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# International Conference on Climate Policy After Marrakech: Toward Global Participation A Conference Summary

Honolulu, Hawaii, USA  
September 4-6, 2003



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**International Conference on  
Climate Policy After Marrakech: Toward Global Participation  
A Conference Summary**

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*Sponsored by*

**Industrial Technology Research Institute, Taiwan  
Institute for Global Environmental Strategies, Japan  
Ministry of the Environment, Japan  
Ministry of Housing, Spatial Planning, and the Environment, The Netherlands**

This summary was prepared by Dr. ZhongXiang Zhang, the conference coordinator, based on presentations and discussions, with input from Ms. Melissa Tipping of the Australian Greenhouse Office; Dr. Alexander Golub of Environmental Defense; and Dr. Paul Bernstein of Charles River Associates.

Presentations, comments, and responses should be treated as the personal viewpoints of the participants and do not necessarily reflect the views of the organizer, the sponsors, or the institutions with which speakers are affiliated. The coordinator bears sole responsibility for any errors and omissions in this summary.

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## Introduction

The Kyoto Protocol, as detailed in the Marrakech Accords, has now been rendered fit for ratification. In anticipation of the Protocol's entry into force, attention has focused on how Annex I countries can put a package of climate policies in place to meet their emissions targets. In the meantime, discussions of what comes next are expected to gain increasing legitimacy, given that the Kyoto targets are only the first step toward addressing the long-term global climate issue.

Against this background, the East-West Center organized the international conference on "Climate Policy After Marrakech: Towards Global Participation" in Honolulu, Hawaii, on September 4-6, 2003. This conference brought together senior technical bureaucrats, well-respected policy analysts, and experienced practitioners to 1) share their views on recent developments in climate policies and initiatives around the globe; 2) advance our understanding of the actions and policy frameworks that can contribute to compliance with Kyoto emissions targets; and 3) discuss the paths forward to a global regime of wider participation and deeper greenhouse emissions cuts. All materials received from the speakers are posted at the conference website at: <http://ewcraql.eastwestcenter.org/~marrakech>.

Many institutions and people have helped make this event a success. As the conference coordinator, I would like to gratefully thank and acknowledge the Dutch Ministry of Housing, Spatial Planning, and the Environment; Industrial Technology Research Institute (Hsinchu, Taiwan); Institute for Global Environmental Strategies (Kanagawa, Japan); and the Japanese Ministry of the Environment for their financial support. I am also very grateful to the following colleagues around the globe for their great help and suggestions for shaping up the program and fundraising: Shinichi Arai, Yunchang Jeffrey Bor, Fabrizio d'Adda, Yvo de Boer, Jos Delbeke, Robert Dixon, Daniel Dudek, Paul Fauteux, Reid Harvey, Lung-Bin Hau, Liza Leclerc, Horng-Guang Leu, Joel Levy, Jhy-Ming Lu, Alan Miller, Hideka Morimoto, Erwin Mulders, Shuzo Nishioka, Karsten Sach, Stefan Schleicher, Terry Surles, Kazuhiko Takemoto, Hiroyasu Tokuda, Fernando Tudela, Paul Vickers, Harlan Watson, Tilly Zwartepoorte, and Zhou Dadi. The Pew Center on Global Climate Change is also gratefully acknowledged for making its two recent reports on U.S. transportation and energy available to our conference attendees.

At the East-West Center, I would like to particularly thank Penny Higa, our program officer, and Arlene Hamasaki, our secretary, for their excellent logistical support. I am also very grateful to Thomas Rutigliano, summer intern from KSG at Harvard University, and Chen Li-chun, visiting scholar from National Yamaguchi University, Japan, for helping me maintain the conference website. Meg McGowan and Mark McMahon also contributed during the initial stage of conference preparation.

Within the summary, questions/comments are given in *italic*, followed by responses and comments. Presentations, comments, and responses are the personal viewpoints of the participants and do not necessarily reflect the views of the organizer, the sponsors, or the institutions with which speakers are affiliated. I hope the summary serves as a good reminder of the conference itself and the wonderful time the attendees spent together here. It also informs those who were unable to participate.

Finally, let me reiterate how pleased I was to have you all as the participants in the conference. I hope that the discussions begun in Honolulu will continue. The conference brought together a remarkable cross-section of world opinion on climate policy after Kyoto. It was thought provoking and illuminating and while much work remains ahead, it is fair to say that these discussions made the way forward a little clearer.

ZhongXiang Zhang, *Ph.D. in Economics*  
Research Program  
East-West Center  
Honolulu, Hawaii, USA

## **Session I: Climate Change in Focus – From Science to Policy**

**Chair: Peter Heyward**, Assistant Secretary, Environment Branch, Department of Foreign Affairs and Trade, Canberra, Australia

### **Presentations**

**Dr. Tom Wigley, Senior Scientist, National Center for Atmospheric Research, Boulder, United States**

#### ***Climate Change Under No-Policy and Policy Emissions Pathways***

Global-mean temperature changes are frequently used as an indicator of the magnitude of future changes. There are great uncertainties in the projections of its future value due to uncertainties in future emissions, climate sensitivity, aerosol forcing, ocean mixing rate, and carbon cycle. If the CO<sub>2</sub> concentration level should double, global-mean temperature is projected to range from 1.5° C to 4.5° C with 90% confidence.

The question is: What can we do to reduce the magnitude of future climate change? Article 2 of the Climate Convention provides the guiding principle that requires stabilization of greenhouse gas (GHG) concentrations to avoid dangerous interference with the climate system. This involves choosing a stabilization target and corresponding pathways toward a given target. For CO<sub>2</sub>, a widely used set of CO<sub>2</sub> concentration stabilization pathways (or profiles) had been devised by Wigley, Richels and Edmonds (WRE) initially, and updated later by Wigley. These profiles had been designed to take into account the economic costs of reducing CO<sub>2</sub> emissions below a no-policy baseline by assuming that the departure from the no-policy case is initially very slow.

A few key points are observed regarding the emissions profiles corresponding to the WRE profiles. First, for stabilization targets above 450 ppm (parts per million volume), emissions could rise substantially above present levels and still allow stabilization to be achieved. This point is crucial: If a stabilization target of 550 ppm or higher were deemed acceptable, then the fact that an immediate reduction in emissions is not required may give us time to develop the infrastructure changes and new technologies required to achieve rapid reduction in emissions that would eventually be required. Second, after peak emissions, rapid reduction in emissions is required to achieve stabilization, implying a rapid transition from fossil to non-fossil energy sources and/or a rapid reduction in carbon intensity (CO<sub>2</sub> emissions per unit of energy production). Third, emissions must eventually decline to well-below present levels.

The Kyoto Protocol's reduction target is close to the requirements of a 450 ppm target, but unnecessarily strong for a 550 ppm target. Purely from the standpoint of emissions requirements, there are conflicts between the WRE results and the demands of the Kyoto Protocol. The Kyoto Protocol requires immediate emissions reduction, whereas the WRE profiles show that stabilization at levels of 550 ppm and above could still be achieved even if there were no immediate reduction relative to the no-policy case. A challenging short-term target, as specified in the Kyoto Protocol, may motivate an awareness of the long-term problem. But a target that appears unnecessarily stringent can lead to outright rejection, as has been the case for the

United States. Equally, blind acceptance of the WRE results would be unwise since they only provide a qualitative assessment of the economic aspects.

**Professor Catrinus Jepma, University of Groningen and Foundation Joint Implementation Network, The Netherlands**

***The Trading Concept: From Theory to Practice***

To work, any economic instrument has to meet the following three conditions: it has to be theoretically sound, empirically evident, and feasible in practice. From a *static* perspective, Kyoto flexibility mechanisms are Pareto efficient, and there is sufficient evidence that the static cost savings potential is significant. Many people have even said that without flexibility mechanisms, there would have been no Kyoto Protocol in the first place. As far as the dynamic aspects are concerned, the theory is inconclusive, and there is no strong evidence that long-term mitigation would benefit from the absence of trading, let alone that the potential adverse dynamic impact could offset static gains. The more challenging issue, though, is whether flexibility mechanisms work. This is not easy to answer, but experience with activities implemented jointly (AIJ) suggests real challenges ahead. The AIJ phase works fine in terms of gaining time and thus building confidence, but has less merit in terms of real learning about baseline setting, project boundaries, and monitoring and verification at project levels— aspects which are relevant to all prospective projects under the Clean Development Mechanism (CDM).

Credit markets are emerging both inside and outside the Kyoto Protocol. Within the Kyoto Protocol, a large number of emissions trading credits are emerging: fast track vs. slow track Emission Reduction Units (ERUs) from joint implementation (JI) projects; Certified Emission Reductions (CERs) vs. Removal Units (RMUs) from CDM projects; and Assigned Amount Units (AAUs) vs. green AAUs. Outside the Kyoto Protocol, credits are being created from different emissions trading schemes. When European Union Allowances (EUAs), CERs, ERUs, and AAUs are linked, their prices would, in theory, be expected to gradually converge to one price level if there are no binding caps, transaction costs, and quality differentiation. But in reality, differences in transaction costs and quality differentiation may well result in green AAUs becoming increasingly popular at the expense of ERUs and CERs.

One important aspect of the credit market is the price of credits. Predicting future prices of any products is difficult and the price of credits is no exception. The U.S. withdrawal from the Kyoto Protocol has had a downward effect on forward credit prices. As a consequence, the maximum credit price in the Dutch Certified Emission Reduction Unit Procurement Tenders (CERUPT) was lowered from € 9 per ton of CO<sub>2</sub>-equivalent to € 4-5. By the end of 2002, the World Bank's Prototype Carbon Fund (PCF) reported that its credit price had become as low as € 3 per ton. In the summer of 2003, the decline in credits prices had reversed and credit prices had risen from € 6 to about € 10. This is attributed to a number of factors: the growing likelihood of Russian ratification of the Protocol, the increasing pace of recovery of the Russian economy that leads to less AAU surplus for sale than originally expected, the reduced scope of implementing JI projects among member states as a result of implementing the EU emissions trading scheme, and the lower supply of CERs as a result of the highly questionable interpretation of additionality by the MethPanel. If the present forward prices could be considered as some kind of predictor and the



present trend continues, credit prices for the first commitment period would be in the range of € 5-15 per ton of CO<sub>2</sub>-equivalent.

**Dr. Daniel Dudek, Chief Economist, Environmental Defense, New York**  
***Partnership for Climate Action and Emissions Trading Among Conglomerates***  
Speaking for Dr. Dudek, Dr. Alexander Golub points out that the Partnership for Climate Action (PCA) is a group of business and environmental leaders working on solutions to climate change. The PCA focuses on developing corporate strategies for a carbon-constrained future to achieve environmental protection at the lowest cost (through emissions trading) and provide valuable experience for companies.

PCA companies have the following common elements:

- Publicly declare a GHG emission target (with a plan to meet goal)
- Measure, track, and publicly report net GHG emissions
- Share best practices with PCA members, customers, and suppliers
- Lead through examples.

PCA is a representative group across countries, industries, and other stakeholders like Environmental Defense.

- Sectors include oil/gas, chemical, aluminium, and utility.
- Coverage is global.
- Combined GHG emissions of PCA companies are greater than emissions from Spain.

The emission targets committed by PCA companies are no less ambitious than the Kyoto targets. For example, British Petroleum (BP) has targeted minus 10% below 1990 level by 2010, DuPont—minus 65%. Despite the fact that the program is voluntary, PCA has had several important environmental achievements such as: reducing emission; learning by doing through the use of market mechanisms; and discovering new business opportunities. PCA companies are achieving environmental results worldwide in a cost-effective manner, and demonstrating that caps and flexibility work and can lead to global participation including non-Annex I countries.

**Professor Warwick McKibbin, Australian National University, Canberra, Australia and Senior Fellow, The Brookings Institution, Washington, DC**  
***Designing a Realistic Climate Change Policy with Global Participation***<sup>1</sup>

The Kyoto Protocol fails to acknowledge and address the single most important aspect of climate change: uncertainty. The U.S. withdrawal from the Protocol is due partly to the built-in flaw in its design that requires each participating industrialized country to achieve a specified emissions target regardless of the cost. Given the uncertainty in risks and costs, a balanced reading of the current scientific literature suggests that neither inaction nor a draconian cut in emissions regardless of the costs is an

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<sup>1</sup> This presentation is based on the following two publications: McKibbin, W.J. and P.J. Wilcoxon (2002), *Climate Change Policy After Kyoto: A Blueprint for a Realistic Approach*, The Brookings Institution, Washington, DC; McKibbin, W.J. and P.J. Wilcoxon (2004), Estimates of the Costs of Kyoto: Marrakesh versus the McKibbin-Wilcoxon Blueprint, in Z.X. Zhang (guest editor), Special Issue on *An Economic Analysis of Climate Policy: Essays in Honour of Andries Nentjes*, *Energy Policy*, Vol. 32, No. 4, pp. 467-479.

appropriate response to climate change. A sensible approach must be a policy between the two extremes: It should provide incentives to reduce GHG emissions but avoid imposing unreasonably large costs. Moreover, since it needs to remain in effect for many years, it must be designed to allow new countries to enter and current participants to exit with minimum disruption.

The McKibbin-Wilcoxon Blueprint would allow each participating country to issue two kinds of emissions permits: perpetual permits that entitle the owner of the permit to emit one metric ton of carbon every year forever, and annual permits (at the internationally agreed price) that allow one ton of carbon to be emitted in a single, specified year. There would be no limit on the number of annual permits that the government could sell to the firms in its country in a given year to cap the firms' spending on abatement. One key strength of the Blueprint is that it would be very stable with respect to changes in the mix of participating countries. It is also more sustainable over long periods because future events have little effect on compliance costs. By contrast, a single, modest change in projected productivity growth in Russia changes the cost of complying with the Protocol substantially. Moreover, the Blueprint has the potential to achieve greater cumulative emissions reduction than the Kyoto Protocol at lower cost because it would encourage wider participation and earlier reductions.

The McKibbin-Wilcoxon Blueprint can be implemented within countries and is consistent with moving toward Kyoto Protocol targets if a country ever wanted to.

## **Discussions**

### **Dr. David Greene**

*To McKibbin—Two questions. First, how are perpetual permits distributed in your scheme? Second, is there a serious problem of annual price negotiation? When countries have to negotiate the world prices for annual permits, would the owners of perpetual permits try to influence/lobby their governments very strongly to get good annual prices for permits?*

### **Professor Warwick McKibbin**

The annual price is negotiated in a 10-year step. So you only have to negotiate it every 10 years and then you hold a fixed guarantee for the next 10 years. The price of perpetual permits would be determined by the market. The interesting question is which way lobbyists would argue for the fixed price to go during negotiations. First, from a company's point of view, if it has perpetual permits then it would prefer prices to go up except that companies who get a large volume of perpetual permits are likely to have a large portfolio of fossil fuel business in their activities. In this case, they would prefer annual prices to go down. The whole point of distributing perpetual permits in the beginning is to line up incentives. So, instead of coal companies buying renewable companies to diversify their business in a very expensive way, governments give them perpetual permits. On their balance sheet the assets are perfectly negative related to their core fossil fuel business in terms of the rate of return. These companies could end up with ambiguous preferences in the lobbying process. Companies, which actually bought these permits and have a set of activities underway, would argue one direction, while other companies would argue another.

Second, governments themselves have the incentive to negotiate a low price rather than a high price. The higher the price, the less direct revenue is received from selling annual permits to fix the price and the less indirect revenue is received from decreasing economic activity due to higher carbon prices. So there is an interesting tradeoff even for governments.

**Dr. Fernando Tudela**

*To McKibbin—In the very long run, global emissions must converge to zero. So the amount of perpetual permits has to shrink to zero. My question is: How is the long-run requirement of zero emissions reconciled with perpetual allocation?*

**Professor Warwick McKibbin**

The perpetual permit is just a simplification. In our book, we argue that the permits should expire over a variety of time horizons. Most importantly, our scheme takes away the allocation process from negotiators and gives them to individual countries. In reality, the number of perpetual permits that you give to a country does not directly affect global climate change. What is binding is the short-term cost to industries of the annual permits and the expectation that the cost is going up. So the allocation issue is no longer an international issue but it is an issue of revenue allocation within countries. The binding negotiation is the price of annual permits. The problem that we face is what price should be negotiated. Even if we cannot reach an agreement on higher prices that would reduce emissions faster and keep prices low for a while, say, two decades, future prices will be moved by market forces through the pricing of perpetual permits. So a combination of long-term prices and short-term costs will give industries an incentive to adapt. These long-term and short-term signals are what we want: some prices are in control of the market directly related to expectations about climate change and some prices are in control of governments.

**Professor Hisakazu Kato**

*To Golub—I wonder what is the motivation for firms to participate in PCA, particularly given that the PCA is open to others to join in?*

*To McKibbin and Jepma—Given that different countries are designing different systems, how are they linked to yield effective global action?*

**Dr. Alexander Golub**

Personally, I think that companies foresee that emissions caps will be imposed on them. They could claim emissions budgets in advance and hope that the future official allocations will be close to what they claimed. Second, some companies, like British Petroleum (BP) that introduces the first company-level greenhouse gas emissions trading in the world, try to avoid the introduction of carbon tax in the United Kingdom by providing positive counter-example to carbon taxes. The reason why PCA would be open to others is because compliance with the emissions limits imposed on by governments requires more companies to sell their permits and enables more buyers to access the emissions trading market.

**Professor Catrinus Jepma**

I have the impression that because the United States had rejected the Kyoto Protocol, new (alternate) ideas are being introduced. But we should not forget the enormous amount of time that we had invested in the Kyoto Protocol. As a cautionary point in

launching new ideas, we should be careful not to throw away what had been achieved through a long, painstaking negotiation process. The Kyoto Protocol has some built-in flaws but it does have some merit in providing a fair amount of flexibility. If you want to work out the concept of trading, you have to set up a trading scheme and explore options in a cost-effective manner. This is exactly the heart of the Kyoto Protocol. Of course, many issues involved in institutional and technical complexity need to be solved incrementally, which I have emphasized in my presentation regarding Kyoto flexibility mechanisms.

**Professor Warwick McKibbin**

We acknowledge that each country has its own system. My presentation lays out the analytical basis of our idea. The reality is that cooperation across countries is needed to work out the carbon cost equivalent in different systems just in the same way as the tariff equivalent under the World Trade Organization (WTO) is worked out. Also, everyone has a minimum price, which in our system is the price of an annual permit. Other countries can put into place any permit trading system and carbon strategy that they choose as long as they are bound by the internationally agreed minimum price. If countries would like to exceed this price, they lose economic efficiency but that is their choice.

**Dr. Harlan Watson**

*To Wigley—In terms of business as usual (BAU), there is a considerable amount of technological innovation in that. Many people test the BAU as nothing happens. I do not think that is right. I want you to give us some idea on how much technological innovation is built into the BAU?*

*To McKibbin—How do you negotiate both  $Q_t$  and  $P_t$  in the international negotiation process, in particular the staggered terms of endowments of 20 years or 30 years and so on?*

*To Jepma—Can you elaborate a little on CDM investment additionality?*

**Dr. Tom Wigley**

There are 40 SRES (Special Report on Emissions Scenarios) scenarios. These scenarios are divided into four families and cover a wide range of input assumptions on technological innovation. If you look at the breakdown in any particular scenario of the energy supply equation, you can see dramatic change over a century time horizon, for example in the renewable energy supply which depends on the assumption of technological development and other aspects. It is true that the BAU scenario really does encompass huge assumptions on changes in lifestyle and technology developments, which vary across a variety of scenarios. Some people have criticized the assumption regarding a sort of spontaneous development in renewable resources, and some criticisms are valid regarding the potential of solar energy production and the competition among the costs of different energy sources. It is pretty hard to predict the weather five days in advance, and even harder to predict a global social-economic system in 100 years. I think that the SRES scenarios capture a range of uncertainty in those sorts of factors and are probably a pretty good attempt to assess the global social-economic system over the next 100 years.

**Professor Warwick McKibbin**

$Q_t$ , the quantity of long-term emissions permits, could already be negotiated. You can call it the Kyoto target for industrialized countries.  $P_t$  is the annual price of permits, and is independent of  $Q_t$  except that in the long run the price of the long-term permits and annual permits should converge. The price of these long-term assets would be the expected future value of short-term prices. What matters to industries is the cost to produce over many years; compensation is determined by long-term prices and targets. I do not think that it is so difficult to negotiate  $Q_t$  and  $P_t$ . Going from Kyoto to our approach, I think that it is very simple in the sense that you just have negotiations on internal structures on these things, not internationally. You negotiate the world prices of annual permits and the phase of the Kyoto target, then bring together developing countries to make commitments. That is the hard part of our approach but it is also the problem facing the Kyoto Protocol.

**Professor Catrinus Jepma**

The recent MethPanel's adoption of financial additionality is a big shock to potential investors. Prior to this decision, the emissions additionality test was the only test. Now the MethPanel has decided to have the investment additionality test. This additional test requirement not only increases transaction costs, but also creates risks that the CDM projects could be rejected on this ground. In my opinion, the chance to attract successful CDM projects decreases significantly, given this new development.

**Yasuhiro Shimizu**

*To Jepma—What is the definition of green AAUs? Does it create a need for additional certification to distinguish green AAUs from other AAUs?*

**Professor Catrinus Jepma**

This term has been introduced partly based on a recent Japan-Slovakia deal basically for public relations (PR). The receipts from these AAUs have been used to invest in new green projects in Slovak to match the amount of AAUs traded. The exchange between the two partners gives credibility to those AAUs traded which otherwise might be regarded as the change in hot air bookkeeping. That is the reason why these AAUs are called green AAUs. There is no additional certification since existing JI provisions can be used.

**Dr. Giorgio Mattiello**

*To Golub—Why do companies invest through PCA— and not in projects/programs managed by international organizations, like the World Bank through its PCF?*

**Dr. Alexander Golub**

No current PCA members have invested in the World Bank's PCF. Generally speaking, corporations prefer to keep cash flow within their own corporations. As experienced by BP, all things being equal, corporations would rather reduce emissions internally than purchase credits for emissions reductions generated outside their own operations. This also avoids paying high transactions costs, which are often the case for funds managed by multinational institutions.

