information on the basis of which this question can be answered, but it has to be answered on the basis of value judgments. And may I therefore appeal to this distinguished audience, and particularly the people of Japan, a society which has always been rooted deep in ethics, that this is an ethical issue and we cannot escape our responsibility in defining what would be ethically correct.

Now there is certain inertia in the climate system and as I mentioned, even if we fix the concentration of these gasses, further warming would occur in the next two decades of about 0.1 degrees Centigrade per decade. And of course there is inertia in the entire infrastructure and the investments that essentially would keep us locked into greater use of energy for quite some time to come and therefore high emission levels, and therefore we will have to change some of these investments and particularly new investments that are being made will have to target much lower emission levels. The choices about the scale and timing of emissions and its mitigation would involve balancing costs of emissions reductions against the risks of delay. Because on the one hand there are costs of mitigation and on the other are the huge costs of inaction. Because if we do not take action, then the impacts and the costs can be terrible over a period of time.

Let me give you some numbers. This is a table that we have come up with in the Working Group III Report. What you see at the top most row, is a stabilization of 445-490ppm. This will be able to limit temperature increase to 2 to 2.4 degrees Centigrade. But if we were to achieve this, then we will have to ensure that CO2 emissions can peak in 2015, but after that they will have to decline very rapidly. And if you look at what the decline should be in the year 2050, it is somewhere between -50 to -85%. So here I would like to commend the leadership of Japan which has made a very definite statement about reducing emissions to half their level by 2050 and trust that all of human society will accept a goal of this nature, if not something even better. But it is critically important to remember that if we want to stabilize at this level, and I for one am not recommending that, it is for the negotiating community to decide where they want to stabilize but if we want to stabilize at this level, then all we have is another seven years. And beyond those seven years, emissions will have to decline as rapidly as possible. We also know that mitigation efforts over the next two to three decades will have a major impact on opportunities to achieve lower stabilization levels over a period of time.

Now we are often told that the cost of mitigation is going to cripple the economy of several countries and that jobs will be lost, but we have so much evidence to show just the contrary. I was living in the United States when the first oil price shock took place and also during the period of the second oil price shock, and Japan took a leadership position at that point of time and reduced its dependency on energy imports, and cut down its energy intensity substantially. But at that period there were not jobs that were lost, the economy certainly did not falter. If you look at the recent example of Germany which has made a major push toward renewable energy use, there has been no loss of jobs, there has been no decline in economic output. In fact, new jobs are being created. Now what we have found is that if we were to go back to the figure that I

gave earlier, and here I would like to draw your attention to the last row in this table. If we want to stabilize at 445ppm of CO<sub>2</sub> equivalent, what would be the cost by 2030? Less than 3% of the global GDP which is really a very small price to pay, and you can look at it in terms of this amounts to only 0.12% of the GDP on an annual basis which is not a high cost at all. And if you want to look at it in the next slide, this is the way, let's assume the steady growth, this is the way it would look without mitigation. But if you introduce stringent mitigation, you get this blue line which means that if the world is going to reach a certain level of prosperity by 2030, through mitigation at best, you would be postponing that level of prosperity by eight or nine months, which is not a high price to pay at all. And if in the meantime, we can develop new technologies, we can develop new methods, then this cost will turn out to be even less than 3% of the GDP.

So while I have given you a lot of bad news in terms of the impacts of climate change, let me give you this good news. It is well within the capacity of human society and the technological capabilities that we have to be able to implement these mitigation measures. And this is a very clear choice for us when it comes to designing policies and implementing them.

What are the key mitigation technologies that we have? Well on the energy supply side, energy efficiency is extremely critical. Fuel switching, moving to new fuels that are low in carbon intensity, using renewable energy, combined heat and power, nuclear power is an option, early applications of CO<sub>2</sub> capture and storage.

The transport sector is extremely important. We need more fuel efficient vehicles and I have the privilege of being on the international advisory board of Toyota Motor Company which has been a leader in energy efficiency and I hope that company will set an example and become even more efficient in providing far more energy efficient vehicles in the future. Hybrid vehicles, biofuels, motor shift from road transport to rail and public transport systems, and I would say again, this requires a behavioral change using bicycles as much as possible. If you go to the Netherlands, everyone uses a bicycle and the trains over there are well equipped to take your bicycle along with you. You can travel from one place to the other on your bicycle, get on the train, the train takes you elsewhere, you get off and use your bicycle again. Now that is the kind of behavioral change that we need in different parts of the world. And land use planning will also help.