**Professor Terry Barker**

*To McKibbin— It seems to me that the major problem in global climate mitigation is consensus on concerted global action between sovereign states. Your proposed scheme has an element of global carbon tax. In the situation where the world's*

*largest GHG emitter has withdrawn from the Kyoto Protocol and will not tolerate even discussions on carbon taxes at high political level, your blueprint proposed as a way forward does not seem to be politically helpful.*

**Professor Warwick McKibbin**

The biggest problem that I see with the carbon tax debate in the United States is not so much the change in carbon prices but that the revenues go to the government. If the people who paid the higher prices were compensated in a lump sum manner, there would be less resistance to the higher prices. What we are proposing here is to impose a price on carbon but to ensure that the revenues go to the owners of property rights, not to the government. It is true that governments need to increase in some year some of the short-term permits entering the market in order to hold the carbon price at the world price. That additional revenue would go to the government, but that would be a very tiny proportion of the total revenue. You can call it a carbon tax if you think that the price of carbon goes up as a result of tax. But in any Kyoto-style system, the price of carbon will go up. So we do not call it a tax— we call it the allocation of property rights. If you put this into the context of the deteriorating fiscal position in the United States, in two to three years the debate in the United States will be how to close the fiscal gap. Our approach is about property rights and markets to price them. It only becomes a tax at the margin when the government needs to step in to prevent the annual price from rising above the cap. The revenue from short-term permits is a pretty good source of revenue relative to others in closing the deteriorating fiscal position in the United States. I think that we will be in a right place at a right time.

**Oleg Pluzhnikov**

*To Jepma—How can green AAUs be realized in practice, given different attitudes of participants? For example, the Japanese companies get AAUs from their partners in Eastern Europe, and do not care how the revenues are used and do not want to monitor how green projects are implemented because doing so is very costly. But on the other hand, the EU countries want to know how the revenues are used and to monitor how green projects are implemented, which in practice works much like JI projects. Do you see that the two radical approaches will bury the idea of green AAUs in practice?*

**Professor Catrinus Jepma**

Sovereign states want to determine things in their own way. My understanding of the recent Japan-Slovakia deal is that the government of Slovak itself decides how the revenues from selling AAUs are allocated in its own country. To the degree to which Japan has to follow specifically the approval, I do not see that this is the case here. Some countries may want to know everything, approve each green transaction, and monitor and verify projects. If that is what you want as an investor, just opt for the JI fast-track procedures—that is the closest system. A regime where investors typically control revenue allocation would be contrary to the definition of emissions trading. How is this going to work in practice? I simply do not know because the Japan-Slovakia case only happened one month ago.

**Dr. ZhongXiang Zhang**

*To Golub—Your presentation seems to suggest that PCA members set their targets taking as a reference the national targets of countries in which they are located. For example, the BP takes the 10% emissions reduction commitment against the overall*

*8% commitments of the EU. I wonder why DuPont takes the 65% emissions reduction commitment, given the 7% target for the United States? Another question is related to the prices of ad hoc transactions among PCA members. Are they strictly kept confidential?*

**Dr. Alexander Golub**

In setting their targets, PCA members may take as a reference the national targets of countries in which they are located. But there are no general rules on this across PCA members. Their commitments depend on emissions in the base year, and abatement options and the corresponding costs. DuPont is committed to emissions reduction of 65% below its 1990 level by 2010 because it believes that it is affordable to do so with major innovation in the production process. Regarding the prices of transactions, generally speaking, they are confidential. But some companies like BP sometimes release brief information about the volumes and prices of transactions, e.g., at their websites.

## **Session II: U.S. Climate Policy and Perspectives**

**Chair: Dr. Robert Dixon**, Senior Advisor for Climate Change, U.S. Department of Energy, Washington, DC

### **Presentations**

Five presentations were given in this session. They covered different aspects of the U.S. climate policy, including both the top-down position at the federal level and bottom-up initiatives and actions at states, sectors, and corporations.

#### **Dr. Harlan Watson, Senior Climate Negotiator and Special Representative, U.S. Department of State, Washington, DC**

##### ***U.S. Climate Change Policy and Actions***

The United States withdrew from the Kyoto Protocol, but remains committed to the United Nations Framework Convention on Climate Change (UNFCCC). The U.S. climate policy has three components:

- reduce GHG emissions per unit of GDP by 18% by 2012
- lay the groundwork for current and future actions (including investments in science, technology, and institutions)
- work with other nations to develop efficient and coordinated responses.

There are more than 60 federal programs to help slow the growth of GHG emission in the United States. However, most of them (like Climate VISION, ENERGY STAR) are voluntary programs. Only some of them like Corporate Average Fuel Economy (CAFE) are mandatory. These programs include new technology development and institutional measures (voluntary carbon registries). The programs have quantity indicators. An important element of the U.S. climate policy is an increase in incentives for carbon sequestration. The United States will invest up to US\$47 billion in the next decade for conservation on its farms and forest lands enhancing the natural storage of carbon. In the international arena, the United States has a bilateral dialog with developed and developing countries. The United States has committed to support developing countries through the U.S. Agency for International Development (AID) and Global Environment Facility (GEF).

#### **Dr. Terry Surles, Manager, Public Interest Energy Research Program, California Energy Commission, Sacramento, United States**

##### ***California Initiatives in Response to Global Climate Change***

With a gross state product of US\$1.35 trillion, California has the biggest economy in the United States. Its size is comparable with some of the most developed countries. The fuel mix of California's electricity supply differs from the fuel mix in the United States as a whole. The major fuel is natural gas (43%) while in the rest of the United States, the major fuel is coal (51%). Also, California is a net importer of electricity. Therefore, GHG emissions in California have grown slower than in the United States overall during the last decade.

However, GHGs are uniformly mixed pollutants. California is suffering from the changing climate which deters the availability of water resources, severely affects the agricultural sector (the largest one in the nation), and leads to sea level rise that is damaging the coastal area.



California is the state that is allowed to set its own pollution standards higher than those imposed by the federal government. This gives the state the ability to set standards more stringent than national standards. In combating global climate change, California has led the nation by requiring reduced tailpipe GHG emissions for passenger vehicles and light trucks from the 2009 model year onward. Its Energy Action Plan sets a goal of reducing electricity consumption per capita by 1% per year. Its Renewable Portfolios Standard requires utilities to increase renewable electricity by at least 1% per year to 2017, until 20% of retail sales are produced from renewables.

**Dr. Paul Bernstein, Principal, Charles River Associates, Washington, DC**  
***Effect of Permit Trading Program for Equity-Efficiency Trade-offs in Carbon Permit Allocations***

The permits created under a GHG cap-and-trade program are a form of wealth that potentially can be used to offset some of the environmental compliance costs incurred by regulated firms. In previous emissions trading systems, almost all of the permits were allocated to the businesses responsible for emissions and for control costs. Recently, several analysts have demonstrated that the total value of carbon permits may substantially exceed the lost return on assets of energy companies that would result from carbon constraints; thus, full allocation of permits to emitters does not have the same distributional consequences for carbon caps as for other types of emissions caps. Existing studies on equity-efficiency trade-offs have explored the equity and efficiency of alternative allocation schemes. A common synopsis of these studies is that allocation of less than about 20% of carbon permits would be sufficient to offset losses to owners of capital assets in energy companies. This presentation demonstrates how such conclusions are inappropriate for most of the carbon trading schemes envisioned for the real world.

The paper by Annie Smith and Paul Bernstein extends one of their models used in earlier equity-efficiency trade-off analyses to reflect two key implementation features discussed in the context of carbon trading schemes. Previous analyses have assumed that policymakers commit to providing an annual allocation in perpetuity. If, instead, asset-value losses are compensated over a 10-year period, the Smith-Bernstein paper finds that required permit allocations exceed 100% of total permits available in some cases. Equally important, if climate policy is enacted in a piecemeal manner with non-market based elements utilizing cap-and-trade only for large point sources and efficiency standards for other sectors of the economy, the high cost of the policy could preclude any opportunity during the first several decades of the policy to recycle revenues while also compensating affected firms.

**Dr. David Greene, Corporate Fellow, Oak Ridge National Laboratory, Knoxville, United States**

***Reducing Greenhouse Gas Emissions from U.S. Transportation<sup>2</sup>***

The United States is the owner of the world's largest transportation system. The U.S. transportation system emits more CO<sub>2</sub> than any other nation's total economy except that of China, and is the fastest growing source of CO<sub>2</sub> emissions in the U.S.

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<sup>2</sup> This presentation is based the following report: Greene, D. and A. Schafer (2003), *Reducing Greenhouse Gas Emissions from U.S. Transportation*, The Pew Center on Global Climate Change.

economy. Therefore, reducing emissions from this system is critical to an overall, effective CO<sub>2</sub> emissions reduction strategy in the United States.

Harnessing market forces is a very useful but probably insufficient strategy for curbing transportation's CO<sub>2</sub> emissions. The study by the National Research Council on the fuel economy standard suggests that the consumers might value only the first three years of fuel savings produced by increased fuel economy, not the fuel savings over the life of car. This represents a significant market barrier to fuel economy improvements.

Therefore, a combination of policies is needed to promote energy efficiency, stimulate investments in research and development (R&D), improve land use, and harness market forces. If taken now, a combination of these policies could lead to transportation's carbon emissions reductions by about 20% by 2015 and almost 50% by 2030, compared to BAU. They would also produce major benefits for U.S. energy security in the form of reduced dependence on imported oil and reduced economic losses from oil price shocks.

**Douglas Cogan, Deputy Director, Social Issues Service, Investor Responsibility Research Center, Washington, DC**

***Corporate Governance and Climate Change: How Are 20 of the World's Biggest Corporate GHG Emitters Factoring Climate Change into their Business Strategies and Governance Practices?*<sup>3</sup>**

This presentation on corporate governance and climate change examines how 20 of the world's biggest corporate GHG emitters are factoring climate change into their business strategies and governance practices. The 20 companies profiled include the top five carbon emitters in electric power, auto, and petroleum industries as well as five other industry leaders. A 14-point Climate Change Governance Checklist analyzes these companies' response actions in the areas of board oversight, management accountability, executive compensation, emissions reporting, and material risk disclosure.

All the companies are beginning to measure their GHG emissions and most have discussed climate change at the board level. However, barely half (12) have reported on the issue in their securities filings and less than half (nine) are projecting GHG emissions trends. Among the 12 companies that do mention climate change in their securities filings, the disclosure tends to be minuscule and vague. Eight companies have made no mention of the issue whatsoever.

Despite the companies' governance actions on climate change, U.S. companies, in particular, are still pursuing business strategies that discount the global warming threat. By contrast, non-U.S. companies are more likely to report on the financial risks and undertake climate change mitigation strategies.

The widest disparity in corporate governance responses to climate change is in the oil industry. BP and Royal Dutch/Shell have pursued all 14 items listed on the Climate

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<sup>3</sup> This presentation is based on the following report: Cogan, D. (2003), *Corporate Governance and Climate Change: Making the Connection*, Investor Responsibility Research Center, Washington, DC and CERES, Boston.

Change Governance Checklist, positioning the companies to deal with emerging issues related to climate change, while the U.S.-based ChevronTexaco, ConocoPhillips and ExxonMobil have pursued only four or five actions. The U.S.-based oil companies continue to devote virtually all development efforts toward fossil fuels, while the European competitors are gaining a foothold in renewable energy technologies that are among the fastest-growing energy sources. As a whole, the electric power industry scores lowest on the checklist. The auto companies are bunched in the middle. The American auto companies are depending on sales of big sport utility vehicles (SUVs) as their main profit center. At the same time, the Japanese competitors are taking the lead in introducing hybrid gas-electric vehicles.

Numerous opportunities exist for climate change to become a structural element of ongoing corporate governance reforms. Governance connections to climate change could be made via corporate boards, executive compensation, proxy voting, and investment research on climate risk.

## **Discussions**

### **Professor Warwick McKibbin**

*To Greene—In your presentation, you stated several times that market forces do not work in transportation. However, international evidence, econometric evidence, and the evidence of your own report strongly support the view that market forces work beautifully in controlling energy use in transportation. Regulations that you talked about actually have little effect on the fact.*

### **Dr. David Greene**

I am not going to argue that market forces have no effects. I did argue that there are probably market failures in fuel economy. It is no doubt that there is a direct relationship between fuel economy standards and the amount of fuel consumed. Fuel economy standards affect new vehicles. Those new vehicles take time to penetrate into the fleet of vehicles. Over time, those fleet vehicles would improve fuel economy through reduced fuel consumption. There is a certain amount of additional driving because of lower fuel cost per mile. But that is no more than a 10-20% impact on fuel consumption. About 80-90% of increased fuel economy is realized as reduced fuel consumption.

Almost every country has fuel economy standards. An interesting question is why the EU and Japan, where fuel prices are four times that of the United States, still feel the need to have fuel economy standards. Fuel prices do affect fuel economy. If there were no fuel economy standards, there would be some increases in fuel economy—there is no question about that. But would such increase be as large as we see here? Almost certainly not.

### **Dr. Irving Mintzer**

*A point of clarification relating to Dr. Watson's presentation—reducing GHG emissions per unit of GDP by 18% by 2012 would lead to a cumulative reduction of 500 million ton of carbon over the next decade. This 4.5% reduction would translate into the cumulative reduction in the neighborhood. What is the benchmark for this amount of reduction?*

**Dr. Harlan Watson**

The BAU scenario from the Energy Information Agency (EIA) forecast is the benchmark. Assuming that the EIA assumption of 14% improvement in carbon intensity is right as compared with the 18% intensity reduction target, this translates into an emissions reduction of 4.5% from BAU over the next decade. This 4.5% reduction would translate into the cumulative reduction in the neighborhood of 500 million ton of carbon.

**Dr. Irving Mintzer**

*To Bernstein—If not in entitlements, why do you think that we need a compensation scheme to make up declines in profits rather than allow markets to drive the outcomes?*

**Dr. Paul Bernstein**

It is mainly on political grounds. The cap-and-trade scheme is going to affect energy producers much more severely than other sectors. These energy producers are very powerful politically. If you want them to buy into a GHG abatement policy, one way to do that is to compensate them.

**Dr. Fernando Tudela**

*To Watson—With respect to the position of the current U.S. administration, I am concerned about the growing cliché emerging in developing countries and Europe that the United States is shying away from its responsibility and not taking climate issue seriously. Many of us are well acquainted with the U.S. institutions and are aware of so many efforts being undertaken. I am sure the scale of these efforts are not enough, even disappointing. But a lot of things are happening in the United States and the rest of the world is not aware of them so there is a PR problem there. Here are few questions that are extremely relevant.*

- *We have heard that President Bush has said that the Kyoto Protocol is too expensive for the U.S. economy. The question is, then, what would be an acceptable cost for the United States?*
- *If a set of developing countries would take on commitments, would that be enough to bring the United States back?*
- *The United States had criticized the architecture of the Kyoto Protocol. Are you are going to propose an alternative or a substitute for the Kyoto Protocol?*

*I think that the PR part of the equation would be solved if the U.S. administration would answer these questions.*

*To other speakers—I have observed that all the analyses say nothing about ancillary benefits. If ancillary benefits are taken into account, will the results change radically?*

**Dr. Harlan Watson**

Yes, we do have the PR problem. I agree that the United States should make an effort to improve it. If you have any suggestions, I would certainly welcome them.

With respect to how much would be enough, I simply do not know. That is the question that the U.S. Senate would have to answer. The previous administration had

signed the Kyoto Protocol, but never submitted the Protocol to the Senate for ratification for obvious reasons.

Regarding what number means developing country participation and its significance to the United States, the answer is that we do not know either. The U.S. emission now is much higher than the Kyoto target, and meeting that target would severely harm the U.S. economy. The Kyoto Protocol as it stands now is absolutely a nonstarter. There are nine Democratic candidates currently running for the presidency. Only one of them has said that he is going to push for the Kyoto ratification. There is no piece of legislation signed by senators or presidential candidates that is sufficient enough to meet the Kyoto target. From that point of view, there is no way that this administration or another administration is going to push for the ratification because it is absolutely not rectifiable. That is the reality of situation.

I do not know what is going to happen or what we are going to do in the future. Regardless, we are not going to do anything to interrupt the Kyoto boat; we have already made that commitment. Clearly, we are going to encounter problems in 2005 when negotiations start for the second period commitments. Right now, we do not see a way to participate in the negotiations. Obviously, negotiations can take place in the context of the UNFCCC, to which we are a party.

**Dr. Terry Surles**

I try to take a state perspective. People in California support the Kyoto Protocol as a concept, but they do not have the whole picture and do not really understand the politics in Washington. Two U.S. senators from California had participated in the 95-0 vote for a resolution warning President Clinton not to sign a treaty that hurts the U.S. economy but omits emissions reduction requirements for developing countries. California is *gung ho* to stop climate change but, in the meantime, is a land of SUVs.

What California is doing is not because of climate change, but due to energy market deregulation. Energy efficiency programs, the Renewable Portfolios Standard, and R&D activities all allow the penetration of renewable technologies and efficient appliances into the market, which provides ancillary benefits as well as carbon reduction.

**Dr. David Greene**

Curbing carbon emissions in transportation will produce substantial benefits in terms of reducing U.S. oil dependence.

**Dr. Stephen van Holde**

*To Surles—Carbon intensity in California differs dramatically from the rest of the United States. It also differs from many industrialized countries. It looks like California moves in right direction. Why don't other states replicate this experience?*

**Dr. Terry Surles**

California has aggressive regulations pushing for stringent standards. But there are other factors that make California different from the rest of the country. First, the carbon accounting factor. California imports a lot of power from coal-fired plants from other states. This makes us look better. Second, the economic factor. California takes advantage of high-technology industries of lower emissions.

**Dr. Giorgio Mattiello**

*To Watson—I agree completely that there is no chance at all for the Kyoto Protocol to be ratified under the U.S. Senate. My question is why wouldn't the United States claim that it would be ready to re-enter the Kyoto protocol at a determined date in the future? This might enable other countries to trust the United States again.*

**Dr. Harlan Watson**

I do not know. I guess that this is the way this president operates. Even if the president were re-elected, he would not be the president in 2012 anyway. In my view, it does not make much sense to say that we would join sometime in the future without knowing what the participation entails although it would generate good PR.

**Professor Hisakazu Kato**

*To Watson—I heard that the motivation for PCA, which the Environmental Defense is involved with, is that companies in PCA expect emissions caps imposed on them at some point in the future. Does the U.S. federal government give some sort of hint or incentive for businesses to take early actions to reduce emissions? If indeed this is the case, would they be given credit for their early action?*

**Dr. Harlan Watson**

I have no idea what exactly motivates those companies in PCA. Obviously, there are a variety of reasons ranging from trying to be a good corporate citizen to anticipating mandatory caps that may come at some point of the future.

To enhance our voluntary GHG registry, we are developing baseline protection so that those companies that do act sooner would not be penalized. We also offer transferable credits for real emission reductions; however, there are no financial incentives.

**Professor Terry Barker**

*To Watson—Does the U.S. administration actively encourage Russia, both privately and publicly, to ratify the Kyoto Protocol?*

**Dr. Harlan Watson**

We take no position. As the president has said repeatedly, we are not encouraging or discouraging any country; it is up to each country to make its own decision.

**Professor Catrinus Jepma**

*To Greene—In Argentina, there are one million cars fueled by natural gas, whose emissions are 15-20% less than ordinary cars. I believe that there are a half million natural gas cars in Brazil. Why are natural gas cars feasible in Argentina and Brazil and not in the United States?*

**Dr. David Greene**

Natural gas vehicles do not offer significant benefits to customers. They have storage problem for fuel and small incremental cost of high-pressure storage, which are even worse for liquefied petroleum gas.

**Dr. Faisal Al-Hothali**

*To Watson—In your presentation, you stated that no one has yet had the answer to where we go from here. What is the U.S. climate policy leading to after the Kyoto Protocol enters into force?*

**Dr. Harlan Watson**

In terms of the U.S. climate policy, our track sets up to 2012. In terms of where we are going, we clearly emphasize technology development. We will try to get the best available technologies into the market to address short-term goals. In the long run, we will put heavy emphasis on technology development in areas such as nuclear fusion, carbon capture and storage, and hydrogen to get emissions down markedly.

### **Session III: European Union (EU) Climate Policy and Perspectives**

**Chair: Professor Catrinus Jepma**, University of Groningen and Foundation Joint Implementation Network, The Netherlands

#### **Presentations**

**Dr. Erik Haites, President, Margaree Consultants Inc., Toronto, Canada**

##### ***Linking EU Trading Programs with Other GHG Trading Systems***

The EU emissions trading scheme is scheduled to operate from January 1, 2005 onward. It will be the first transnational GHG emissions trading scheme in the world. Twenty-five member countries of the enlarged EU (15 current member countries plus the 10 accession countries scheduled to become full members by May 2004) are involved in this scheme.

In the pilot phase (2005-2007), trading will be confined to CO<sub>2</sub> emissions from large power plants and industrial sources. These sources are estimated to account for 46% of the total EU's CO<sub>2</sub> emissions in 2010. Based on the review of the progress in monitoring GHG emissions, trading can be extended to other sources and gases.

The EU trading scheme incorporates opt out and pooling provisions. These two voluntary provisions would weaken the scheme somewhat by reducing the scope of the market. But incentives to opt out or pool are weak because of the equivalent effort and collective compliance requirements respectively. Depending upon the extent to which opt out or pooling are adopted, the equilibrium price is estimated to be in the range of € 5-10 per metric ton of CO<sub>2</sub> equivalent. With about 1.8 billion allowances per year, this would lead to a total allowance value of € 9-18 billion in 2005 for the enlarged EU25 CO<sub>2</sub> trading scheme.

Other GHG emissions trading programs with different designs are being developed in conjunction with the EU trading scheme. Linking these trading programs together with the EU scheme would reduce the total compliance cost. However, linking through mutual recognition is unlikely before 2008 for political and timing reasons. Post-2008 mutual recognition is possible, but it is much easier to indirectly link all trading programs through an exchange into/out of Kyoto units, which is equivalent to required transfers of AAUs.

**Tilly Zwartepoorte, Director, Department of Climate Change and Industry, Ministry of Housing, Spatial Planning, and the Environment, The Hague, The Netherlands**

##### ***Dutch Climate Policy and Elements for a Future Climate Regime***

The Netherlands is committed to a GHG emissions reduction of 6% compared with its 1990 level. The Dutch government has decided to fulfill half of its effort to meet its Kyoto commitments through domestic emission reductions and the other half through the Kyoto mechanisms. Its domestic efforts comprise a series of measures that build upon actions already taken toward saving energy and developing renewable sources. The reduction of non-CO<sub>2</sub> GHG accounts for about 40% of its total domestic effort.

The Netherlands thinks that it does not make much sense to have the Kyoto target if there is no follow-up. Given the global differences in terms of responsibilities and stages of development, the so-called staged approach might be the way forward. In



this approach, industrialized countries would take the most stringent targets that are legally binding. The Netherlands is striving to bring about a global regime with a key goal for all industrialized countries to reduce their GHG emissions by 30% in 2020 compared with their 1990 levels. Countries at a different stage of development would take a less stringent commitment, while the least developed countries could perhaps be more involved through specific commitments on policies and measures. Within that overall context, there could be further differentiation. An approach like this ensures maximum participation from the various countries.

Emissions trading, technology, and development are three important elements in the post-2012 global climate regime. Emissions trading will continue to play an important role in the Kyoto and/or follow-up regimes. The Netherlands will implement its emissions trading scheme under the EU emissions trading banner. The Netherlands is also pushing ahead on implementing JI and CDM by adopting a multitrack approach that includes tender procedures for bilateral projects, cooperation with private banks, and collaboration with multilateral development banks. However, Kyoto mechanisms alone are not enough to lead to the reductions required to fulfill the Climate Convention's ultimate objective. By attaching a price to emissions reduction, Kyoto mechanisms only aspire a market pull incentive. A push program is also needed for R&D and demonstration.

Economic development is a key precondition for conducting a climate policy. Responding to climate change will help pursue sustainable development. But it could make achieving sustainable development more difficult than it already is. Thus, there is a need to seek possible synergies between responding to climate change and attaining sustainable development.

**Professor Terry Barker, Department of Applied Economics, University of Cambridge, United Kingdom**

***EU and UK Leadership in Moving Toward Low Carbon Economy and Strengthening Future Commitments***

The United States was an effective Kyoto leader. But after the U.S. withdrawal from the Kyoto Protocol, the EU had taken an instrumental leadership role to steer climate negotiations and future regimes toward a more productive direction. More specifically, the EU leadership is reflected in broad aspects that include engaging and supporting the UNFCCC, Kyoto processes, and Intergovernmental Panel on Climate Change (IPCC) activities; getting the Kyoto Protocol ratified, and calling for even more stringent targets for the future; exploring low-abatement-cost options; developing new policy instruments (e.g., the EU emissions trading scheme, carbon tax in the Netherlands, and the UK Climate Change Levy and associated industrial agreements); and providing additional funding for further R&D.

Within the EU, the UK is one of the countries taking a prominent role in shaping climate policy. Its Energy Policy White Paper 2003 sets a 60% reduction policy for CO<sub>2</sub> emissions by 2050, along with maintaining the reliability of energy supplies, promoting competitive markets in the UK and beyond, and ensuring that every home is adequately and affordably heated. To achieve such a substantial reduction in CO<sub>2</sub> emissions, the UK is expected to experience a very modest GDP loss of 0.5-2%.

On the cost side, the UK is no exception. If emissions trading and ancillary benefits are taken into account, the cost of U.S. compliance with its Kyoto target is negligible, although the U.S. administration claims otherwise. On a global scale, a stringent atmospheric concentration target, such as the stabilization of GHG concentration at 450 ppm (parts per million volume) in 2100, would only lead to a small global GDP loss in comparison with the expected GDP level under BAU. The main reasons for small, global, long-term costs of mitigation are the small shares of fossil fuel energy in global GDP (3–5%), the ease of substitution to low-GHG-emission energy products and processes in the long run, and more investment in low-carbon technologies and renewable energy.

Clearly, the availability of low-carbon technologies is crucial to making future, more stringent emission targets affordable. But without a push, the pace of technical innovation and development is limited. Lack of targets for the post-2012 period is seen as a threat to the pace of technical innovation and development. In this regard, the EU faces great challenges ahead in strengthening future commitments for industrialized countries, getting developing countries to take on greater commitments, exploring a differentiated but equitable approach to adaptation and mitigation, and opening a constructive, free, and full dialogue.

## **Discussions**

### **Professor Warwick McKibbin**

*To Haites—Two comments. First, why did you mention potentially massive losses of asset value when talking about the merging of emerging emissions trading regimes? Second, you mentioned that the United States might be a net buyer of permits. My speculation is that the United States is more likely to be a net seller if it joins an international emissions trading regime because energy prices are so low and there are plenty of low-abatement-cost opportunities in the United States.*

### **Dr. Erik Haites**

You are quite right on your first point. Within any program, there will be winners and losers. If prices drop through linking, the net buyers would be happy, net sellers would be unhappy, and *vice versa*. So, there are divided political pressures in any program as a result of linking and changes in asset values. This makes formal linkage through mutual recognition much more difficult. The rules through intermediation of Kyoto units are there and exist. I do not see the same political difficulties there.

On your second point, if the United States decides to recognize the Kyoto units for compliance, it could be a net buyer because the amount of hot air and sinks in the Kyoto system could make the Kyoto price lower than the domestic price in the United States.

### **Dr. ZhongXiang Zhang**

I would like to add one point to Erik's comments. I agree with Erik that it is quite possible that the Kyoto price would be lower than the domestic price in the United States. But I think the point of relevance here is whether the United States is allowed to sell its non-Kyoto allowances to the Kyoto parties. Nothing in the Kyoto Protocol prevents the Kyoto parties from selling their permits to buyers in non-Kyoto parties

like the United States. But many legal scholars argue that the Kyoto Protocol does not allow non-Kyoto allowances to be sold to Kyoto parties unless there is an amendment to the Protocol. I do not see major negotiating parties having an interest in amending the Protocol to recognize credits generated by non-Kyoto parties like the United States and allow them to enter the Kyoto market.

**Dr. Erik Haites**

I agree that Kyoto parties have no incentive to amend the Protocol to allow the purchase of allowances from a nonparty, especially the United States, which they feel should be a net buyer due to its large share of global emissions and high per capita income. However, if the United States is a net buyer of Kyoto units, then it would help defuse a number of issues. It would reduce competitiveness concerns by industry because firms in the United States and in Kyoto parties would face the same marginal cost of emissions abatement. Second, it would weaken the argument in the United States that limiting GHG emissions would be economically ruinous. That might make adoption of international commitments easier in the future. I believe that a unilateral target that results in U.S. purchase of Kyoto units would be a substantial, positive development, while allowing the United States to sell units to Kyoto parties is unlikely and undesirable.

**Toshiyuki Sakamoto**

*To Haites—You said in your presentation that to avoid double counting, the scope of JI would be reduced among member states as a result of implementing the EU emissions trading scheme. I wonder why this has to be the case. I am particularly interested in this point because some in Japan have said that the EU is trying to take all the opportunities of emissions reduction in Central and Eastern Europe by preventing countries outside the EU from implementing JI projects there.*

*Regarding the Japanese emissions trading, it is true that we had started an experimental trade this year. But that was just to prepare for internal trading of CERs and ERUs. At this point, we do not have a plan to introduce a cap-and-trade system because of the lack of interest among Japanese companies.*

**Dr. Erik Haites**

It is true that you can design JI projects to limit double counting. But the EU Directive requires that member countries hosting JI projects ensure that no ERUs are issued for reduction of GHG emissions from installations covered by this Directive. Let me cite a specific example to illustrate this point. The emissions from thermal power plants are covered by the trading program. A JI project to use renewables to reduce emissions from thermal power plants means that the power plants have surplus allowances or need to buy fewer allowances because their actual emissions are lower. To avoid double counting, the reductions that could be credited as ERUs would be zero. That effectively reduces the scope of JI.

**Douglas Cogan**

*To Haites—In your presentation, you did not mention the Chicago Climate Exchange. Do you have any comments on it?*

**Dr. Erik Haites**

Let me to put this diplomatically. The Chicago Climate Exchange is voluntary. In Canada, we have had two voluntary trading programs. The fundamental lesson that we learned is that there are unlikely to be buyers in a voluntary trading program, where buyers are sources that spend substantial amounts of money rather than PR money to buy allowances. So I would be happy to be a seller on the Chicago Climate Exchange. But I would not expect to sell a large volume unless we have an informal understanding that everybody buys some allowances and sells some allowances and in the end no one ends up with a big profit. We might learn from this or not. But if you want to do real trading, there are real markets where you can buy something with a real compliance value.

**Peter Kalas**

*To Zwartepoorte—Your presentation described clear strategies of the Dutch government regarding international cooperation. In the World Bank experience, the Dutch government has played a prominent role in promoting international co-operation with the host countries. You do it in a very proactive way by ensuring purchases of CERs from many countries. I would be interested in knowing how these programs including those directed into Eastern Europe work in practice. What kind of experience have you learned? How far will these programs— which are presently driving the market—continue?*

**Tilly Zwartepoorte**

I have to make a distinction between JI and CDM. For both programs we have public funding. For CDM projects, we try to tender bilateral projects and cooperate with international banks and organizations for multilateral projects. Actually, we are in the early stage because the Executive Board, which must approve the projects, is just discussing criteria for them. Our experience in Bonn in June 2003 was kind of disappointing; we will get past that since we are well on track with our CDM programs.

Regarding JI, substantial programs have also been launched. The problem is that the final criteria can only be settled by the JI supervisory committee. We are taking risks as early starters. Prior to entry into force of the Kyoto Protocol, we cannot be certain of the value of the JI investment to our commitment.

What we learned and we would like to share with everyone basically reflects our general attitude to environmental policy. It is a little bit risky. But so far, experience suggests that we get a good price (about US\$5 per ton of CO<sub>2</sub> equivalent) for the tons that we purchased.

**Oleg Pluzhnikov**

*To Zwartepoorte—How do you evaluate the results of the initial CERUPT and Emission Reduction Unit Procurement Tenders (ERUPT) in the Netherlands? Do you plan more projects through these programs?*

**Tilly Zwartepoorte**

The initial CERUPT and ERUPT tenders have led to many project submissions. We have a national system to select the most promising projects in terms of cost-effectiveness and feasibility. Although we are awaiting the acceptance of our

methodologies by the Executive Board, we are very satisfied with the results from these tenders. It is more than we expected. If funding is available, we will probably continue these and other programs.

**Dr. Alexander Golub**

*To Barker—Why did the EU not support a large scale of carbon sequestration?*

**Professor Terry Barker**

The reasons for the EU's reluctance to accept sequestration as a major means of coping with climate change are, first of all, major problems in verification and monitoring of carbon sequestration, particularly in land-use change. These problems are not just the monitoring of what is happening but also the scientific understanding of what is going on during land-use change. A different aspect is diversion from domestic mitigation actions. The EU emphasizes the importance of domestic actions and is reluctant to accept tackling the problem in the rather scientifically uncertain area.

**Dr. Erik Haites**

*To Barker—Did you suggest that governments might intervene in allowance markets to stabilize the prices? Many years ago, the Canadian government intervened in energy prices, but the results were disastrous. Why did you make such a suggestion?*

**Professor Terry Barker**

Markets will collapse if prices fluctuate rapidly. Prices fluctuate as a result of the changes in supply and demand and market manipulation by the bigger players. Governments and players have an interest in maintaining an orderly market. Modelling results show that there is a potential for disorderly markets. Yes, at present there is no plan for government intervention. But if and when markets become disorderly, the role of government would change. Otherwise, the system might collapse.

**Professor Hisakazu Kato**

*To Barker— Two comments. First, you pointed out that there are a lot of underused industrial facilities in industrialized countries, and they could be low-cost options for technology transfer to developing countries through CDM. But, in reality, developing countries normally demand the most advanced technology. Second, Japan is caught between the United States and Europe. On the one hand, like the EU, Japan goes along with Kyoto. But unlike the EU, Japan does not have many easy options: Almost all of our energy is imported—Japan has no domestic coal yet Japanese industry is supposedly the most efficient in the world in terms of energy consumption. Therefore, the only alternative for Japan is large-scale technical innovation. That is why Japan recently joined the U.S. initiative to embark on a very aggressive R&D program for technical innovation.*

**Professor Terry Barker**

Regarding your first comment, an example is gas turbines which could be used to replace coal power stations. These are essentially state-of-the-art equipment and produced in Japan, Germany or the United States. Developing countries will not accept that equipment—I'm not sure why. As for your second comment, yes, Japan is not in a favorable position for low-cost GHG emissions reduction as Europe. This is

why an emissions trading system is being set up; low-cost options will be available to Japan through trading allowances.

**Professor Warwick McKibbin**

*To Barker—What is big or what is small? Your graph shows GDP deviation under an atmospheric concentration target at 450 ppm relative to BAU. Yes, relative to the scale of the world economy, the differential in GDP outcomes of US\$100-300 billion per year is small number. But relative to what you can do with US\$300 billion per year, you probably can address AIDS or solve malaria in developing countries. This is an additional resource that you otherwise do not have. I guess that the size is in the eyes of the beholder. But I still believe that this cost is reasonably large and should not be dismissed as if it did not exist.*

**Professor Terry Barker**

Whether US\$100-300 billion is big or not is a perception issue. The large number should be compared with GDP or differences in economic growth rate. The question of whether it is right to spend money on this or that is a question of social choice. It is really up to the individual government to choose how to spend its money.

**Dr. Harlan Watson**

*To Barker—Regarding the list of reduction options to cut emissions by 15-25 million tons of carbon under the UK Energy Policy White Paper, notably no reference is made to nuclear energy. What are the assumptions toward the nuclear option?*

**Professor Terry Barker**

The nuclear option is a highly sensitive issue in the UK. Approximately 20% of the electricity in the UK comes from nuclear at the moment. This percentage will go down to 10% when long-lived nuclear stations are online between 2015 and 2035; it will go to zero by 2035. What the government says in the White Paper is that the nuclear option will remain open, but only if economically feasible. The government is not going to provide a subsidy to keep nuclear power. If an emissions trading scheme provides a viable price or the cost of nuclear is low enough, the nuclear option will be exercised and new plants will be built.

**Dr. Tom Wigley**

*Tony Blair's scientifically erroneous statement of a 60% reduction worldwide in GHG emissions by 2050 quoted by Professor Barker shows the political consciousness of climate issues, but is totally wrong. To stabilize the atmospheric concentration at 550 ppm, we do not really get back to the present emissions level, not even to reduce emissions, until sometime near the end of this century. I think that this sort of statement is really detrimental to the goal of doing something about it. It is not necessary to make such a statement. I do not think that it is good to repeat it as a hype. Even for a concentration target of 450 ppm, the overshooting pathway allows you to go out at 550 ppm and then come back to 450 ppm. By doing this, global GHG emissions in 2050 could be very similar to today.*

## **Session IV: Challenges for Other Major Industrialized Countries**

**Chair: Dr. Robert Dixon**, Senior Advisor for Climate Change, U.S. Department of Energy, Washington, DC

### **Presentations**

#### **Peter Heyward, Assistant Secretary, Environment Branch, Department of Foreign Affairs and Trade, Canberra, Australia**

##### ***Policies to Control Australia's Emissions***

Australia's national circumstances result in high vulnerability to the impacts of climate change. Australia is a dry southern hemisphere continent with high levels of endemism and biodiversity already vulnerable to the impacts of climate variability. The structure of the economy (reliance on energy and emissions intensive industries) results in exposure to efforts to address climate change. The federal structure also affects Australia's response to climate change—actions are taken at both state and federal levels.

Australia supports an approach which balances environmental effectiveness, economic costs and benefits, and social and regional impacts. Australia does not intend to ratify the Kyoto Protocol under current circumstances due to the absence of the United States and major developing countries. Australia remains committed to working internationally to realize a response that includes all major emitters, and to meeting the target set at Kyoto.

Australia has established the Australian Greenhouse Office and a National Greenhouse Strategy and has in place a broad range of policies and measures including: the Greenhouse Gas Abatement Program, the Greenhouse Challenge Program, Greenhouse Friendly Labelling, mandatory renewable energy targets and programs, Generator Efficiency Standards as well as initiatives aimed at households and local governments, development of a National Carbon Accounting System, climate research and observation, and investment in technology R&D. Through these policies, measures, and initiatives, Australia has achieved significant reductions in the emissions intensity of the Australian economy and is on track to meet its Kyoto target.

A future approach needs to take into account uncertainties and have the flexibility to accommodate new developments. The aim is to sustain well-being, play a constructive role in the global economy and conserve the environment, and contribute to an effective global response to climate change.

#### **Yasuhiro Shimizu, Director, Climate Change Policy Division, Ministry of the Environment, Tokyo, Japan**

##### ***Japan's Strategy to Meet its Kyoto Target***

Japan's GHG emissions were lower in 2001 than in 2000, due in part to Japan's recession and a mild winter resulting in less energy consumption. However, Japan's emissions are still 5.2% above 1990 levels, so an 11.2% reduction is required to meet Japan's Kyoto target. Emissions from residential/commercial/institutional and transport sectors have increased significantly since 1990, so there is a focus on abatement from these sectors.

Japan implemented the New Climate Change Policy Program in 2002, which is based on four main ideas: revitalization of the Japanese economy and employment; step-by-step progress with provision for review; reduction across all sectors; and international cooperation. Japan has set out how it intends to achieve 4.4% of the required 6% reduction from 1990 levels with the remainder to be realized through overattainment of sectoral targets or use of the Kyoto mechanisms.

Japan is undertaking a number of actions to achieve GHG reductions such as reducing emissions in energy demand and supply sectors through promoting new energy sources, and establishing the Centers for the Promotion of Activities to Prevent Global Warming and the Global Warming Prevention Headquarters. Economic incentives have been implemented, including reduced taxes on environmentally friendly cars and reform of the energy tax scheme. Technology development is also a focus. Assessment and review of policies and measures is to occur in 2004 and 2007. Based on this review, additional measures may be implemented including a possible GHG reduction tax and domestic emissions trading scheme.

Japan is keen to see the early entry into force of the Kyoto Protocol which, it believes, is necessary to address climate change and reap significant benefits. In post-Kyoto discussions, there is a need to consider whether a new mandate is needed. There is also a need to consider how the Kyoto Protocol might be built on for the future. Incentives will be the key to reduce GHG emissions in Japan and enlist global participation. Japan is currently undertaking a research project to look at incentives that will enlist countries to participate in a future international regime.

**Oleg Pluzhnikov, Deputy Head, Ecological Department, Ministry of Energy, Moscow, The Russian Federation**

***Climate Policy of the Russian Federation—What Next?***

Russian economic growth is currently high- with GDP projected to increase at around 5% per year until 2020. The Russian Federation's GDP will return to 1990 levels by 2010; however, emissions will not return to 1990 levels until 2020 due to increases in energy efficiency and the increased use of nuclear and renewable energy and natural gas.

Three key directions form the basis of the Russian climate policy:

- Under the new energy strategy, the energy intensity of the Russian economy has to decrease by 14% by 2010.
- The share of renewable energy will be raised to 2% by 2010 through federal law.
- Gas has to play a dominant role in the Russian energy balance.

Improved energy efficiency has been achieved through federal and regional programs and increased energy prices. Significant energy-saving potential still exists in the Russian economy.

A number of reasons exist both for and against the Russian ratification of the Kyoto Protocol. President Putin has stated Russia's intention to ratify the Kyoto Protocol in September 2002, and in autumn 2003 that was the general position of all ministries. The most likely scenario is Russian ratification in summer 2004. Upcoming



parliamentary and presidential elections will delay the ratification and signing of the Protocol until that time.

The United States has not been placing pressure on Russia to withdraw from the Kyoto Protocol. The only pressure has been coming from the EU with letters to President Putin calling for ratification from German Chancellor Schroeder and British Prime Minister Blair.

**Dr. ZhongXiang Zhang, Senior Economist, East-West Center, Honolulu, United States; Chinese Academy of Social Sciences and Peking University, Beijing, China**

***Open Trade With the United States Without Compromising Canada's Ability to Comply with its Kyoto Target<sup>4</sup>***

The United States is Canada's largest trading partner. The U.S. deviation from international obligations makes Canadian industries' competitiveness (trade) concerns become even more rigorous. However, as far as the first commitment period is concerned, the issue of competitiveness in the United States and Canada context may be a little bit exaggerated. Significant sinks credits allowed in the Marrakech Accords relax the emissions targets substantially. Also, allowing the unrestricted use of Kyoto flexibility mechanisms makes it much easier for the remaining Annex B parties to meet their relaxed targets. These two factors can lower the Canadian compliance costs substantially. In the meantime, the United States also incurs economic losses even if it faces no mandatory constraints. Many EU countries, although awarded with less sinks credits in the Marrakech Accords than Canada, intend to do more than the minimum required under the Kyoto Protocol. The combined effects of these factors suggest that additional costs borne by Canada would appear not that high relative to the United States and the EU as they appear at first glance.

To deal with increased emissions in Canada as a result of increased energy exports to the United States, Canada could (to the extent allowable) incorporate the abatement cost of exported energy in energy pricing and/or increase the amount of cleaner energy exports to the United States. Canada would further mitigate competitiveness concerns by shielding those sectors more vulnerable to global competition and/or invoking trade measures against non-Kyoto parties, although it needs to ensure WTO consistency. But Canada cannot resort to those U.S. credits to lower its compliance costs. Recognizing credits from emissions reduction projects in non-Kyoto parties like the United States would require an amendment to the Protocol, which is unlikely to be acceptable to major parties.

From these perspectives, it is argued that the issue of competitiveness in the United States and Canada context during the first commitment period is a little bit exaggerated. Some may share this view, but still question that there might be long-term problems arising in the second and third commitment periods, provided that the United States still remains outside the Kyoto regime. This is a legitimate concern, but overall competitiveness concerns makes it unlikely that any country would step out too far in front. Provided that the United States would still remain outside the Kyoto

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<sup>4</sup> This presentation is based on the following publication: Zhang, Z.X. (2004), Open Trade with the U.S. without Compromising Canada's Ability to Comply with its Kyoto Target, *Journal of World Trade*, Vol. 38, No. 1, pp. 155-182.

regime at that time, it is hard to imagine that Kyoto parties like Canada would assume future commitments that they regard as overly costly and unfair.

**Dr. Alexander Golub, Senior Economist, Environmental Defense, Washington, DC**

***Economies in Transition: Potential for GHG Reduction and Incentive for Implementation of Robust Climate Policy***

There is huge potential for GHG reductions in transition economies. All are at different stages of transition but have some similarities: high discount rate, high transaction costs, high degree of externalities, and poor market experience. For all transition countries, carbon emissions in 2008-2012 will be far below those of the Kyoto Protocol budget. These countries also have the possibility to keep emissions within the 1990 benchmark beyond 2012. However, the actual emissions path depends on rapid development of the capital market, liberalization of prices for energy resources, subsidy elimination, market reforms and structural changes of GDP, and transfer to new technologies. If market reforms are slow and the capital market is premature, GDP growth is likely to be based on old energy-intensive technologies, and GHG emissions are likely to be higher than predicted.

Participation in global emission trading under the Kyoto Protocol will compensate the shortfall of investments in GHG reduction. The trading potential is 3-5 billion tons of CO<sub>2</sub>-equivalent (without the forest sector). Ninety percent of this potential is in Russia and Ukraine. Most Eastern European countries will join the EU soon, and therefore will join the EU bubble. So the seller on the GHG market will most likely be Russia and Ukraine.

At the moment, the most important preconditions for implementation of the low pathway for CO<sub>2</sub> growth are not yet in place in Russia and Ukraine. To be able to trade efficiently, they have to meet some preconditions in terms of institutional building. There are other incentives to drive GHG emissions down, including ancillary benefits of GHG reduction. By implementing such reduction policy, Russia will be able to avoid about 40,000 lives lost during the coming decade and up to 15,000 in Ukraine. Despite the social importance of such benefits, there is no mechanism in place yet to adequately internalize these benefits.