What you see over here is a picture of a building my own institute has which uses no power from the grid. It uses efficient lighting, it uses all kinds of efficient appliances and the design of the building itself is such that it cuts down energy demand to about one third of what you would have in a conventional building. And all of that is met through renewable sources of

energy such as a biomass gasifier, and then we have used something called an earth-air tunnel. If you go four meters below the surface of the earth, the temperature is uniform throughout the year. So what we have are four tunnels through which we blow air and that gives you cooling in the summer, and heating in the winter. So I think we have to harness traditional knowledge, use science and technology to make the best use of these opportunities and there is no reason why we cannot design more efficient buildings in the future. But there is an urgency to do this quickly because once you construct a building, you are locked into a pattern of energy use that cannot be changed very rapidly.

And the range of stabilization levels of GHGs can be achieved by deployment of a portfolio of technologies that are currently available. So we do not have to wait for any miracles. These technologies are available, they are being used in Japan, some of them are being used in Germany, in France and in several countries around the world. And of course those that I expect to be commercialized in the coming decades will be extremely valuable.

Now let me just mention some key technologies and measures. We need appropriate incentives for the development of technologies. What is absolutely critical is an effective price on carbon. This is something that we have put forward very clearly in the Working Group III Report. Unless there is a price on carbon, even if you invent the best and the most energy efficient technologies, they are not going to be disseminated. Producers and consumers will react to prices that they get in the market. If a low carbon technology costs less and a high carbon technology costs more, obviously consumers will demand the low carbon technology. So a price on carbon is absolutely critical. And energy infrastructure investments have to be made with some degree of vision because a power plant for instance, will last for 30 or 40 years, and that technology cannot be changed once you have made that investment. Therefore we need to look beyond and make enlightened investments taking that into account. And as I mentioned, changes in lifestyle and behavior are critical.

Now Japan has much to offer to the rest of the world. Your solar roofs program you launched in 1994, a whole range of options were provided, low interest loans, rebates for grid connected residential systems, education and awareness programs, and may I submit that this is where Japan can have a major impact on the rest of the world, starting with other countries in Asia. And the total capacity has increased more than 42% annually between 1994 and 2002, leading to a 75% cost reduction per watt.

But we also need much more research and development on these technologies. Unfortunately in

1985, when oil prices crashed, research and development expenditure was also cut down around the world. Otherwise we might have had much better renewable energy technologies with us today. And today as you know, oil prices have touched US\$90 a barrel so there is reason for us to direct expenditure on research and development to produce some of these technologies, and if there was a carbon price that is suitable then the private sector would also invest in development of these technologies.

Annual PV module production has grown substantially in Japan and is now the world's leading manufacturer, producing over half the present annual production. So this is a message, this is a methodology that has to be exported to other countries in the world. The "cool-biz" dress code as I mentioned earlier is again, and this is particularly for our distinguished participants from overseas, is extremely valuable and shows a behavioral change in bringing about mitigation of greenhouse gasses. Summer business styles promoted to encourage business people to wear cool and comfortable clothes. I am sorry I am not wearing the right clothes, perhaps I should not be wearing a tie at this time, but certainly this is catching on in Japan. And CO<sub>2</sub> emissions I believe have been reduced by a substantial amount in 2005. Japan has outstanding green cover, 67% of the land is covered with semi-natural and planted forests. Planted forests account for more than 60% of carbon sequestration, and sequestration potentially estimated at a fairly large scale of 35-70 million tons of CO<sub>2</sub> per year. Forest management of course is necessary to maintain carbon sequestration and to curb saturation. And this again is an area where Japan can provide its expertise to other countries in the world.

Comprehensive assessment systems for building environmental efficiency as a labeling tool which has been used for environmental performance of buildings in 2005 onwards. There are four assessment tools: predesigned, new construction, existing buildings and renovation. Because we have to take care of all of these, new buildings as well as existing buildings, and therefore that is a great deal that Japan can provide by way of experience and know-how in this area. There were 20 buildings certified as of September 2007 I was told and some local governments require new building owners to report the results of their buildings. There are over 1,400 reports submitted as of March 2007, this is the information I was able to get.

Now, finally let me end by giving a quote from Mahatma Ghandi and I end all my talks with some wisdom that Ghandi saw several decades ago. He was clearly a leader well ahead of his time and he said, "Be the change you want to see in the world." So therefore, if Japan and all of us want to see a change in the world, then we have to be the initiators of that change, we have to be that change. Thank you very much.