**Discussions**

**Dr. Erik Haites**

*To Zhang—Two comments. First, gas exports from Canada to the United States in 2012 are not marginal supplier to the U.S. market so they do not set the price. Therefore, the effect of Canada's emission restrictions simply reduces the profits of those Canadian suppliers, but has no price effect. Second, under the North American Free Trade Agreement (NAFTA), countries are obligated to treat like products equally, whether they originate from the United States or Canada. In Canada the proposed system of offsets, for which credits will be issued, will need to be considered carefully regarding rules to create and award those credits. Otherwise, the American companies could implement the same actions and claim them as like products. Therefore they could argue that they should be awarded with credits that could be*

*sold to the Canadian market. But Canada cannot count on them toward Canadian compliance with its Kyoto target.*

**Dr. ZhongXiang Zhang**

Your first question raises an issue of whether Canada is able to set prices outside the country to recover its mitigation costs. Currently, the United States receives about 94% of its natural gas imports from Canada, and Canada's natural gas exports go almost exclusively to the United States whose natural gas consumption in 2003 is estimated at 22.3 trillion cubic feet. Canada has had a number of natural gas pipelines connecting to the United States. Currently, there are two competing proposals for building a natural gas pipeline from the Arctic to the U.S. market –one from the Canadian Arctic (MacKenzie Delta) and another from Alaska. The MacKenzie Delta pipeline is estimated to carry as much as 1.9 billion cubic feet per day of natural gas, possibly beginning in 2008. A competing pipeline would transport natural gas from Alaska's North Slope fields with possible capacity as high as 4-5 billion cubic feet per day and potentially beginning sometime around 2012. The delivered price of natural gas from the Arctic will be higher than the delivered price of gas from western Canada. Thus, the marginal price of gas in the U.S. markets supplied by Canada will be the delivered price of MacKenzie Delta gas possibly beginning in 2008. Subsequently, the marginal price will be set by Alaskan gas beginning sometime around 2012. This means that Canadian suppliers will earn substantial profits on their gas exports, and are able to pass on their Kyoto-compliance costs to U.S. consumers before Alaskan gas becomes available. But when Alaskan gas becomes available, the Kyoto compliance costs cannot be passed on to U.S. consumers as an additional cost. This will reduce Canadian profits earned from natural gas exports though the effect is expected to be very small. To give a sense of the possible magnitude of the price impact, Canada's official study indicates that the impact of meeting its Kyoto target on natural gas and oil industries is less than 1% of unit price.

Regarding your comment on like products, it could be a potential problem only if Canada's domestic offset program were not carefully designed. But to me, whether carbon credits are subject to trade rules (WTO or NAFTA) is an open question. If they are not subject to trade rules as lawyers suggest, then the like products clause does not apply.

**Dr. David Greene**

*To Heyward– Why do Australia, the United States, and China choose not to participate in the Kyoto Protocol? The United States claims that the Protocol is likely to be too costly. But many studies show that the United States is likely to be a net seller rather than a buyer. Thus, it is not really about the cost. Australia refuses to ratify since the United States and China are not taking on targets, but it agrees to meet its Kyoto target anyway. All three countries have a lot of coal, so it is really about property rights because restricting the ability to get carbon emissions into the atmosphere is some sort of restrictions on property rights to carbon and energy resources. Therefore, the solution to get these three countries' participation would be to partially restore some sort of these property rights.*

**Peter Heyward**

Australia has large coal reserves, and this is a factor in how Australia reacts to the international situation. However, Australia's reasons for not ratifying go deeper than

that. The primary reason is that the Kyoto Protocol is not the long-term answer. There is a need to look further for an appropriate solution.

**Professor Warwick McKibbin**

Australia is meeting its target partly because of policies that it has implemented to reduce emissions and partly because of the Australia Clause (land use changes). However, Australia's GDP is projected to be severely impacted in the second commitment period where the same sinks concessions will not be available. It is not so much the first commitment-period calculations that cause the concern; unknown costs in the second commitment period are the concern.

**Professor Terry Barker**

*To Pluzhnikov—What happens to the revenue from an increased gas price in Russia? Given that the market for gas in Russia is more restricted than the market for oil, if gas demand reduces as a result of increased prices, where will the extra gas go?*

**Oleg Pluzhnikov**

Russian gas policy is not simple. At this moment, there are five different proposals to liberalize gas market for the Russian government to consider. Regarding gas revenues, GAZPROM supplies more than 80% of the market, while the rest is from independent producers. The revenue is projected to fall as a result of increased prices. However, increased transparency of the existing gas structure will increase the efficiency of GAZPROM. Through this increasing efficiency, falling revenues of GAZPROM will to some extent be compensated.

**Professor Terry Barker**

*To Pluzhnikov—Why will revenue fall when gas prices go up?*

**Oleg Pluzhnikov**

When gas prices go up, consumers pay more. But GAZPROM has to invest in more right now to increase the transparency of the existing gas structure. There is a need to invest US\$6-8 billion per year to increase the transparency of the gas sector.

**Dr Harlan Watson**

*To Zhang—A point of clarification relating to your presentation. Your argument suggests that, from a legal point of view, the United States needs to formally withdraw from the Kyoto Protocol, not the UNFCCC. It is unclear how to do it. Basically, our position is that the president has sent a letter to the UNFCCC stating numerous times that we have withdrawn. But no one really knows what is meant by the formal withdrawal. Also the United States is not a party to the Vienna Convention.*

*To Pluzhnikov—Thanks to Russia for clarifying that the United States has not been applying pressure to withdraw from the Kyoto Protocol. I notice that the recent state address by President Putin at the Duma set a goal of doubling Russian GDP by 2010, which is considerably faster than the 5% assumed in your analysis. Have you considered this in your analysis regarding implications for energy use or emissions?*

*To Heyward—Most of Australia's emission reductions in the 2001 inventory occurred in the Land Use, Land-Use Change, and Forestry (LULUCF) sector. Does this have something to do with Article 3.7 of the Kyoto Protocol?*

**Dr. ZhongXiang Zhang**

It is clear that the United States has withdrawn from the Kyoto Protocol, and is committed to the UNFCCC. My argument is that, from a legal point of view, it is important for the United States to remain a party to the UNFCCC. This would give the United States legal standing to challenge policies and measures under the WTO, which Canada, the EU, and other like-minded countries had put in place to enforce the Kyoto Protocol. My understanding is that, in dealing with transboundary and global environmental problems such as climate change, policies and measures adopted through multilateral negotiation processes have a better chance to be WTO-consistent and thus avoid unnecessary conflicts and trade disputes. However, the question is how would the WTO apply its rules with respect to specific trade-related measures in multilateral environmental agreements (MEAs) when one WTO member country is not a party to such MEAs but is affected by the trade measures in such MEAs? Could the affected country use WTO rules to overrule the trade measures? This is an issue that needs to be clarified under WTO. The EU wants WTO members to agree that this should not be allowed to happen.

**Peter Heyward**

Australia has also been looking at the possibility of WTO challenges on the basis of nonratification of the Kyoto Protocol. Our view is that, though we address climate change seriously, they would be very difficult to sustain under WTO. I do not think that the formal withdrawal would make a difference in that context.

On land use and the LULUCF issue, I do not pretend to be an expert. I gather that Australia's decrease in LULUCF emissions resulted from a combination of a decrease in land clearing and an increase in plantation forestry.

**Oleg Pluzhnikov**

Doubling Russian GDP in 2010 represents an optimistic scenario, in comparison with a moderate scenario of 5% per year assumed in my presentation. In my view, achieving a radical economic growth of 7-8% per year would require modernization of the economy and radical growth in energy efficiency. To achieve 5% economic growth, Russia's energy use should grow 1-2% per year, but it needs to grow 2-3% per year to achieve 8% economic growth. This means that, in practice, Russia would not sell 300 million tons of CO<sub>2</sub> equivalent in 2010 under the moderate scenario. Rather it would only have a maximum of 100 million tons of CO<sub>2</sub> equivalent for sale under an optimistic scenario of economic growth. In the context of the potential for emissions trading, this is not a serious problem.

**Peter Kalas**

*To Pluzhnikov—Large energy saving potential in Russia of around 40% is very similar to that found in World Bank studies for Eastern European countries, i.e., 46% energy saving potential in the Czech Republic. However, this potential is theoretical only. There are many barriers, such as institutional barriers, energy pricing, and financial restrictions. These barriers would lead to a real potential of only 8%. Your figure suggests a great potential of joint implementation projects. Given these barriers, how realistic are your estimates of energy saving potential in Russia? Does Russia consider trade with other former Soviet Union countries, where barriers are even higher? This might be a feasible intermediate solution.*

**Oleg Pluzhnikov**

How realistic are the projections? In the last three years, Russia has had GDP growth of 9%, 8%, and 5%, and is predicting 5% for 2003. Establishing energy saving legislation and energy efficiency centers throughout Russia demonstrates how the situation is changing along with the economic recovery. We do not expect very positive results immediately but some results will be seen in the near future. We still face a problem of energy pricing. Currently, there is a struggle between the industry sector, which consumes gas at old prices, and the reality of potentially significant shortages in the very near future if gas prices remain the same. We have no choice; the only possibility is to increase gas prices significantly, which eventually increases electricity prices. Increased prices are a good incentive for energy saving. We are still face many institutional and pricing barriers but we believe that, step-by-step, we will overcome these barriers.

**Dr. Peter Reid**

*Deep emissions reduction does not necessarily mean closing down the coal industry. The United States is investing in clean coal, carbon capture and storage, and sequestration technologies. There is still a lot of cheap coal available in the world. Even when adding the costs of carbon capture, this sector is likely to remain competitive.*

*To Shimizu—Among the articles that you considered relevant, would you include Article 3.3?*

*To Pluzhnikov—How do you see the relationship between Russia's role as the second largest oil exporter and as a seller of a large number of carbon credits? Given that other oil exporting countries lobbied vigorously during negotiations on the Kyoto Protocol to water down commitments, do you see it as a conflict or not?*

**Yasuhiro Shimizu**

The first thing to stress is that we have to concentrate on choosing a mandate—this is very important in the first stage when deciding which direction we are going. Article 3.3 is about the content of the Framework itself. We need to distinguish this from the four articles recommended, which address procedural matters rather than content.

**Oleg Pluzhnikov**

Russia has not undertaken any specific investigation on this issue. There might be some consequence with respect to the development of the Russian gas sector, which anticipates the possibility of exporting more gas to Europe. One concern of the Russian oil sector (related to the Kyoto Protocol) might be the realization of more joint implementation projects in the gas sector.

**Dr. Irving Mintzer**

*To Shimizu—In your breakdown of the 6% reduction target in 2010 for Japan, CO<sub>2</sub> emissions from energy sources are set at 0% reduction. Based on Japan's current level, this implies an 8% reduction in CO<sub>2</sub> emissions from energy sources. How will the 8% be met?*

*To Pluzhnikov—I received an email this morning indicating that the Russian Ministry of Natural Resources had forwarded documents of ratification yesterday. Do you want to revise your timeline of the Russian ratification in light of this development?*

**Yasuhiro Shimizu**

Targets for energy-related emissions in 2010 have been set for each sector: industry 7% below 1990 levels; residential/commercial –2%; transportation 17%. The current situation looks like this: Industry: –5.1% reduction; residential/commercial 25% above 1990 levels, so a lot of efforts are needed in this sector; transportation still needs a 3-4% reduction.

**Oleg Pluzhnikov**

Unfortunately, I am not so well informed. If earlier ratification were the case, this is a positive signal but I would not make radical corrections to my statement. To ratify the Kyoto Protocol, several stages have to be passed. I am 92% sure that the Russian government will support ratification. The next sitting is in September/October. No session has been dedicated to the Kyoto Protocol at this stage, but it can be changed if political pressure is applied from the very upper level of government and parliament. The parties in the Duma have divergent views on the Kyoto Protocol. In the Duma there is about 60% support for ratification and 40% against ratification. I still think the most probable case of ratification will occur next year in Spring.

**Dr. Alexander Golub**

I am a little bit more optimistic about the Russian parliament. However, the most important step is having the Russian government send the paperwork to parliament. Unfortunately, it has not happened yet.

**Professor John Kirton**

*To Shimizu—Three questions. First, how confident can Japan's G8 partners be about Japan's ability to meet its target? Second, what is Japan's likely GDP growth over the next 10 years? Third, you mentioned overattainment of set sectoral targets or use of the Kyoto flexibility mechanisms to meet Japan's target. Does this require Japan's fiscal capacity?*

**Yasuhiro Shimizu**

Japan's climate change program was announced in March last year. Japan had set numerical targets with each controlled by different agencies. If each agency implements its objectives then we could collectively achieve the targets. However, uncertainties exist such as the GDP growth and the speed of implementation, so we cannot answer with certainty right now, –maybe after the review in three years.

Your second question is a very tough one. The government assumptions use approximately 2% but in the past, growth has been much less, around 1%.

With respect to the use of the Kyoto flexibility mechanism, there is an internal argument whether or not to allow the emissions trading system, which has not been determined yet. But the government is actively supporting CDM and JI, has established facilitative mechanism, and has formulated guidelines to encourage Japanese companies to invest in CDM and JI projects.

**Dr. Robert Dixon**

*To Shimizu—California is the fifth largest economy in the world, and almost 5% of its electricity comes from geothermal energy. Why isn't Japan putting more emphasis on geothermal energy or offshore wind?*

**Yasuhiro Shimizu**

Japan is pushing renewable energy, but the amount of energy use is so large that, proportionally, renewable energy is very low. One problem with geothermal energy is that most potential sites are located in national parks, so other environmental considerations prevent the utilization of geothermal energy. I have no idea why offshore wind power has not been utilized.

**Professor Akio Morishima**

In addition to the huge sites required, which are located in national parks, another problem with geothermal energy is disposal of contaminated water. Some good opportunities for wind power exist (for example in Northern Japan), but have low efficiencies. Japan cannot build many windmills in similar sites as California or the North Sea. Regardless, Japan is promoting renewable energy. Currently, renewable energy provides about 1% of the total electricity supply, and this will increase to 3% in 2010.

**Professor Hisakazu Kato**

*To Heyward— There have been a number of Japanese companies investing in plantation projects in Australia for carbon credits. Hopefully, they would get credits once Australia ratifies the Kyoto Protocol. There was particular encouragement from Australia for this. What is your government's formal position now regarding incentives to encourage investment in this area?*

*To Pluzhnikov—Bilateral negotiations between Russia and Japan on use of Kyoto mechanisms (JI and emissions trading) have been going on for many months now. So far, they have come to no definite conclusions. I understand that the primary reason for this is a very cautious attitude from the Russian side. What is the main reason for caution from Russia?*

*To Shimizu—On the post-Kyoto regime, you stated that there should be coherence between the Kyoto Protocol and future regimes. Does this imply that the Japanese government is ready to consider other regimes quite different from what is now in the Kyoto Protocol?*

**Peter Heyward**

The Australian government always welcomes investment in sustainable forestry projects. Such projects in Australia will not be able to generate JI credits because we are not a party to the Kyoto Protocol. But I do not believe that any sink projects funded by Japanese companies have been withdrawn, so there must be other benefits yielded by these projects.

**Oleg Pluzhnikov**

JI projects with Japan are the result of many years of consideration. My Ministry of Energy had started negotiations with the Ministry of Economy, Trade, and Industry



(METI) almost five years ago. In the very first stage, we had proposed 100 possible projects to Japan, which then selected 20 projects and prepared feasibility studies. Two JI projects were agreed upon three years ago. Since then, we have met every three to four months. This has involved many lengthy negotiations and is a slow moving process due to Japan's iterative procedure.

**Yasuhiro Shimizu**

No, this is just my personal opinion.

## **Session V: Issues Related to Developing Countries**

**Chair: Dr. Irving Mintzer**, Global Business Network, Silver Spring, United States

### **Presentations**

**Dr. ZhongXiang Zhang**, Senior Economist, East-West Center, Honolulu, United States; Chinese Academy of Social Sciences and Peking University, Beijing, China

#### ***Reconstructing Climate Policy: How Best to Engage China and Other Major Emitting Countries in the Post-2012 Global Climate Regime?***

The United States and China have pointed at the other as the culprit who is blocking the climate negotiation process. This leads to a dilemma. On the one hand, the United States rejects the Kyoto Protocol because it exempts major developing countries like China, Mexico, and India, and thus it is conceivable that the United States would not rejoin the international climate regime without more specific commitments than those general commitments from major developing countries. On the other hand, the U.S. withdrawal from the Kyoto Protocol will substantially reduce incentives to invest in CDM projects. Given that China is widely regarded as the dominant host country of the CDM projects, the significant decrease in demand for permits as a result of the world's largest single buyer remaining outside the international market of tradable permits would lower China's gain substantially. So some American analysts have suggested joint accession by the United States and China. This proposal does have the merit of enhancing environmental effectiveness of the Kyoto Protocol and helping stabilize the price of permits on the international market. It is certainly in the interest of the United States.

This presentation first examines why the proposal is not in the interest of China from the following perspectives: How does China value the importance of maintaining unity of the Group of 77? What lessons has China learned from bilateral negotiations with the United States regarding accession to the WTO? What is the legitimacy of the U.S. insistence that it would rejoin the Kyoto Protocol only if major developing countries take on greater commitments? What are the implications of the United States' strikingly reversed position on the commitments of developing countries in New Delhi for initiating discussions on joint accession by the United States and China? How would joint accession by the United States and China be perceived?

The presentation then addresses the issue that even if participation in a global cap-and-trade regime is beneficial to China as many economic studies suggest, why has China consistently refused in international negotiations even to discuss its participation in it? The presentation looks at this issue from the following perspectives: How do developing countries like China and India perceive the issue of emissions caps in the first place? Is it perceived as an issue of "what is" in positive economics or an issue of "what ought to be" in normative economics? Why have China and India been skeptical about international emissions trading? How is an inflow of CDM investment into China perceived politically in comparison with the exports of emissions permits to the United States? What are the implications of being locked into emissions caps with no rules or principles for setting emissions targets for the commitment periods subsequent to Kyoto? How is the complex undertaking of setting emissions caps for developing countries addressed when the caps, if any, must be linked to future, unobserved levels?

Finally, the presentation touches on the likely path forward. The current international negotiating process is best characterized as pledge-based. Consequently, the negotiated results are mainly influenced by bargaining power and economic might rather than by objective criteria, which leaves all countries directionless on what to expect. This presentation argues that international climate negotiations should not continue to follow the Kyoto pledge-based approach in negotiating the post-2012 global climate regime. When negotiating future commitments, it emphasizes the importance of objective indicators, either quantitative or qualitative, to avoid reducing everything to politics which happened in Kyoto. These objective indicators should measure wide differences in national circumstances and avoid a stalemate in which every country claims its unique circumstances. The equity principle should also be reflected. Otherwise, the large disparity in per capita carbon emissions between the United States and China becomes unimportant, while a disparity between the United States, who would be required to reduce emissions, and China, who would not, becomes paramount. Moreover, to better reflect the specific needs and circumstances of developing countries, participation could take different forms. Although current debates on commitments from developing countries have overwhelmingly focused on emissions caps, other forms of commitments that are more explicitly linked to needs, responsibilities, and development objectives could be considered to enlist wider participation. This could be a useful step toward assuming emissions caps particularly for the majority of countries who are still at a low level of development. Clearly, this stepped approach encourages China and other major developing countries to take an increasing degree of responsibility over time and could eventually lead China and other major developing countries to assume emissions targets.

**Dr. Fernando Tudela, Director, Program on Water, Environment, and Society, El Colegio de Mexico, Mexico City, Mexico; Former Chairman, Inter-Ministerial Committee for Climate Change in Mexico**

***Developing Countries and the Evolution of Commitments***

The developing countries are heterogeneous in terms of the stage of development and the size of GHG emission in relative and absolute terms. Therefore, the form of commitments may be different. Some countries like Brazil, China, and Mexico have already made significant contribution to climate change mitigation, although none of their carbon reductions have resulted from conscious domestic climate mitigation policies.

Capacity analysis and capacity building in developing countries are crucial to undertake future commitments. It includes formulation of climate change policy, effective participation in international negotiations on climate change, elaboration of GHG inventory, promotion of mitigation projects, and public participation. Developing countries could achieve the GHG quantity target gradually beginning with a sustainable development (SD) approach before proceeding to SD and GHG monitoring and control, then finally attaining their emission target. Some advanced developing countries are ready to discuss stepping up their commitments if the equity concerns are taken into account.

There are other options to achieve emission targets. One of them could be carbon efficiency standards (i.e., intensity target). The target could be countrywide or just be set at the sectoral level. The intensity target could be adjusted to the stages of economic growth (i.e., dynamic targets). As demonstrated recently in Mexico, in

periods of real economic growth the energy intensity diminishes. So the intensity target should be stricter when the economy is growing faster. This provides one of the ways leading to the contraction and convergence of per capita GHG emissions globally.

**Peter Kalas, Senior Technical Coordinator, National Strategy Studies Program, The World Bank, Washington, DC**

***National Strategy JI/CDM Studies: Promoting Links between Climate Change Issues and Sustainable Development***

The National Joint Implementation/Clean Development Mechanism (JI/CDM) Strategy Studies (NSS) program of the World Bank is established to provide a capacity building assistance to the JI/CDM host countries regarding the application of the Kyoto flexible mechanisms, which promote trade of GHG emission reductions. Launched in 1997, this program initially was a collaborative effort between the government of Switzerland and the World Bank. With the World Bank actively playing the catalyst role, the NSS program now receives support from Germany, Australia, Finland, Austria, Canada, and Italy as well as the major Swiss donor support.

The NSS program is host-country driven and Kyoto-flexibility-mechanisms-oriented. To help host countries materialize potential gains from implementing JI/CDM, capacity building under the NSS program includes advancing the understanding of Kyoto flexible mechanisms; initiating the national high-level dialogue on country participation in JI/CDM; and providing assistance to the host country to build a national team of experts, the relevant institution, a legal and regulatory framework, and the JI/CDM project pipeline. This also leads to identifying low-cost options to reduce carbon emission and financing the project preparation through the Prototype Carbon Fund.

The NSS program had targeted over 30 host countries. Experience with these 30 countries suggests that there exists great regional differences regarding government's role, policies, institutional set-up, identified potential of CDM projects, and private sector involvement. Latin America takes the lead and Asia lags behind but is catching up quickly, whereas Africa is still moving rather slowly. The NSS studies, which have been completed and are ongoing, enumerate the challenges of implementing CDM projects such as high transaction costs, complex rules, and the need for the intermediary institution. All these factors reduce efficiency and the CDM's attractiveness. JI rules may also contribute to high transaction costs and reduce the efficiency of this flexible mechanism. The NSS program is working with host countries and its strategic partners to address these issues and facilitate GHG emissions reduction to promote the integration of global climate change issues into the sustainable development of these countries.

**Toshiyuki Sakamoto, Director, Global Environmental Affairs Office, Ministry of Economy, Trade and Industry, Tokyo, Japan**

***Emission Trend in Developing Countries and Measures to Facilitate CDM Implementation in Asia***

Between 1990 and 2000, energy-related CO<sub>2</sub> emissions had increased by 33% in China, 53% in Brazil, 62% in India, 88% in South Korea, and 97% in Indonesia. The rapid increase in energy-related CO<sub>2</sub> emissions in major developing countries is due to

heavy reliance on coal and greater energy consumption to fuel development and economic growth. Inefficient use of energy is also a major cause for the rapid increase in carbon emissions in developing countries. According to the IPCC's Third Assessment Report on the current trends, CO<sub>2</sub> emissions from non-Annex I countries are expected to grow to 44% of the world total in 2010. This share will go up to 50% in 2020.

In terms of energy consumption per unit of GDP, Japan has the most efficient economy in the world. Increasing CO<sub>2</sub> emissions in developing countries on the one hand and a huge disparity in energy efficiency between developing countries and Japan on the other hand suggest that there is great potential for the CDM to be a win-win mechanism. The Japanese government has approved a few JI/CDM projects. To further help Japanese companies to become familiar with JI/CDM mechanisms and develop projects, the Japanese government has published the Kyoto Mechanism Guidebook (in Japanese), provided financial support for JI/CDM project developers, and established the Help Desk. Inquiries received by the Help Desk suggest that most JI/CDM potential projects focus on energy efficiency in Asia.

Partly because of geographical reasons and partly because of the potential of the CDM market in Asia, Japan had launched the Asia CDM Capacity Building Initiative. Working with partners such as China, India, Indonesia, Malaysia, the Philippines, Thailand and Vietnam, this initiative aims to remove major barriers to JI/CDM through institutional streamlining, disseminating expertise, developing national strategies in promising areas, and enhancing private sector support. Japan has gained valuable experience through this initiative and is determined to expand programs to address the needs of developing countries, cooperate and coordinate with international organizations and other countries, and share experiences and good practices among various stakeholders within developing countries.

## **Discussions**

### **Dr. Stephen van Holde**

*To Tudela and Kalas—How can we construct a more-equitable international climate regime that particularly reflects the needs and wants of developing countries?*

### **Dr. Fernando Tudela**

This is an extremely difficult question. Discussions on this issue are going to be very difficult before 2005 within or outside the Kyoto Protocol. We have to be aware of perspectives other than a scientific or political science viewpoint. We are in the middle ground. We cannot hope that the rerun of the black box, like the Kyoto Protocol, will be acceptable - horse trading in the dark is going to be very difficult. But it is equally impossible to get a fully transparent box where objectives and formulas will give you a direction of where developing countries should go. I think that we have to be pragmatic. Particularly, we should leave room for politicians to maneuver with support from analyses previously unavailable in Kyoto.

### **Peter Kalas**

The NSS program faces a very different experience. A couple of very successful countries provide strong governmental and nongovernmental support and advance the

process in contrast to some other countries, though their situation may be attributed to political discontinuity. We have learned to energize international discussions on the CDM rules by providing quantified impacts of different approaches. Through this process, national experts obtain a better understanding of the subject. However, given very differentiated approaches and reactions of countries, we need to consolidate the whole process regionally and internationally. There are many things that remain to be done.

**Dr. Alexander Golub**

*Mr. Sakamoto's presentation cited the IPCC's projection of future carbon emissions in developing countries. I do not believe these numbers. I believe that developing countries have ancillary benefits as an incentive to get their carbon emissions below the IPCC's emissions baseline. I also think that the CDM is almost dead. I do not believe that the CDM will provide additional incentives for developing countries to reduce their carbon emissions. Given ancillary benefits and the likely demise of the CDM, why don't developing countries take on emissions reduction commitments? If not caps, what other alternatives would attract developing countries?*

**Dr. Fernando Tudela**

It seems that we are in such a hurry but we need to proceed very carefully. Your suggestion is similar to Argentina's position a while ago. At the fourth Conference of the Parties (COP) in 1998, the Argentine president said that the country was going to take on voluntary commitments. But if you talk with Argentine officials today, they are unwilling to discuss that commitment. From their perspective, that commitment was made for geo-political reasons and does not make any sense for them now. The Argentine case suggests that we should avoid jumping into a course of action. Just as you would not play in the major leagues without years of preparation, you would not commit to a long-term process without capacities, policies, and measures in place.

**Dr. ZhongXiang Zhang**

Yes, developing countries are more concerned about local pollutants. This prompts them to take action to lessen emissions of local pollutants. At the same time, this would lead to a reduction of carbon emissions and produce ancillary benefits. Ultimately, their actual GHG emissions in the future might be lower than the emissions baseline projected by the IPCC. But this is just one side of story. Lowering emissions levels today through proactive measures could hinder future negotiated commitments. Developing countries may argue that they have already initiated productive actions and the resulting (lower) emissions levels should not be regarded as their emissions baseline. Also, if you insist on caps for all countries, then the timeframe should be different. Some countries will have caps in 2010 just like the Annex B countries under the Kyoto Protocol; other countries might have caps in 2020, 2030, or even later. The question is, then, do you really believe that the 20 to 30 year commitments that countries make today are realistic and credible? This goes back to Professor Tudela's point and the arguments in my presentation. Instead of jumping stages, it might be more appropriate to step back and seek more realistic actions between the caps and the do-nothing approach.

**Toshiyuki Sakamoto**

You mentioned that the CDM is almost dead. In my view, the CDM should not be and must not be dead, given the amount of efforts that we have made so far. It seems to

me that all the problems come from the CDM's Executive Board and MethPanel, which are working on the mandates of the COP. The COP9 in Milan in December 2003 should take some action to mediate discussions on the CDM's Executive Board and MethPanel so that the CDM can be implemented as originally designed. Regarding setting quantitative targets of emissions reduction, it seems to me that we discuss numbers too much. I completely share Dr. Zhang's sentiment that setting national commitments under the Kyoto Protocol has been rather arbitrary. Many Japanese feel that the Kyoto targets had been decided in last-minute negotiations by bargaining powers. Once we discuss those targeted numbers either as absolute caps or intensity targets, we would face the same problems that we had in Kyoto in 1997. I would suggest that, instead of quantitative targets, we should look at qualitative aspects of future commitments, such as policies and measures and technology standards. If we proceed this way, this may lead to more equitable commitments in the future.

**Dr. Irving Mintzer**

I would like to add to Dr. Golub's comments regarding ancillary benefits for developing countries that incorporate caps on emissions. His logic might also apply to industrialized countries like the United States.

**Oleg Pluzhnikov**

I would like to add to Mr. Sakamoto's point on CDM's Executive Board by saying that CDM's Executive Board does the best to destroy the CDM. Every time the CDM's Executive Board meets in Bonn, supervisors sit in the room nearby. After each meeting, CDM's Executive Board always meets everybody who wants that and has answers to all the questions. So it is not a problem to control the CDM's Executive Board. If you really think that the CDM's Executive Board is able to do something in that circumstance, I suggest you to visit these meetings.

**Peter Kalas**

Our experience with the host countries contrasts sharply with Dr. Golub's statement that the CDM is almost dead. For example, in our recent experience in Peru, more than 50 projects are identified and there are industrial dialogues there. So, at least, there are a lot of expectations in several, if not many, host countries regarding the CDM.

**Professor Terry Barker**

*Assuming that the Kyoto Protocol is going to enter into force, each Annex I country is going to consider both domestic actions and Kyoto flexibility mechanisms to meet its emissions target. It seems to me that the introduction of CDM is a major development linking industrialized countries and developing countries. I have three questions. First, what is the potential scale of CDM to meet the Kyoto targets of Annex I countries? Second, for an Annex I country like Japan which has ratified the Kyoto Protocol, does the METI have any idea of the potential scale of CDM to meet Japan's target? Third, for the host country like China, is it setting criteria necessary for CDM projects? What is the potential scale of CDM in terms of emissions reduction below the emissions baselines or compared with foreign direct investments?*

**Toshiyuki Sakamoto**

Mr. Shimizu's presentation yesterday provided a breakdown of how Japan's Kyoto target of 6% below 1990 emissions level will be achieved. His presentation suggests that domestic policies and measures will lead to a reduction of 4.4% below 1990 emissions level. A reduction of 1.6% below the 1990 emissions level would be achieved through the Kyoto mechanisms. But we have not analyzed the extent to which we would rely on AAUs, ERUs, or CERs. Most Japanese feel that, if the frustrating situation with CDM continues, then the contribution of CERs to meet Japan's Kyoto commitment would be marginal.

**Dr. ZhongXiang Zhang**

Just after Kyoto, I did a study for the Asian Development Bank (ADB) to examine the potential size of the market for Kyoto mechanisms. My results suggest that about 28% of the total needed emissions reductions in Annex I countries in 2010 would be met through domestic actions. This is broadly in line with the IPCC's finding. Depending on the policy scenarios examined, the CDM is expected to contribute 21-58% of the total required reductions. That ADB study also investigated the geographical distribution of the CDM flows. Because of many low-cost abatement opportunities available in China's energy sector and the sheer size of its population, China is expected to emerge as the dominant host country of CDM projects with about 60% of the total CDM flows. This amount of CDM inflow to China helps lower its baseline CO<sub>2</sub> emissions in 2010 by 176-437 MtC. Expressed as a percentage of its baseline emissions, this amount of emissions reduction is roughly 11.6-40.1%.<sup>5</sup> These results had been obtained when the United States was still in the Kyoto Protocol. With the U.S. withdrawal from the Protocol, some studies even show that the amount of hot air from Russia alone would be sufficient to meet the demand for permits by the remaining Kyoto-constrained Annex I countries.

Regarding the criteria, the kinds of criteria set and types of projects given priority would definitely have an impact on the scope of CDM projects and the overall size of investments. At this time, China is in the process of developing criteria for CDM projects. As Dr. Golub has said, developing countries are more concerned about local pollutants. Logically, I would expect that CDM projects that would also lead to reductions in local pollutants, for example, energy efficiency improvement projects and renewable energy projects, would be given priority in China. China may not allow unilateral CDM projects without direct involvement from partners of industrialized countries. This is partly because unilateral CDM projects do not contain the element of technology transfer and have no additional up-front investments from industrialized country partners. Another consideration might be that unilateral CDM projects, if allowed, would lead to an increase of cheaper permits flooding the already weak demand market, which would do more harm to developing countries. Ultimately, you could accumulate huge amount of credits. Later, when negotiating future commitments, other countries could argue that you should take on and meet

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<sup>5</sup> The numbers cited in this paragraph are taken from the following two publications: Zhang, Z.X. (2000), Estimating the Size of the Potential Market for the Kyoto Flexibility Mechanisms, *Weltwirtschaftliches Archiv - Review of World Economics*, Vol. 136, No. 3, pp. 491-521; Zhang, Z.X. (2004), Meeting the Kyoto Targets: The Importance of Developing Country Participation, *Journal of Policy Modeling*, Vol. 26, No. 1, pp. 3-19.



more stringent commitments because of the many accumulated credits. So, on the one hand, we have international agreements like the Kyoto Protocol and Marrakech Accords that specify what is allowed (e.g., sinks projects and unilateral projects). On the other hand, individual governments still have flexibility in the choices that fit their national circumstances. Their choices would certainly impact the scope of CDM projects and the overall size of investment.

**Dr. Fernando Tudela**

In some regions, particularly Latin America, the CDM has played a very important role in capacity building. High expectation there have had very positive impacts in the sense that environmental authorities, who are usually in charge of climate issues, have managed to convince economic authorities that climate change would make a difference in project development. Economic authorities have gotten involved in the discussions because of the CDM. Environmental authorities are often weak in these countries, but the involvement of economic authorities leads to high expectation. The short-term obstacle to the CDM is real development in host countries because investors are not interested in the development aspects of the CDM. In my opinion, the CDM provides an excellent starting point for some countries, but advanced developing countries would soon outgrow the CDM, which is artificially restricted now by the Executive Board.

**Peter Kalas**

There is an asymmetry between host countries and investor countries, and our program tries to address asymmetry in the host countries, which is still a huge effort. We are in the front in helping to create DNAs (Designated National Authority) and bring partners together. There is a great potential for the CDM to contribute to future energy efficiency improvements and emissions reductions in many countries. But actual achievement depends on the level of cooperation. At the present, few large firms from industrialized countries are interested in developing CDM projects with partners in developing countries because it is too complex and involves huge transaction costs. We still need more time to get there.

**Dr. Irving Mintzer**

I would like to add another thought on the indicator of the scale. It has been six years since the Kyoto Protocol and we only have 16 projects being considered by CDM's Executive Board and only one baseline methodology approved by the MethPanel. If the CDM is going to be a meaningful contributor to global GHG emissions reduction, we have to reach the stage where the approval rate for projects should be in the range of 500-5000 per year.

**Dr. David Greene**

*A country's decision on whether to participate in the Kyoto Protocol or take on commitments depends on the economics. I think that the key economic barrier to full participation today is not the question of efficiency, but who gains or who loses. Carbon constraints will lead to a huge decline in the present value of carbon-based energy assets. This issue is going to influence a country's decision on participation. If you ignore the impacts of carbon constraints on the value of carbon-based energy assets that countries hold, you'll probably never get countries like the United States, Australia, or Saudi Arabia to sign on.*

**Dr. ZhongXiang Zhang**

I fully agree with your view that the issue of who gains or who loses, that is, the issue of income distribution, matters a great deal. Take China's accession to the WTO as an example. Many macroeconomic studies show that China's accession to the WTO has very modest macroeconomic impacts in terms of GDP growth. But when it comes to sectors/products, differences would be much bigger with or without China's accession to the WTO. Then the question would be: Why would China want to join the WTO and how would you balance the winners and losers? Even in a domestic context, it is already quite difficult for the government to pursue some kind of income transfer from one sector to another to mitigate negative impacts on severely affected sectors/products. It would be even more difficult to take mitigating action on behalf of those countries severely affected by an international climate agreement. If we were able to reach an agreement with side payment that makes each country happy, this would involve huge capital transfers from one country to another. Some American congressmen already regard such a transfer as foreign aid, and consider it unacceptable. Even for those who gain from the transfer, they would want more. Income distribution is indeed a very big issue and probably one of the most difficult to address in international climate negotiations and target setting. This also explains why international climate negotiators are unable to reach any substantial conclusions on the resulting adverse effects of the so-called policies and measures.

**Peter Heyward**

*To Sakamoto—You mentioned the interim report by the Japanese Global Environmental Subcommittee et al. on “Perspectives and Actions to Construct a Future Sustainable Framework on Climate Change”.<sup>6</sup> Can you tell me where it is going from here? Is it just for internal use or are there other intentions?*

**Toshiyuki Sakamoto**

That report had been published in July 2003. Many Japanese feel that the Kyoto targets were decided in last-minute negotiations. That is why we wanted to start discussing a future framework at an early stage. The report contains the basic concept of a future framework and we have provided specific recommendation for future actions. Those recommendations were first published in Japanese then translated into English. Our intention is to stimulate discussions on a future framework both in Japan and abroad.

**Professor Catrinus Jepma**

*Regarding the scope of the CDM, everybody agrees that the potential is enormous. It is extremely important that the capacity in host countries is sufficient and confident. But we should not forget the important role of investors and business communities. They should feel confident as well. If business communities really feel that the CDM is something of interest to them, then I would expect a large number of CDM projects in the future.*

**Peter Kalas**

I just want to confirm the important role that the Dutch government has played in building the confidence of business communities in Latin America and other parts of

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<sup>6</sup> This report is available at:  
<http://www.meti.go.jp/english/information/data/cPubComCliChae.html>.

the world. The purchase of 10 million tons of CO<sub>2</sub> reductions by the Dutch government from Peru provides an enormous stimulation to the market and sends a strong message to local communities because it creates a certain level of market. The Dutch government repeats this in many countries. This is probably one of the ways to channel business communities both in your country and host countries.

**Dr. Faisal Al-Hothali**

*When talking about where to go from here, I think that it should go back to the UNFCCC itself. No progress or very little progress has been made in the issues most relevant to developing countries, for example, adverse effects under Articles 4.8 and 4.9 of the UNFCCC. Developed countries have not fully implemented their commitments yet. Why should we talk about bringing developing countries into commitments?*

**Dr. Fernando Tudela**

A climate regime is not only about commitment, it is about action. Having said that, commitments act as the goal of actions. If commitments are rational and feasible and make sense, you can use those commitments to move countries forward in the right direction. It would be too simplistic to think that Annex I countries do not live up their commitments. We non-Annex I countries are also behind our own commitments. For example, except for the least developed countries, we non-Annex I countries are supposed to produce national communications and sound GHG emission inventories. As far as I know, Mexico is the only non-Annex I country that has produced the second national communication. Some able countries have not even produced the initial national communication. Commitments need a political will to live even if they are not that stringent.

**Toshiyuki Sakamoto**

I would like to make a brief comment from an Annex I country perspective. You mentioned that Annex I countries have made commitments but have not taken action yet. I think that most Annex I countries have already taken action to meet their Kyoto commitments. As Mr Shimizu's presentation showed yesterday, Japan is implementing policies and measures and spending billions of U.S. dollars annually to mitigate climate change.

## **Session VI: Panel Discussions: Where Do We Go from Here?**

**Chair: Professor Catrinus Jepma**, University of Groningen and Foundation Joint Implementation Network, The Netherlands

### **Panelists**

**Peter Heyward**, Assistant Secretary, Environment Branch, Department of Foreign Affairs and Trade, Canberra, Australia

**Professor Akio Morishima**, Chairman, Board of Directors, Institute for Global Environmental Strategies, Kanagawa, Japan

**Dr. Robert Dixon**, Senior Advisor for Climate Change, U.S. Department of Energy, Washington, DC

**Dr. Irving Mintzer**, Global Business Network, Silver Spring, United States

**Douglas Cogan**, Deputy Director, Social Issues Service, Investor Responsibility Research Center, Washington, DC

**Dr. Fernando Tudela**, Director, Program on Water, Environment, and Society, El Colegio de Mexico, Mexico City, Mexico; Former Chairman, Inter-Ministerial Committee for Climate Change in Mexico

**Tilly Zwartepoorte**, Director, Department of Climate Change and Industry, Ministry of Housing, Spatial Planning, and the Environment, The Hague, The Netherlands

**Oleg Pluzhnikov**, Deputy Head, Ecological Department, Ministry of Energy, Moscow, The Russian Federation

### **Opening remarks**

**Peter Heyward:** I would like to take advantage of being the first speaker on the panel to summarize some of the main points made throughout the three-day sessions. To start with, it is important to remember how far we have come. All countries are now better able to engage in this issue. However, there is still a long way to go. There is still a need for significant capacity building, and morale is low on the next steps.

The Kyoto Protocol will likely come into force next year, but without Australia or the United States. There is still no certainty of meeting the UNFCCC objective, and there are some concerns with respect to the implementation of the Kyoto Protocol and difficulties in Kyoto flexibility mechanisms, as we have heard and discussed.

There are many possible ways of moving forward. Some see a move forward within the Protocol framework. But there are also other possible starting points, such as the McKibbin-Wilcoxon Blueprint or the U.S. technology-based approach.

This process will take time. There are triggers in the existing framework for further negotiations, including the UNFCCC. How can Australia engage in this process? The context is important. Australia has a high level of commitment.

Two issues keep coming up. Whatever happens, the U.S. position is critical to future developments; otherwise, what life would the Kyoto mechanisms have? Australia has no one answer. Australia is engaging in a domestic consultation process. Being here in this process personally gives me a lot of ideas that I can take back to that debate. Being a party to the UNFCCC, Australia still needs to be part of the future negotiations.

**Professor Akio Morishima: *Japanese Perspectives on a Beyond-2012 Regime***

Discussions on post-Kyoto are underway in Japan. As mandated under the Kyoto Protocol, deliberations on the post-2012 commitments start in 2005. The METI and the Ministry of the Environment have started discussions. An interim report on future regimes is available from the METI. But we do not yet have a complete idea, and are discussing barriers, etc., and implications of the first commitment period for Japan. In discussing building a future climate regime, elements to be considered include environmental objectives, institutional coherence, and politico-economic concerns. There is a need to change the pattern of the economic structure and a need to consider fairness to future generations.

Regarding institutional coherence, the negotiations at Kyoto and discussions afterward suggest that we might not find a much better way than the Kyoto regime. Thus, we should start from the Kyoto regime and go forward. Yes, there are many defects in the Protocol, but the Protocol is a significant step to address climate change. There are several institutional developments under the Protocol; some are not ideal and need to improve, but the basic institutions are fine. Thus, we should build the future regime based on the Kyoto Protocol. The continuity of Kyoto mechanisms and other ideas are very important even if the Protocol is reviewed.

Fairness and costefficiency are the two most important political considerations. The Kyoto targets were not based on scientific rationales. Japan's target did not account for Japan's existing high-energy efficiency and high marginal abatement costs. Compliance cost for Japan is higher than other Annex B countries (The IPCC's Third Assessment Report suggests that, measured in 1990 US\$ per ton of carbon, the marginal abatement cost of meeting Japan's Kyoto target in 2010 is 330.4 in comparison with 248.4 in OECD Europe and 178.5 in the United States). Japan's cost is almost double that of the United States. Regardless, Japan is determined to meet the requirements of the Kyoto Protocol.

The U.S. position is peculiar in terms of fairness. The United States has no reason to walk away from the Kyoto regime. Looking at Chinese and U.S. emission trends to the year 2025, we see that the U.S. emissions are growing, and the absolute amount is large. China's emissions are also going up rapidly. China and India are not in the same position as the United States, but we have to negotiate with developing countries regarding equity for future generations, not that they should be subject to the same obligations but that they should be committed in some way.

**Dr. Robert Dixon: *U.S. Department of Energy Hydrogen and Fuel Cell Programs***

Technology solutions will be important in reducing GHG emissions. The United States is investing billions of dollars in clean energy technology development. There are many drivers for policy development. The U.S. position is, in part, driven by energy security. The U.S. domestic production of oil is falling, while domestic use is growing. Even with higher CAFÉ standards (e.g., 40 mpg) the gap is large. So a new approach is required.

Based on this, the United States developed 105 national energy policy recommendations. On January 28, 2003, President Bush announced at the 2003 State of the Union Address the Hydrogen Fuel Initiative—the first car driven by a child born today would be powered by hydrogen and be pollution-free. It should take 16-17 years to develop this. This project is similar to the Manhattan project or the first moon landing as former National Aeronautics and Space Administration (NASA) management is involved in this U.S. Department of Energy (DOE) project, and there is a real national commitment to meet this goal. Hydrogen Fuel Initiative complements FreedomCAR (Cooperative Automotive Research), a partnership between DOE and the U.S. Council for Automotive Research, and a cooperative endeavor among DaimlerChrysler, Ford, and General Motors to conduct precompetitive, high-risk, high-payoff research into advanced automotive technologies.

Why hydrogen? It is highly efficient and there are many sources. Desire for freedom is also a key in the decision to move toward hydrogen. Americans are wedded to freedom—the freedom to use vehicles where, when, and how they want, and freedom from dependency on foreign oil.

Regarding bringing in a 14-country coalition on the H-fuel cell, with a recently held summit in Washington, D.C., substantial resources have been dedicated to this task. The United States committed US\$1.7 billion for the first five years of a long-term hydrogen energy technology and infrastructure development program, and the EU committed up to € 2 billion for long-term R&D of renewable and hydrogen energy technologies. The United States has taken political leadership in initiating the International Partnership for the Hydrogen Economy (IPHE). The IPHE-participating country's consumers will have the option to buy a competitively priced hydrogen power vehicle and refuel it near their homes and places of work by 2020. But to get there, the United States and its IPHE partners have to overcome many impediments, barriers, and skepticism.

**Dr. Irving Mintzer: *Importance of Looking Back to Move Forward***

It is most important to find ways to return to the shared vision and consensus that led to the agreement at Rio. The key element is the ultimate objective of the UNFCCC—promote sustainable development in both developing countries and developed countries. In moving forward, we focus first on the commitments under Article 4.1 of the UNFCCC. New technology development helps but is not sufficient to help bring down a still-rising trajectory of carbon emissions in industrialized countries. There is also a need for regulatory and institutional changes in industrialized countries including, but not limited to, the United States.

As we look forward, we need to seek mechanisms that allow developing countries to meet their development objectives while dramatically slowing the growth of

emissions. Successfully implementing the UNFCCC objectives requires not treating climate in isolation. We need to treat climate change as an issue within the broad context of energy security, development, and economic security. We need to recognize energy security not only for the United States but also for developing countries. The United States and other Annex I countries have to think carefully where resources will come from to meet China's energy security needs if we hope to have China's participation to meet our shared goal of stabilizing atmospheric GHG concentrations. This might lead us to take a new view on China sourcing different sources of fuel.

Going forward, we need CDM or similar mechanisms to meet economic needs of developing countries while slowing down the growth of their emissions. This flexible approach may take different forms in different countries, but must reflect a shared vision of all parties. This is not just an issue of targets and timetables. We would need a plan to reduce emissions over the long term and stabilize atmospheric GHG concentrations. This will lead us to address the following issues:

- 1) Maintain economic stability while reducing emissions. (How do we efficiently turn over capital in the developed countries?)
- 2) Develop vehicles to integrate the climate change issue with other issues, such as trade talks and partnerships.
- 3) Recognize that theological commitment in the language of the Kyoto Protocol will not get the emissions reductions needed. (We need to follow through on the Protocol and go significantly beyond the reduction of 5.2%.)

We may have to give up hope on the Kyoto Protocol II, but need commitment to the UNFCCC, which will allow us to move forward safely. We must find a way and the will to proceed.

**Douglas Cogan: *After Marrakech: Where Do We Go from Here?***

Building a business case for climate change action is needed to move forward. Projected costs of warming are likely to be greater than the costs of action in the longer term. But the United States has extended relaxed standards for the life of its coal assets, and has had very little improvement in fuel efficiency standards since 1986. Based on current trends, CO<sub>2</sub> emissions in the United States are projected to increase by 12% in 2010–33% above the Kyoto target. Thus, the U.S. policy is at odds with the Kyoto Protocol.

The United States and developing countries do share a common rising emissions trajectory and will not bind themselves to the Kyoto targets. The Kyoto Protocol will enter into force, but this alone is not enough to answer the problem. It is important to take incremental steps as well. Kyoto's legacy is that the EU, Japan, and Canada remain committed, important institutions are being established, and that countries will have gained practical experience with emissions trading.

The Kyoto Protocol will affect U.S. companies. The effects include their constrained access to emission trading, potential trade barriers, and effects on multinational companies. Regarding the U.S. political dimension, the 1997 U.S. Senate vote is increasingly becoming old news. Climate change is likely to be an issue in the 2004 presidential election.

Investors hate uncertainty. President Bush's plans provide some certainty—no emissions caps until 2012—but uncertainties remain, including whether President Bush will remain in power through 2008. A quasi-Manhattan Project to combat climate change would entail a funding commitment more in line with what the United States is now spending in Iraq than what it is spending on the FreedomCAR program – but it shows that the resources can be found when the perceived threat is great. For long-term investors, the primary concern is that companies may invest in projects which do not make sense under future carbon constraints, cannot recover sunk costs, and cannot catch up to competitors. This will move us from avoiding the high cost of taking action to bearing the high cost as well as losing any strategic advantage by not taking action.

**Dr. Fernando Tudela:** Moving a climate regime forward will take a lot of effort and will be a slow-moving process. We have to be patient, flexible, and pragmatic. There are several possible scenarios going forward:

- 1) The Kyoto Protocol does not take off. Russia may not ratify the Kyoto Protocol, and the Protocol falls apart. So we may have to look for a convergence of several regimes.
- 2) The Kyoto Protocol enters into force. Temptation to bring Australia back and isolate the United States in the hope that the United States will want to join is totally unrealistic since the United States is too large an elephant to be left behind. We have to work with the United States and help it fully understand the challenges that we are facing.

Once the Kyoto Protocol enters into force, we have to expand options and explore opportunities and mechanism to bring down costs. Within the Kyoto house, we have to negotiate the second commitment period. If we have to negotiate a new Annex for developing countries, I believe that some developing countries are ready to discuss that if the equity concerns are taken into account.

Outside the Kyoto house, if the United States wants to discuss hydrogen, the rest of the world should join in. We should not see this as undermining the Kyoto Protocol. We have to strike a balance between environmental effectiveness and political feasibility. This needs a political will.

We [the world] have to share a vision. I am confident that this vision is there. These are grounds for optimism.

**Oleg Pluzhnikov:** The Kyoto Protocol is a good first-step document, but not good enough. It did not manage to unite the interests of the United States and developing countries. As discussed throughout this conference, a unified formula for all countries is impossible, as there are too many differences—economical, ecological, political. There is even a big difference among countries with economies in transition. But the Kyoto Protocol provides a good background for making a move forward.

There are many options to group countries and assign their commitments. One option is first to categorize countries according to responsibility, then to establish the extent of participation of different categories of countries. (One possible approach is dynamic targets that allow differentiation among different countries.)



This conference is really a good move forward in getting and relaying ideas for the next steps.

## **Discussions**

**Professor Catrinus Jempa:** It is a good time to brainstorm for the 2005 negotiations. Let me briefly suggest a few directions for our discussions:

- 1) Some kind of follow-up of Kyoto. It may not be a copy of the Kyoto Protocol, but is based on Kyoto flexibility mechanisms simply because institutions are there.
- 2) Criteria for targets. Only bargaining took place at Kyoto, and there is no framework, no clear thinking of rules and commitments. We need to think about a set of criteria to allocate future commitments among countries.
- 3) Absolute emissions targets. Somehow this turns out to be a problem, particularly for the United States. But it is fair to say that it is a rather rigid system. Going forward, we might have to think about relative targets. They may have a better chance of adoption
- 4) Further participation. Developing countries have to play a larger role in the whole scheme. Their commitments could be actions or policies and measures rather than caps. The Kyoto Protocol does not leave room for these forms of commitments.
- 5) Capacity. It's unfair to ask a country to take some action if it has no capacity to do so. Capacity grows in parallel with the possibility of carrying out policies and measures.
- 6) The business community needs certainty.
- 7) The Kyoto Protocol is just a climate policy. If you want to participate in international negotiations, you have to find linkages with other policies in order to get a package deal (e.g., trade, technology, and energy security).

**Professor James Roumasset:** Researchers from Knut Wicksell to the modern-day Harvard Negotiation Project<sup>7</sup> look at economic justice from a more practical point of view of facilitating cooperation. The basic principle is that the costs of the agreement be allocated according to benefits thereof. This approach incentivizes the maximum participation in multi-lateral agreements. Even parties who have more to lose than gain from an agreement can sometimes be induced to join through interlinkage, e.g., linking climate change with energy security/national security.

When an agreement is made with a suboptimal set of participants, the welfare gains from the agreement can still be increased by developing instruments to include non-signatories. The efficiency prices on which such extensions would be based (e.g., the shadow price of carbon) can be approximated by those arising from the agreement among first-round signatories. Unfortunately, the prospect of a second-round of agreements is a disincentive to joining on the first round. The CDM mechanism and sequestration formulas pose this kind of moral hazard as well as uncertainties in baselines and additionality. A procedure for adding signatories in a way that does not make them better off than had they signed the original agreement would remove the

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<sup>7</sup> See the web site at: <http://www.pon.harvard.edu/research/projects/hnp.php3>.

perverse incentives. But this underscores the importance of allocating costs according to benefits in the original agreement.

**Professor Terry Barker:** *Climate change linkages mean that there might be win-win opportunities where we might not expect. Here are two examples.*

- 1) *Emissions trading scheme being developed by the EU will involve a financial transfer to those with permits. The question is, what happens to the money received? There are large-scale investments needed in the European energy systems. Part of the money could fund energy investors. It could also be used for investment in low carbon technology. We can extrapolate this into the U.S. situation. The United States is undergoing a series of energy supply crises. This clearly requires a large amount of new investment. Funding for that new investment could come from an emissions trading scheme. This would lead to a win-win situation where the United States could use money from the emissions trading scheme to secure an energy supply and, in the meantime, achieve emissions reductions by encouraging shifts toward low-carbon electricity production technologies.*
- 2) *Large-scale resource transfer to developing countries could stimulate the global economy. If several countries do this, it could make a difference.*

**Dr. Irving Mintzer:** The United States does have experience in emissions trading. Emissions trading can redirect resources in a positively constructive way. But at this moment, I do not see any momentum to introduce an emissions trading system based on CO<sub>2</sub> emissions, which are not considered a pollutant by the Bush administration.

**Professor Akio Morishima:** The United States could develop an emissions trading system if it had total control of the pollutant. The United States can offer a market for those who want to sell permits to American entities, but it cannot offer the good [permit] itself since its permit has no legal recognition under the Kyoto Protocol.

**Dr. ZhongXiang Zhang:** I would like to add one point raised by Professor Morishima. Even if U.S. credits have no legal recognition under the Kyoto Protocol, some entities from the Kyoto parties might still want to acquire U.S. credits based on either an expectation of speculative profits or an expectation of second or subsequent commitment period participation or for the purpose of secondary transfers or for the use of their own, future establishments in the United States. Trading of Kyoto permits and non-Kyoto credits is possible via a clearinghouse system, whereby the American firms that wish to export the U.S. credits to Kyoto parties could exchange them for Kyoto permits and then sell the Kyoto permits back into the Kyoto market. Two technical questions need to be resolved. The first question revolves around the exchange rate at which one ton of non-Kyoto credits is equivalent to one ton of Kyoto permits. Provided that the exchange rate can be worked out, the next question is whether there are ways to ensure no net inflow of non-Kyoto credits into the Kyoto regime. In this regard, a gateway may be needed to ensure that the allowed emissions levels for each Kyoto party remain unchanged even without restricting flexibility of trading between Kyoto and non-Kyoto parties.

**Douglas Cogan:** The prevailing view in the U.S. administration is that CO<sub>2</sub> is not a pollutant. However, some moves are underway in the U.S. Congress to discuss trading and caps on the CO<sub>2</sub> bill. The McCain-Lieberman bill is a comprehensive plan for

introducing CO<sub>2</sub> emissions trading, but it will not pass the Republican-dominated Senate. (In October, the bill was defeated by a vote of 55-43.) Within the utility sector, there is some prospect for four-pollutant legislation. The Carper bill is a compromise bill calling for modest CO<sub>2</sub> emissions reduction in the utility sector. I am optimistic that this may have a chance of passing. There is a feeling that the president's Clear Skies bill is losing momentum, and that there is a momentum toward four-pollutant legislation.

**Peter Heyward:** Emissions trading has been discussed in Australia too. However, an issue was a possible political signal that this might send in relation to Australia's international position, so emissions trading is very unlikely to occur right now. I suspect that the same thing is exactly true in the United States.

**Dr. Robert Dixon:** I would like to clarify the situation in the United States. Currently, there are active carbon trading groups in the United States. These firms make profits by trading carbon. As far as I know, the Bush administration is neither giving any negative signals nor imposing any restrictions.

**Dr. Tom Wigley:** *I just want to say something about the U.S. policy beyond Kyoto in the context of WRE profile. The first point goes back to the PR aspects of the president's initiative. President Bush's scheme calling for the reduction in energy intensity has only limited duration, but if applied globally, it falls on the WRE trajectories of stabilizing CO<sub>2</sub> concentrations in the long run at 450 or 550 ppm. If the president had worded his policy to include this fact, this would have really changed people's perspective and he would not be facing the current PR nightmare.*

*The second issue is the WRE emission trajectories that we had envisaged before Kyoto could be used. We felt that they could be used to set global targets. Some system needs to be developed to assign global targets among countries. I can easily think of six to 10 ways that you could allocate emissions targets among countries. I may be too naïve, but one could undertake the following system to allocate emission permits [country targets] to stay on one of the WRE trajectories. First, countries must agree on the global target. Second, every country can then figure out how many emission credits would receive under each of the six to 10 allocation schemes and hence the corresponding emissions reductions that it would have to make under each scheme. Each country is then allowed to choose its emission allocation that gives itself the second lowest amount of required emissions reduction, provided that it is not the lowest one because it is quite often an outlier. After every country did this, the UNFCCC could sum up what this would mean for total world emissions. Most likely, this sum would exceed the target in the WRE scenario. Therefore, for the WRE target to be met, each country would need to scale up its emissions reduction by the ratio of the WRE target and the total of all the countries' emission targets as chosen by the countries.*

**Professor Catrinus Jepma:** The EU bubble is similar. Eventually, it was settled by some allocation rule that was completely missing in the Kyoto Protocol. Should we fix this for the next stage? If we could find some consensus on the allocation criteria, then it would be easier to allocate emission targets.

**Tilly Zwartepoorte:** It is common sense that the Kyoto Protocol II will be a different one. We need to find ways to bring the United States on board and bring in developing countries too. We have heard many options during this conference. I hope that when we leave here and go back to our own government's offices, we could agree upon exploring some of these options. It is a matter of political trust and will. We need a will to proceed. I am fully aware that some issues are very sensitive. We need to find ways to continue dialogue on these sensitive issues without countries losing face. We need to create a new arena in which everybody feels safe.

**Dr. Robert Dixon:** To Wigley for clarification—Do you suggest opening up the Kyoto Protocol or the UNFCCC to implement your idea?

**Dr. Tom Wigley:** The allocation issue is the Protocol issue. There is a need to open up the Protocol to find something that is economically feasible and meets safe level of environmental risk within the Framework Convention.

**Professor Hisakazu Kato:** I would like to add additional information here. The first ever proposal made by Japan at the fifth Ad Hoc Group on the Berlin Mandate (AGBM) session before Kyoto was based on the price and quantity formula. No values were specified. The essential idea is that countries are allowed to choose one of two formulas that best fit their national circumstance. This is very similar to Dr. Wigley's suggestion. This proposal was not supported by any other country so Japan immediately dropped this idea.

**Dr. Tom Wigley:** Maybe this proposal could be revived with changes that we have seen.

**Toshiyuki Sakamoto:** A future framework needs to take into account wide differences in national circumstances, be flexible, and be able to open for anything about commitments. A future framework will be much better than the Kyoto Protocol if it incorporates long-term perspectives. In order to achieve long-term significant emissions reductions, we need to develop innovative technologies. The short-term commitments under the Kyoto Protocol will not provide incentives for long-term technology development. We need to look at long-term solutions and incentives. Regarding discussions on a future framework, this should take place where non-Kyoto parties like Australia and the United States can fully participate. In this regard, the COP/MOP (COP serving as the Meeting of the Parties to the Kyoto Protocol) may not be the appropriate place.

**Douglas Cogan:** Tom Wigley's proposal provides a sense of what the ultimate goal would be in terms of the stabilization of atmospheric concentration. It would be helpful to pursue it. We also need to go through a sectoral analysis to understand what might happen to different sectors, particularly from an investment perspective. This, combined with a long-term perspective, would provide the investment communities with great confidence on whether we are on the trajectories of meeting the target or off target.

**Dr. Tom Wigley:** I would like to make a brief comment related to technological innovation. The Kyoto Protocol already allows for the transferability across different gases. We need to broaden the transferability to include investments in low emissions

technologies and infrastructures. It is not trivial to equate such disparate things. The Kyoto Protocol uses simple 100-year global warming potentials, which are scientifically wrong, but at least provide a way to equate all GHGs. Could we use a simple formula to broaden the playing field (e.g., giving credit for R&D) rather than just for emissions reductions)?

**Dr. ZhongXiang Zhang:** *To Zwartepoorte—I fully agree with you that open dialogue among parties is very important in the course of negotiating future commitments. One important dialogue is the transatlantic dialogue. Some people have said that, with the U.S. withdrawal from the Protocol, the EU has taken the lead by default. As we all know, the U.S. withdrawal from the Protocol reduces the environmental effectiveness of the Protocol. The moral right to persuade developing countries to take on commitments is low if the world’s largest emitter is still out. In my presentation yesterday, I took the Canada-US case to indicate that overall competitiveness concerns mean that any country is unlikely to step out too far in front. Provided that the United States would still remain outside the future global regime in the second or third commitment, it is hard to imagine that Kyoto parties like Canada and the EU would assume future commitments that they regard as overly costly and unfair. All this suggests that the U.S. position is crucial for future commitments. As world trade negotiations have demonstrated, compromise and consensus between the EU and United States have played a very important role in keeping trade talks moving forward. Similarly, a compromise and consensus between the EU and United States is crucial to keep international climate negotiations moving forward. In this regard, I appreciate hearing your view on how the EU is going to pursue this transatlantic dialogue on climate issues.*

**Tilly Zwartepoorte:** The EU’s Environment Commissioner Wallstrom stated repeatedly the need for a staged approach and the necessity to get U.S. involvement in future discussions. The EU now finds itself as a leader in this process. The EU is committed to explore paths in this direction. Right now, the EU and the United States have already made a bilateral agreement for scientific and technological cooperation. Personally, I feel that if nothing happens after 2005 regarding future commitment periods, the risk of disintegration of the whole agreement would be very big. But at this point, the EU is determined to take the next step. Great effort will be taken by the EU to get all countries to the table. The reason I am here is explore ways that might be more successful for future regimes.

**Professor John Kirton:** *I would like to raise the issue of political architecture in moving beyond the current framework. The EU already set a bubble as an example under the Kyoto Protocol. What are the opportunities for other bubbles/coalitions? Regional organizations now exist in a number of fora. Should North America have its own bubble? North American agencies currently handle some joint issues. Could the United States, Canada, and Mexico sit down to map out a post-Kyoto regime?*

**Dr. Fernando Tudela:** There is a large difference between the EU bubble and NAFTA. The EU is a political unit, whereas the NAFTA is just a trade treaty. The EU countries are much more compatible and similar, but the three countries under the NAFTA are a mouse, a dog, and a horse. Although we are not that strange to each other, climate change makes us strange bedfellows.

**Dr. Robert Dixon:** There exists a number of different institutions that address what you propose. There are titles under the NAFTA to create the Commission for Environmental Cooperation. It provides a lot of opportunities to have three countries work together. Work on climate change is certainly possible. There are other institutions. The North American Energy Working Group meets every quarter, and talks about common interests. I have been to one of the meetings with climate change on the agenda. Possibilities are not limited to NAFTA, but also exist at the Asia-Pacific Economic Cooperation (APEC) and the G8.

**Dr. Giorgio Mattiello:** Looking at the discussions at Kyoto or beyond, it seems to me that different points, such as economical, technological, and political aspects, are being taken into account, but cultural points have not been considered in this context. The basis of many problems that we face is cultural. China and India are not developed economically in terms of per capita GDP, but are developed culturally. On the other hand, some developed countries are rich but are not developed culturally. The United States needs to recognize that cultural change requires cultural diffusion. Cultural change takes one generation. If we do not reach the level of cultural understanding that needs sacrifice, we will not reach the required environmental goal.

**Professor Akio Morishima:** Dialogue is very important, particularly with China and the United States. Under the current international system, there is no sovereign international body. Each country has its own sovereignty. Unless sovereign countries agree with each other, no agreement can be reached. No court can direct the United States to get back in.

Dialogue should continue, but dialogue itself cannot realize the final solution. Each country must make its own decision. Big countries must also consider interests of other countries as well as the interests of future generations. Otherwise, this kind of procedure cannot be successful.

**Dr. Alexander Golub:** *It is more or less clear that eventually each country should have its own emissions cap. Where are we now? Hopefully, we will have the Kyoto Protocol in effect soon. Australia and the United States will have energy intensity targets. These are not as effective as caps, but better than nothing. Developing countries have the CDM, but the CDM is not going to bring us from here to there. We need another incentive, including incentives for developing countries. What can be done to create these incentives?*

**Professor Catrinus Jepma:** I think that there are many possible futures in this respect. I see four possible scenarios:

- 1) The Kyoto Protocol does not come into force, and various commitments among countries evolve.
- 2) The Kyoto Protocol enters into force, but without the United States. There may be some soft link between the United States and the Kyoto parties.
- 3) The United States is still out, but has its own system that is good enough so that it can link with the emissions trading schemes of the Kyoto parties.
- 4) The Kyoto Protocol enters into force and is flexible enough to encourage greater participations.

**Dr. Robert Dixon:** I would like to broaden this kind of thinking even further. We might want to also consider other types of protocols, for example, a technological protocol? Another thought is the potential impact of the U.S. economy on the rest of the world. The United States comprises 25% of the world economy. Every country trades with us. Policies that harm the U.S. economy will affect everyone, and this needs to be considered. The final thought is that, regardless of policies and measures, we need investment for the future. Robust economies are funding this. We need to keep this in mind as we consider possible solutions.

**Dr. Irving Mintzer:** I would like to add two other possible climate-friendly but horrible futures.

- 1) Imagine a future with a radical reduction in GHG emissions as a result of a combination of events negatively affecting the Japanese and U.S. economies but positively affecting the Chinese economy. In the event of the instability in the Middle East that leads to extremely high oil prices, China maintains its internal growth since it relies heavily on coal, but the United States and Japan would suffer economic contraction, reduce oil consumption greatly, and hence reduce their emissions. This scenario would cause global emissions to decline, but there are no real advances toward sustainable development and economic cooperation.
- 2) Abrupt climate change causes the shutdown of North Atlantic deep water formation over the 10- 20 year period and the rapid cooling in those countries above the North Atlanta. Cooling of such magnitude causes the European economy to rapidly contract but it does not affect the Japanese and U.S. economies severely. Such a change might result in quite a different approach to mandatory reductions in GHG emissions through a vehicle like the Kyoto Protocol. These sorts of uncertainties are quite different from those uncertainties associated with reliable, easily usable fuel-cell vehicles or political interplays that we have discussed during this conference.

As we look forward, I suggest giving careful consideration to a broader range of future scenarios and making sure that the strategies chosen would position us to respond appropriately to these challenges.

**Oleg Pluzhnikov:** Regarding Dr. Golub's comments, you are an optimist about the Russian ratification, but a pessimist about the Kyoto Protocol. I share your optimism, but not your pessimism. After the Kyoto Protocol comes into force, it will create a good foundation for moving forward. For the Russian Federation, it is not just a demonstration of benefits through emissions trading and joint implementation. It is a clear understanding of the situation in general. Russia has already taken several steps to create monitoring systems and will have a clear understanding of other requirements like registries. For me, the most difficult step for Russia and the other countries with economies in transition is the first step.

**International Conference on  
“Climate Policy After Marrakech: Toward Global Participation”**

**Hawaii Imin International Conference Center (Keoni room)  
1777 East-West Road, Honolulu, Hawaii, USA**

**September 4-6, 2003**

**Program**

**Thursday, September 4, 2003**

- 7:45 am**      **Bus transfer from Aston Waikiki Beach Hotel to the conference venue**
- 8:00 am**      **Registration and Breakfast**
- 9:00 am**      **Opening and Welcome**  
**Chair: Dr. ZhongXiang Zhang**, East-West Center, Honolulu, United States
- Dr. Charles E. Morrison**, President, East-West Center, Honolulu, United States
- Mr. Mukul Sanwal**, Special Advisor, UNFCCC Secretariat, Bonn, Germany
- Mrs. Tilly Zwartepoorte**, Director, Department of Climate Change and Industry, Ministry of Housing, Spatial Planning and the Environment, The Hague, The Netherlands
- Mr. Yasuhiro Shimizu**, Director, Climate Change Policy Division, Ministry of the Environment, Tokyo, Japan
- Dr. Jhy-Ming Lu**, Director, Sustainable Energy Research Division, Industrial Technology Research Institute, Hsinchu, Taiwan
- 9:30 am**      **Session I: Climate Change in Focus—From Science to Policy**  
**Chair: Mr. Peter Heyward**, Assistant Secretary, Environment Branch, Department of Foreign Affairs and Trade, Canberra, Australia
- Dr. Tom M.L. Wigley**, Senior Scientist, National Center for Atmospheric Research, Boulder, United States  
*Climate Change Under No-Policy and Policy Emissions Pathways*
- Professor Catrinus Jepma**, University of Groningen and Foundation Joint Implementation Network, The Netherlands; Coordinating Lead Author, IPCC Third Assessment Report



*Clean Development Mechanism and Joint Implementation*

- 10:30 am**      **Coffee break**
- 10:45 am**      **Dr. Daniel Dudek**, Chief Economist, Environmental Defense, New York  
*Partnership for Climate Action and Emissions Trading Among Conglomerates*
- Professor Warwick J. McKibbin**, Australian National University, Canberra, Australia, and Senior Fellow, The Brookings Institution, Washington, DC  
*Designing a Realistic Climate Change Policy with Global Participation*
- 11:45 am**      **Discussion**
- 12:45 pm**      **Lunch**
- 2:00 pm**      **Session II: U.S. Climate Policy and Perspectives**  
**Chair: Dr. Robert K. Dixon**, Senior Advisor for Climate Change, U.S. Department of Energy, Washington, DC
- Dr. Harlan L. Watson**, Senior Climate Negotiator and Special Representative, U.S. Department of State, Washington, DC  
*U.S. Climate Change Policy and Actions*
- Dr. Terry Surles**, Manager, Public Interest Energy Research Program, California Energy Commission, Sacramento, United States  
*California Initiatives in Response to Global Climate Change*
- Dr. Paul Bernstein**, Principal, Charles River Associates, Washington, DC  
*Effect of Permit Trading Program for Equity-Efficiency Trade-offs in Carbon Permit Allocations*
- 3:30 pm**      **Coffee break**
- 3:45 pm**      **Dr. David L. Greene**, Corporate Fellow, Oak Ridge National Laboratory, Knoxville, United States  
*Reducing Greenhouse Gas Emissions from U.S. Transportation*
- Mr. Douglas G. Cogan**, Deputy Director, Social Issues Service, Investor Responsibility Research Center, Washington, DC  
*Corporate Governance and Climate Change: How Are 20 of the World's Biggest Corporate GHG Emitters Factoring Climate Change into their Business Strategies and Governance Practices?*
- 4:45 pm**      **Discussion**

- 5:45 pm**      **Bus transfer to the Waikiki Aquarium**
- 6:00 pm**      **Reception with the Halau performance at the Waikiki Aquarium**  
(2777 Kalakaua Avenue)

**Friday, September 5, 2003**

- 8:40 am**      **Bus transfer from Aston Waikiki Beach Hotel to the conference venue**

- 9:00 am**      **Session III: European Union (EU) Climate Policy and Perspectives**  
**Chair: Professor Catrinus Jepma**, University of Groningen and Foundation Joint Implementation Network, The Netherlands

**Dr. Erik Haites**, President, Margaree Consultants Inc., Toronto, Canada; Advisor to the UNFCCC Secretariat  
*Linking EU Trading Programs with Other GHG Trading Systems*

**Mrs. Tilly Zwartepoorte**, Director, Department of Climate Change and Industry, Ministry of Housing, Spatial Planning, and the Environment, The Hague, The Netherlands  
*Dutch Climate Policy and Elements for a Future Climate Regime*

- 10:30 am**      **Coffee break**

- 10:45 am**      **Professor Terry Barker**, Department of Applied Economics, University of Cambridge, United Kingdom; Coordinating Lead Author, IPCC Third Assessment Report  
*EU and UK Leadership in Moving Toward Low Carbon Economy and Strengthening Future Commitments*

**Mr. Fabrizio d'Adda**, Senior Vice President, Eni Group, Milan, Italy; Chairman, Environment Working Group, Union of Industrial and Employers' Confederations of Europe (UNICE)  
*Climate Change: A Business Risk or a Business Opportunity?*

- 11:45 am**      **Discussion**

- 12:45 pm**      **Lunch**

- 2:00 pm**      **Session IV: Challenges for Other Major Industrialized Countries**  
**Chair: Dr. Robert K. Dixon**, Senior Advisor for Climate Change, U.S. Department of Energy, Washington, DC

**Mr. Peter Heyward**, Assistant Secretary, Environment Branch, Department of Foreign Affairs and Trade, Canberra, Australia  
*Policies to Control Australia's Emissions*

**Mr. Yasuhiro Shimizu**, Director, Climate Change Policy  
Division, Ministry of the Environment, Tokyo, Japan  
*Japan's Strategy to Meet its Kyoto Target*

**Mr. Oleg Pluzhnikov**, Deputy Head, Ecological Department, Ministry  
of Energy, Moscow, The Russian Federation  
*Climate Policy of the Russian Federation—What Next?*

**3:30 pm**      **Coffee break**

**3:45 pm**      **Dr. ZhongXiang Zhang**, East-West Center, Honolulu, United States;  
Chinese Academy of Social Sciences and Peking University, Beijing,  
China  
*Open Trade with the United States without Compromising Canada's  
Ability to Comply with its Kyoto Target*

**Dr. Alexander Golub**, Senior Economist, Environmental Defense,  
Washington, DC  
*Economies in Transition: Potential for GHG Reduction and Incentive  
for Implementation of Robust Climate Policy*

**4:45 pm**      **Discussion**

**5:45 pm**      **Bus transfer to Ala Moana Shopping Center**

**6:00 pm**      **Conference dinner in Longhi's Ala Moana** (1450 Ala Moana Blvd.,  
Ste. 3001 (Ocean Side, Mall Level). Tel: (808) 947 9899)

### **Saturday, September 6, 2003**

**8:40 am**      **Bus transfer from Aston Waikiki Beach Hotel to the conference  
venue**

**9:00 am**      **Session V: Issues Related to Developing Countries**  
**Chair: Dr. Irving M. Mintzer**, Global Business Network, Silver  
Spring, United States

**Professor Zhou Dadi**, Director-General, Energy Research Institute,  
National Development and Reform Commission, Beijing, China  
*China's Perspectives*

**Dr. Fernando Tudela**, Director, Program on Water, Environment, and  
Society, El Colegio de Mexico, Mexico City, Mexico; Former  
Chairman, Inter-Ministerial Committee for Climate Change in Mexico  
*Developing Countries and the Evolution of Commitments*

**Mr. Imran Ahmad**, Pakistan's Chief Negotiator at UNFCCC COP7 and SB18, Ministry of Environment, Islamabad, Pakistan  
*Technology Transfer and Capacity Building*

**10:30 am**      **Group Photo**  
**Coffee break**

**10:45 am**      **Mr. Peter J. Kalas**, Senior Technical Coordinator, National Strategy Studies Program, The World Bank, Washington, DC  
*National Strategy II/CDM Studies: Promoting Links between Climate Change Issues and Sustainable Development*

**Mr. Toshiyuki Sakamoto**, Director, Global Environmental Affairs Office, Ministry of Economy, Trade and Industry, Tokyo, Japan  
*Emission Trend in Developing Countries and Measures to Facilitate CDM Implementation in Asia*

**11:45 am**      **Discussion**

**12:45 pm**      **Lunch**

**1:45 pm**      **Session VI: Panel Discussions: Where Do We Go from Here?**  
**Chair: Professor Catrinus Jepma**, University of Groningen and Foundation Joint Implementation Network, The Netherlands

**Mr. Peter Heyward**, Assistant Secretary, Environment Branch, Department of Foreign Affairs and Trade, Canberra, Australia

**Professor Akio Morishima**, Chairman, Board of Directors, Institute for Global Environmental Strategies, Kanagawa, Japan

**Dr. Robert K. Dixon**, Senior Advisor for Climate Change, U.S. Department of Energy, Washington, DC

**Mrs. Tilly Zwartepoorte**, Director, Department of Climate Change and Industry, Ministry of Housing, Spatial Planning, and the Environment, The Hague, The Netherlands

**Professor Zhou Dadi**, Director-General, Energy Research Institute, National Development and Reform Commission, Beijing, China

**Dr. Fernando Tudela**, Director, Program on Water, Environment, and Society, El Colegio de Mexico, Mexico City, Mexico; Former Chairman, Inter-Ministerial Committee for Climate Change in Mexico

**Mr. Oleg Pluzhnikov**, Deputy Head, Ecological Department, Ministry of Energy, Moscow, The Russian Federation

**Mr. Fabrizio d'Adda**, Senior Vice President, Eni Group, Milan, Italy;  
Chairman, Environment Working Group, Union of Industrial and  
Employers' Confederations of Europe (UNICE)

**Dr. Irving M. Mintzer**, Global Business Network, Silver Spring,  
United States

**Mr. Douglas G. Cogan**, Deputy Director, Social Issues Service,  
Investor Responsibility Research Center, Washington, DC

- 3:15 pm**      **Discussion**
- 4:15 pm**      **Closing remarks**  
**Dr. ZhongXiang Zhang**
- 4:30 pm**      **Bus transfer back to Aston Waikiki Beach Hotel**

**International Conference on  
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**List of Speakers**

**Mr. Imran Habib Ahmad**

Pakistan’s Chief Negotiator at COP7  
and SB18  
Ministry of Environment  
House-35, Street-4  
F 8/3  
Islamabad  
Pakistan  
Tel/Fax: +92-51-225 4000  
Email: [imran@alumni.brandeis.edu](mailto:imran@alumni.brandeis.edu)

**Professor Terry Barker**

Department of Applied Economics  
University of Cambridge  
Sidgwick Avenue  
Cambridge CB3 9DE  
United Kingdom  
Tel: +44-1223-335289  
Fax: +44-1223-335299  
Email: [Terry.Barker@econ.cam.ac.uk](mailto:Terry.Barker@econ.cam.ac.uk)

**Dr. Paul Bernstein**

Principal, Charles River Associates  
5265 Lawelawe Place  
Honolulu, HI 96821  
U.S.A.  
Tel: +1-202-662 3843  
Fax: +1-202-662 3910  
Email: [PBernstein@crai.com](mailto:PBernstein@crai.com)

**Mr. Douglas G. Cogan**

Deputy Director, Social Issues Service  
Investor Responsibility Research  
Center  
1350 Connecticut Ave., NW  
Washington, DC 20036  
U.S.A.  
Tel: +1-603-675 9274  
Fax: +1-603-675 9275  
Email: [doug.cogan@irrc.org](mailto:doug.cogan@irrc.org)

**Mr. Fabrizio d’Adda**

Group Senior Vice President  
Health, Safety & Environment  
Department  
Eni S.p.A.  
Piazza Vanoni, 1  
20097 San Donato Milanese  
Milan  
Italy  
Tel: +39-02-520 51810  
Fax: +39-02-520 51814  
Email: [fabrizio.d’adda@eni.it](mailto:fabrizio.d’adda@eni.it)

**Dr. Robert K. Dixon**

Senior Advisor for Climate Change  
U.S. Department of Energy  
1000 Independence Avenue, SW  
Washington, DC 20585  
U.S.A.  
Tel: +1-202-586 3003  
Fax: +1-202-586 2096  
Email: [robert.dixon@ee.doe.gov](mailto:robert.dixon@ee.doe.gov)

**Dr. Daniel J. Dudek**

Chief Economist  
Environmental Defense  
257 Park Avenue South  
New York, NY 10010  
U.S.A.  
Tel: +1-212-505 2100  
Fax: +1-212-505 2375  
Email: [ddudek@environmentaldefense.org](mailto:ddudek@environmentaldefense.org)

**Dr. Alexander Golub**

Senior Economist  
Environmental Defense  
1875 Connecticut Avenue, NW  
Washington, DC 20009  
U.S.A.  
Tel: +1-202-387 3500  
Fax: +1-202-234 6049  
Email: [agolub@environmentaldefense.org](mailto:agolub@environmentaldefense.org)

**Dr. David L. Greene**  
Corporate Fellow  
Center for Transportation Analysis  
Oak Ridge National Laboratory  
National Transportation Research  
Center  
2360 Cherahala Blvd.  
Knoxville, TN 37932  
U.S.A.  
Tel: +1-865-946 1310  
Fax: +1-865-946 1314  
Email: [dlgreene@ornl.gov](mailto:dlgreene@ornl.gov)

**Dr. Erik Haites**  
President  
Margaree Consultants Inc.  
120 Adelaide Street West, Suite 2500  
Toronto, Ontario M5H 1T1  
Canada  
Tel: +1-416-369 0900  
Fax: +1-416-369 0922  
Email: [EHaites@netcom.ca](mailto:EHaites@netcom.ca)

**Mr. Peter Heyward**  
Assistant Secretary  
Environment Branch  
Department of Foreign Affairs and  
Trade  
RG Casey Building, John McEwen  
Cres  
Barton, ACT 2600  
Australia  
Tel: +61-2-6261 3560  
Fax: +61-2-6261 1365  
Email: [Peter.Heyward@dfat.gov.au](mailto:Peter.Heyward@dfat.gov.au)

**Professor Catrinus J. Jepma**  
Department of Economics  
University of Groningen  
Meerkoetlaan 30-A  
9765 TD Paterswolde  
The Netherlands  
Tel: +31-50-309 6815  
Fax: +31-50-309 6815  
Email: [jjq@northsea.nl](mailto:jjq@northsea.nl)

**Mr. Peter J. Kalas**  
Senior Technical Coordinator  
National Strategy Studies Program  
The World Bank, ENV  
1818 H St. N.W., MC4-204  
Washington, DC 20433  
U.S.A.  
Tel: +1-202-458 5647  
Fax: +1-202-522 2130  
Email: [pkalas@worldbank.org](mailto:pkalas@worldbank.org)

**Dr. Jhy-Ming Lu**  
Director  
Sustainable Energy Research Division  
Industrial Technology Research  
Institute  
T000, ERL/ITRI  
Bldg. 74, 195 Sec. 4, Chung Hsing Rd.  
Chutung, Hsinchu  
Taiwan 310  
Tel: +886-3-591 5491  
Fax: +886-3-582 0375  
Email: [jimylu@itri.org.tw](mailto:jimylu@itri.org.tw)

**Professor Warwick J. McKibbin**  
Convenor of Economics Division  
Research School of Pacific & Asian  
Studies  
Australian National University  
Canberra, ACT 0200  
Australia  
Tel: +61-2-61250301  
Fax: +61-2-61253700  
Email: [wmckibbin@msgpl.com.au](mailto:wmckibbin@msgpl.com.au)

**Dr. Irving Mintzer**  
Global Business Network  
9514 Garwood Street  
Silver Spring, MD 20901  
U.S.A.  
Tel: +1-301-587 8714  
Fax: +1-301-587 8716  
Email: [irvingm@attglobal.net](mailto:irvingm@attglobal.net)

**Professor Akio Morishima**  
Chair, The Board of Directors  
Institute for Global Environmental  
Strategies (IGES)  
Nippon Press Center Bldg. 8F  
2-2-1 Uchisaiwai-cho, Chiyoda-ku,  
Tokyo 100-0011  
Japan  
Tel: +81-3-3595 1081  
Fax: +81-3-3595 1084  
Email: [morishima@iges.or.jp](mailto:morishima@iges.or.jp)

**Dr. Charles E. Morrison**  
President  
East-West Center  
1601 East-West Road  
Honolulu, HI 96848-1601  
U.S.A.  
Tel: +1-808-944 7103  
Fax: +1-808-944 7106  
Email: [MorrisonC@EastWestCenter.org](mailto:MorrisonC@EastWestCenter.org)

**Mr. Oleg Pluzhnikov**  
Deputy Head, Ecological Department  
Ministry of Energy  
The Russian Federation  
Kitaygorodsky proezd 7  
Moscow  
109074 Russian Federation  
Tel: +7-095-710 6247  
Fax: +7-095-710 5468  
Email: [opluzhnikov@mte.gov.ru](mailto:opluzhnikov@mte.gov.ru)

**Mr. Toshiyuki Sakamoto**  
Director, Global Environmental Affairs  
Office  
Ministry of Economy, Trade and  
Industry  
1-3-1 Kasumigaseki Chiyoda-ku  
Tokyo 100-8901  
Japan  
Tel: +81-3-3501-7830  
Fax: +81-3-3501-7697  
Email: [sakamoto-toshiyuki@meti.go.jp](mailto:sakamoto-toshiyuki@meti.go.jp)

**Mr. Mukul Sanwal**  
Special Advisor  
UNFCCC Secretariat  
Martin-Luther-King Strasse 8  
D-53153 Bonn  
Germany  
Tel: +49-228-815 1429  
Fax: +49-228-815 1499  
Email: [MSanwal@unfccc.int](mailto:MSanwal@unfccc.int)

**Mr. Yasuhiro Shimizu**  
Director  
Climate Change Policy Division  
Global Environment Bureau  
Ministry of the Environment  
1-2-2 Kasumigaseki, Chiyoda-Ku  
Tokyo 100-8975  
Japan  
Tel: +81-3-5521 8249  
Fax: +81-3-3580 1382  
Email: [yasuhiro\\_shimizu@env.go.jp](mailto:yasuhiro_shimizu@env.go.jp)

**Dr. Terry Surles**  
President  
Pacific International Center for  
High Technology Research  
1020 Auahi Street  
Honolulu, HI 96814  
U.S.A.  
Tel: +1-808-591 6490  
Fax: +1-808-591 6491  
Email: [Linda.Ome@PICHTR.org](mailto:Linda.Ome@PICHTR.org)

**Dr. Fernando Tudela**  
Director  
Program on Water, Environment and  
Society  
El Colegio de Mexico, PIA.  
Camino al Ajusco 20  
Pedregal de Santa Teresa,  
Tlalpan Mexico DF  
CP 10740 Mexico  
Tel: +52-55-56280615  
Fax: +52-55-58280671  
Email: [ftudela@semarnat.gob.mx](mailto:ftudela@semarnat.gob.mx)



**Dr. Harlan L. Watson**  
Senior Climate Negotiator and Special  
Representative  
Bureau of Oceans and International  
Environmental and Scientific Affairs  
U.S. Department of State  
2201 C Street, N.W., Room 4330  
Washington, DC 20520  
U.S.A.  
Tel: +1-202-647-3489  
Fax: +1-202-647-3970  
Email: [watsonhl@state.gov](mailto:watsonhl@state.gov)

**Dr. Tom M.L. Wigley**  
Senior Scientist  
National Center for Atmospheric  
Research  
P.O. Box 3000  
Boulder, CO 80307-3000  
U.S.A.  
Tel: +1-303-497 2690  
Fax: +1-303-497 1333  
Email: [wigley@ucar.edu](mailto:wigley@ucar.edu)

**Dr. ZhongXiang Zhang**  
Fellow  
Research Program  
East-West Center  
1601 East-West Road  
Honolulu, HI 96848-1601  
U.S.A.  
Tel: +1-808-944 7265  
Fax: +1-808-944 7298  
Email: [ZhangZ@EastWestCenter.org](mailto:ZhangZ@EastWestCenter.org)

**Professor Zhou Dadi**  
Director-General, Energy Research  
Institute  
National Development and Reform  
Commission  
B1515 Guohong Building Jia 11  
Muxidibeili, Xicheng District  
Beijing 100038  
China  
Tel: +86-10-63908575  
Fax: +86-10-63908568  
Email: [ddzhou@eri.org.cn](mailto:ddzhou@eri.org.cn)

**Mrs. Tilly Zwartepoorte**  
Director, Department of Climate  
Change and Industry  
Ministry of Housing, Spatial Planning,  
and the Environment  
Directorate Climate Change and  
Industry  
P.O. Box 30945, IPC 650  
2500 GX The Hague  
The Netherlands  
Tel: +31-70-339 4691  
Fax: +31-70-339 1310  
Email: [Tilly.Zwartepoorte@minvrom.nl](mailto:Tilly.Zwartepoorte@minvrom.nl)

## **Profiles of Speakers**

### **Imran Habib Ahmad, Pakistan's Chief Negotiator at COP7 and SB 18, Ministry of Environment, Islamabad, Pakistan**

Mr. Ahmad has been actively engaged in the areas of engineering, environmental issues, energy development, policy planning, project management and project cycle management in the government, nonprofit and development agencies and the private sector in Pakistan, Denmark, and the United States since 1992. Mr. Ahmad has been involved in public, donor, and private sector initiatives in environmental management, climate change studies, climate change policy, policy analysis, and project design and development. He has a strong interest in multilateral environmental negotiations and has worked on the implementation of multilateral environmental agreements in Pakistan, principally with: United Nations Framework Convention on Climate Change (UNFCCC), Convention on Biological Diversity (CBD) and United Nations Convention on Combating Desertification (UNCCD).

Mr. Ahmad was Pakistan's chief negotiator at the UNFCCC COP7 and SB18 meeting in Marrakech and Bonn respectively and has represented Pakistan at major international meetings and conferences. At COP7, Mr. Ahmad was nominated as the G-77/China Coordinator to negotiate the text of UNFCCC input to WSSD on behalf of G-77/China, while at SB18 he coordinated the issue of capacity building under Decision 2CP/7. Mr. Ahmad has extensive experience working on Pakistan's initial National Communication to UNFCCC, which is in the process of completion. Mr. Ahmad has been actively engaged in the work of UNFCCC and is a member of UNFCCC expert group on National Communications from non-Annex 1 parties and expert group on technology transfer. Mr. Ahmad is an active member of the international dialogue on climate change and has participated in major international conferences and workshops on the subject.

Mr. Ahmad is currently working at the Ministry of Environment in Islamabad, Pakistan in the area of program coordination and development. He is an alumnus of the Heller Graduate School (Sustainable International Development Program) at Brandeis University.

### **Dr. Paul Bernstein, Principal, Charles River Associates, Washington, DC**

Dr. Bernstein has a Ph.D. in Operations Research from Stanford University. For the past seven years, Dr. Bernstein has worked for the energy and environment group at Charles River Associates (CRA). He has developed a number of energy-economy models to quantify the economic costs of various energy and environmental policies. His projects have been concentrated in two areas. First, he has applied CRA's suite of general equilibrium models to analyze the economic impacts of climate change policies, such as the Kyoto Protocol, on several world regions and international industries. Much of the remainder of his work has concentrated on computing the costs faced by U.S. electricity generators to meet various three- or four-pollutant emission caps.

**Douglas G. Cogan, Deputy Director of the Social Issues Service and Director of the Tobacco Information Service, Investor Responsibility Research Center (IRRC), Washington, DC**

Mr. Cogan had joined IRRC in 1982 and is the author of the new IRRC report, *Climate Change and Corporate Governance: Making the Connection*. The report examines how 20 of the world's biggest emitters of GHG are factoring climate change into their business strategies and governance practices. Mr. Cogan has recently testified before U.S. Congress to provide an investor perspective on climate change and clean air legislation.

Mr. Cogan is also the author or co-author of several books on energy and environmental topics. His 1992 book, *The Greenhouse Gambit: Business and Investment Responses to Climate Change*, was one of the first to focus on the implications of climate change for the electric power, auto, agriculture, and forest products industries. Since 1994, Mr. Cogan has covered the U.S. global warming shareholder campaign and written more than three dozen company analyses on this topic.

Mr. Cogan has also written extensively on fiduciary issues related to socially responsible investing and shareholder activism. In 2000, Mr. Cogan had edited *Tobacco Divestment and Fiduciary Responsibility: A Financial and Legal Analysis*. The report examines legal and fiduciary issues raised by fund trustees who seek to align investment practices with their institutional missions.

Mr. Cogan is a frequent contributor to IRRC's *Corporate Social Issues Reporter*. He also writes analyses of shareholder resolutions and provides guidelines consulting for institutional investors that subscribe to IRRC's proxy voting and agency voting services.

IRRC is an independent research firm that is the leading source of high-quality, impartial information on corporate governance and social responsibility issues affecting investors and corporations worldwide. Founded in 1972, IRRC provides research, software products, and consulting services to more than 500 institutional investors, corporations, law firms, universities, and foundations. Consistent with its charter, IRRC takes no advocacy positions on the issues that it covers.

Mr. Cogan is a graduate of Williams College. He had graduated *cum laude* and received highest honors in political economics.

**Dr. Robert K. Dixon, Senior Advisor for Climate Change, U.S. Department of Energy, Washington, DC**

Dr. Dixon is Senior Advisor for Climate Change, Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy (DOE). He has more than 20 years of energy and environment experience with three federal agencies, the private sector, and academia. Dr. Dixon earned his B.S, M.S. (1979) and Ph.D. (1982) degrees from the University of Missouri.

Dr. Dixon had been a tenured faculty member at the University of Minnesota and Auburn University from 1982 to 1989. He was competitively awarded an Exxon Fellowship in 1984 and a Smithsonian Fellowship in 1985. Dr. Dixon also served as a Visiting Professor at Oxford University, United Kingdom; Humboldt University,

Germany; Delhi University, India; and Kasetsart University, Thailand during the 1980s. He is the author or co-author of seven books and over 125 scholarly journal articles on energy and environment science and policy topics. He had been a consultant to the Office of Science and Technology Policy (OSTP) during the Reagan Administration.

The U.S. Agency for International Development (AID) and Winrock International had employed him in 1986 to manage energy science and policy programs in Asia. During this period he had helped develop AID's network of Renewable Energy Program Support Offices (REPSO), led energy policy reform efforts in 11 countries, and led or developed energy and environment projects sponsored by various bilateral (e.g., USDA, NASA) and multilateral (e.g., UNDP, World Bank, UNEP) organizations in over 80 countries worldwide (1982 to present).

Dr. Dixon is cofounder Plant Health Care, Inc. (1987). Plant Health Care, Inc., a biotechnology R&D firm, markets or licenses processes and products in all 50 states and more than 30 countries. Dr. Dixon started his career with the Allied Corporation and managed a large-scale R&D and technology deployment program for four years. He is the co-author of two U.S. patents.

In 1989, Dr. Dixon had joined the U.S. Environmental Protection Agency's (EPA) Office of Research and Development as a senior scientist. He has led a national research and development program to support the Clean Air Act and Amendments. In 1991, Dr. Dixon was seconded to EPA's Policy Office to support the administrator and the Executive Office of the U.S. President (Bush Administration) in preparation for the 1992 UN Conference on Environment and Development (Earth Summit). He was awarded EPA's bronze medal for his contributions in 1992. He was an adjunct Professor at Oregon State University from 1989 to 1997.

Dr. Dixon led two Presidential Initiatives: U.S. Country Studies Program (1992 to 1998) and the U.S. Initiative on Joint Implementation (1995 to 1998) to advance U.S. strategic interests in the UNFCCC. Dr. Dixon has served on the U.S. negotiating team for the UNFCCC since 1990. He has also served in a variety of senior U.S. diplomatic assignments, lived in six countries during his career, and developed foreign language capabilities.

In 1997, Dr. Dixon had joined DOE's Office of Energy Efficiency and Renewable Energy (EERE). At DOE he has been engaged in policy analysis, R&D and program management. From 1999 to 2002 Dr. Dixon served as deputy assistant secretary and led the largest renewable energy R&D program in the world. He is currently co-chairman of the International Energy Agency's Renewable Energy Working Party.

Dr. Dixon lectures at the Johns Hopkins University Paul H. Nitze School of Advanced and International Studies (SAIS) and Georgetown University. He appears on public television programs such as the *Discovery Channel*. Dr. Dixon has been an advisor to Ted Turner's UN Foundation, the Soros Foundation, the International Foundation for Science, CARE, and other philanthropic organizations. He also has been a consultant and contributor to the U.S. National Academy of Science and the U.S. National Academy of Engineering activities during the past 10 years. Dr. Dixon has been honored with awards from the public and private sector as well as scientific organizations for his distinguished public service.

**Dr. Daniel J. Dudek, Chief Economist, Environmental Defense, New York**

Dr. Dudek specializes in the reduction and control of atmospheric pollutants through the development of markets for environmental commodities to manage local and global pollution from stationary and mobile sources. He has led the team credited by President George H.W. Bush with breaking the logjam on acid rain. Dr. Dudek has participated in market development activities of the U.S. sulfur dioxide allowance trading system for the reduction of acid rain, including auctions, spot and future markets. He was also involved in the creation of tradable production entitlements for chlorofluorocarbons for compliance with the Montreal Protocol, a U.S. EPA-approved mobile-stationary source trading program for hydrocarbon and nitrogen oxide reductions in nonattainment areas, the volatile organic material trading program in Illinois, the emerging regional nitrogen oxides trading market in the eastern United States, and the evolving GHG market. He had brokered the first interpollutant trade which involved sulfur dioxide and carbon dioxide, developed the first emission trade in Poland, facilitated the first international GHG trade involving options, partnered with BP to develop its internal GHG trading system, and is developing SO<sub>2</sub> emissions trading in China in partnership with the State Environmental Protection Administration.

Dr. Dudek has also served as: advisor, Organization for Economic Cooperation and Development; Ministry of Environment, Poland; United Nations Conference on Trade and Development; Regional Environment Center, Budapest; Acid Rain Advisory Committee and Clean Air Act Compliance Committee, U.S. Environmental Protection Agency; Chicago Board of Trade; Secretary of Energy Advisory Board; British Petroleum; Massachusetts Institute of Technology; State Environmental Protection Administration, People's Republic of China; and advisor to various public and private institutions.

Dr. Dudek is also the author of numerous articles, abstracts, and papers on creating strategies for using market forces to solve environmental problems.

He has been an assistant professor of resource economics, Department of Agricultural and Resource Economics, University of Massachusetts, Amherst (1982-86).

**Dr. Alexander Golub, Senior Economist, Environmental Defense, Washington, DC**

Dr. Golub is involved in the development of climate change strategy for Russia and other NIS countries (development of institutions for the emissions trading and economic analysis for forward trade). He is also working on the emissions trading and GHG reduction policy for the biggest Russian Company—United Energy System—which accounted for almost half of Russian CO<sub>2</sub> emissions.

He has approximately 20 years experience in the field of environmental economics, natural resources management, and global climate change mitigation policy. He was the lead expert in several international policy and advisory projects and successfully completed assignments for the GEF, the OECD, the World Bank, U.S. EPA, Bureau of Economic Analysis, TACIS, Denmark's EPA, Czech EPA, the Russian Environmental Protection Committee, and various other regional environmental protection committees.

Dr. Golub was a research fellow, Kennedy School of Harvard University (1998-2000); project director for the Harvard Institute of International Development (HIID) (1998-2000); workshop coordinator on climate change economics and policy issues in Russia, Uzbekistan, Kazakhstan, the Philippines, and Climate Change and Development Workshop in HIID. He has led the World Bank study on GHG emission management in Russia (1997-98) and is an accredited IPCC expert and adviser to the Russian and the Kazakh governments.

Dr. Golub holds a Ph.D. from Moscow University and a doctorate in economics, Central Economics and Mathematics Institute, Russian Academy of Sciences.

**Dr. David L. Greene, Corporate Fellow, Oak Ridge National Laboratory, Knoxville, United States**

Dr. Greene has spent 25 years researching transportation and energy policy issues for the U.S. government. His research interests include analysis of policies to mitigate GHG emissions from transportation, energy, and transportation demand modelling; economic analysis of petroleum dependence; and understanding market responses to advanced transportation technologies and alternative fuels. Dr. Greene earned a B.A. degree from Columbia University in 1971, an M.A. from the University of Oregon in 1973, and a Ph.D. in geography and environmental engineering from The Johns Hopkins University in 1978. He has published over 150 articles in professional journals and have contributed to books and technical reports. In recognition of his service to the National Academy of Science and National Research Council, Dr. Greene has been designated a lifetime National Associate of the National Academies.

**Dr. Erik F. Haites, President, Margaree Consultants Inc., Toronto, Canada**

Dr. Haites is an expert on emissions trading and its potential application to GHG. He was a consultant to the National Round Table on the Environment and the Economy on the analysis of alternative designs for a domestic GHG trading system for Canada. He was a consultant to the IPE for the design of a domestic GHG trading program for the United Kingdom and a research collaborator for the Heinz Center project on domestic GHG emissions trading in the United States. Dr. Haites has participated in the PERT pilot program for NO<sub>x</sub>, VOC, and GHG emissions trading in southern Ontario. He is currently involved in a feasibility study of multiple pollutant trading programs for Alberta.

Dr. Haites has assisted the UNFCCC secretariat on issues related to the Kyoto mechanisms. Dr. Haites served as head of the Technical Support Unit for Working Group III of the IPCC while its contribution to the Second Assessment Report was prepared. He has been invited to testify before the House of Commons Committees on Environment and Natural Resources and the Ontario Select Committee on Global Warming.

**Peter Heyward, Assistant Secretary, Environment Branch, Department of Foreign Affairs and Trade, Canberra, Australia**

Mr. Heyward is assistant secretary of the environment branch of the Department of

Foreign Affairs and Trade, Australia. Since moving to the department from the Commonwealth environment portfolio in 1989 in the lead-up to the UN Conference on Environment and Development in Rio, he has held a range of positions, mostly working on multilateral issues. His overseas postings include Buenos Aires and most recently Geneva, where he was the deputy head of Mission at Australia's Mission to the United Nations and participated in many international meetings, including the World Conference Against Racism. He was a senior member of the Australian delegation to the World Summit on Sustainable Development and had led the delegation to the 18<sup>th</sup> Subsidiary Bodies meeting on Climate Change in Bonn, Germany.

### **Professor Catrinus Jepma, Universities of Groningen and Amsterdam, The Netherlands**

Professor Jepma, Ph.D. Econ. (1986), LL.M., is since 1988 a professor of international (environmental) economics, appointed at the University of Amsterdam, the University of Groningen and Open University, the Netherlands. His fields of specialization are: North-South economic relations, East-West European integration, international finance and investment, international economic policy coordination, and international energy and environmental economics.

His professional experience related to international energy and environmental economics include:

- He has acted as advisor to various national governments and international institutions (including UNFCCC Secretariat, FAO, EU) on various occasions.
- He has drafted a number of studies in the field of energy in conjunction with private sector energy companies.
- He has been heavily involved in international policy discussions leading up to the Kyoto Protocol flexibility mechanisms.
- He was leader of a research team modelling tropical deforestation issues.
- He is chairman of the Board of Experts of Keurhout foundation, the institution verifying if SFM certificates on timber imported in the Netherlands comply with the SFM standards of the Netherlands' government.
- He was the convening lead author of the writing team for Chapter 7 of Working Group III of the Second Assessment Report of the IPCC and he was coordinating lead author of the chapter on Policies and Measures of Working Group III of IPCC's Third Assessment Report.
- He was the project coordinator of the EU-funded PROBASE project, a research consortium comprising EU-based and Central European research institutions.
- He is the chief editor of *Joint Implementation Quarterly* and co-editor of *Mitigation and Adaptation Strategies for Global Change*.
- In May 2001 he co-organized/co-chaired a European Commission workshop on "Developing Synergies between Sustainable Forest Management and Carbon Sequestration."
- He had recently drafted on behalf of the Netherlands' government the "Terms of Reference ERUPT 2001, Appendix 4: Operational guidelines for baseline studies, validation, monitoring, and verification."
- He advises the Netherlands' government on the various tenders in the framework of climate policy, notably ERUPT and CERUPT.

**Peter J. Kalas, Senior Technical Coordinator, National Strategy Studies Program, The World Bank, Washington, DC**

Mr. Kalas has been since 1998 in charge of the World Bank program of the National JI/CDM Strategy Studies (NSS Program) and participated also in its conceptual preparation. The NSS Program was designed to provide the capacity building assistance to host countries regarding the implementation of the Kyoto Protocol flexible mechanisms and thus to stimulate international carbon market. To date, the NSS program has targeted more than 30 countries with 19 completed studies in Latin America, Central and Eastern Europe, Africa, and Asia. Mr. Kalas has facilitated the climate change dialogue with the governments of all involved host countries and cooperates closely with national teams of experts.

A Swiss national, Mr. Kalas had joined the World Bank in 1994 on a special assignment of the Swiss government to coordinate the multilateral cooperation in the environmental area with Central and Eastern European countries (CEEC) within the “Environment for Europe” program. This assignment, which encompasses all 24 countries in the CEEC region, also maintained close cooperation with the Western donor countries to mobilize their financial support for the preparation of several dozens of environment projects.

Before joining the World Bank, Mr. Kalas had worked at the Swiss Ministry of Economy in charge of the financial development assistance to South America, Asia, and Africa. Between 1991-94, Mr. Kalas also coordinated the Swiss technical assistance in the environmental area in Central Europe.

Born in Prague (1940), Mr. Kalas had graduated at the Czech Technical University in Prague with a Master’s degree in energy engineering and economy (with honors). He had left Czechoslovakia in 1968 for Switzerland and his subsequent professional background included 15 years as an international consultant with a reputable Swiss company in the field of energy and industry planning. He has managed or participated in nearly 100 projects in more than 30 countries in Latin America, Africa, and Asia that included also National Power and/or Energy Strategy projects in Nigeria, Colombia, Malaysia, and Bangladesh. He has published articles on power and energy planning.

**Dr. Jhy-Ming Lu, Director, Sustainable Energy Research Division, Energy & Resources Laboratories, Industrial Technology Research Institute, Hsinchu, Taiwan**

**Education**

Ph.D. in geography, Chinese Culture University, Taiwan

**Experience**

- Deputy General Secretary of National Forum on Sustainable Development
- Manager, Sustainable Development Research Laboratory, ERL/ITRI
- Project Manager, APEC Energy Working Group Research & Associated Affairs
- Project Manager, Earthquake Response Research Program for Energy Supply System
- Project Manager, Strategy Planning and Mitigating of Taiwan for UNFCCC



**Professor Warwick J. McKibbin, Australian National University, Canberra;  
Senior Fellow, The Brookings Institution, Washington, DC**

He is Professor of international economics and convener of the economics division in the Research School of Pacific and Asian Studies at the Australian National University (ANU). He is also a nonresident senior fellow at the Brookings Institution in Washington DC, and president of McKibbin Software Group. He was appointed to the Board of the Reserve Bank of Australia in 2002 for a five-year term. Professor McKibbin spent 16 years on the staff of the Reserve Bank of Australia and has been a visiting scholar at the Japanese Ministry of Finance and the U.S. Congressional Budget Office. He has been a consultant for international agencies including The United Nations, The World Bank, the Asian Development Bank, and the Intergovernmental Panel on Climate Change as well as the governments of Australia, Canada, Indonesia, Japan, New Zealand, the United Kingdom, and the United States on issues of macroeconomic policy, international trade and finance, and GHG policy issues. Professor McKibbin has published widely in technical journals and the popular press including the book “*Global Linkages: Macroeconomic Interdependence and Cooperation in the World Economy*” written with Professor Jeffrey Sachs of Harvard University, and the new book “*Climate Change Policy after Kyoto: A Blueprint for a Realistic Approach*” with Professor Peter Wilcoxon of the University of Texas. He is internationally renowned for his contribution to multicountry economic modelling through his development of the MSG multicountry model and the G-Cubed series of multicountry models that are used in many countries by policymakers, corporations, financial institutions, and academics.

Before moving to the ANU in September 1993, Professor McKibbin was a senior fellow at the Brookings Institution and an adjunct professor at the Johns Hopkins University. He received his B.Com (Honours 1) and University Medal from University of NSW (1980) and his AM (1984) and a Ph.D. (1986) from Harvard University. He is a Fellow of the Australian Academy of Social Sciences and a founding member of the Harvard University Asian Economic Panel.

**Dr. Irving M. Mintzer, Global Business Network, Silver Spring, United States**

Dr. Mintzer is executive editor of *Global Change Magazine*, a senior associate of the Pacific Institute for Studies in Development, Environment, and Security, and a member of the Global Business Network. Since 1983, Dr. Mintzer has been an active participant in the international debate on national energy strategies and on policy options to reduce the risks of rapid climate change. In 1995-96, he was a lead author of Working Group 3 (Economics and Policy Responses) of the IPCC and a co-author of the IPCC Synthesis Panel Report. Between 1997 to 2001, Dr. Mintzer had taught courses on multilateral negotiations at the Johns Hopkins School of Advanced International Studies in Washington, DC. During the last decade, he has testified on energy and climate policy issues before the U.S. Congress, the British Parliament, the German Bundestag, the Italian Parliament, and the European Parliament. He has been a senior special fellow with the UN Institute for Training and Research (Geneva, Switzerland) and a visiting scientist with the Swedish Academy of Sciences, the Soviet Academy of Sciences, and the Hungarian Academy of Sciences. Dr. Mintzer holds a Ph.D. in energy and resources and a Master’s degree in business administration from the University of California,

Berkeley.

Dr. Mintzer is the author of numerous articles in scientific journals and other periodicals. He is co-editor with J.A. Leonard of *Confronting Climate Change: Risks, Implications, and Responses* (Cambridge University Press) and *Negotiating Climate Change: The Inside Story of the Rio Convention* (Cambridge University Press).

**Professor Akio Morishima, Chair of the Board of Directors, Institute for Global Environmental Strategies (IGES), Kanagawa, Japan**

Professor Morishima serves as president of the Central Environment Council of the government of Japan, and is considered a theoretical leader of environmental law and policy development there. He is an internationally eminent lawyer and has long been an enthusiastic supporter of environmental justice. After graduating from the University of Tokyo, School of Law in 1958, he was at Nagoya University for more than 35 years, as associate professor, and professor and dean at the School of Law, and as the dean of the Graduate School of International Development. He has contributed to the Basic Environmental Law in Japan as chairman of the Policy and Planning Committee of the Central Environment Council and was mastermind behind the 1998 report Basic Environment Plan, which outlines the long-term policies for environmental conservation in Japan. He is the 1996 laureate of Global 500 Award of UNEP.

**Dr. Charles E. Morrison, President, East-West Center, Honolulu, Hawaii, United States**

**Research interests**

- The Asia Pacific Economic Cooperation (APEC) forum
- Asia-Pacific international relations, economic issues, and security issues
- U.S.-Asia policy, trade policy, and U.S.-Japanese relations

At the Center for 23 years, he had assumed the post of president on August 1, 1998. He has had extensive involvement in the conceptualization, organization, and funding of policy-oriented educational research and dialogue projects in both Japan and the United States, and has long been involved in promoting the concept of an Asia-Pacific community. He is a founding member of the U.S. National Committee for Pacific Economic Cooperation and a member of the U.S. Committee for Security Cooperation in Asia Pacific. Other posts include: past chair, U.S. National Consortium of APEC Study Centers; co-director, East-West Center-University of Hawaii APEC Study Center; former director of the Center's Program on International Economics and Politics; former U.S. Senate aide; and research adviser to two binational Japan-U.S. Commissions. Dr. Morrison's projects include APEC trade and development cooperation, the New Generation Seminar (exchange program for young leaders), the Congressional Study Group on Japan, the Congressional Study Group on the Pacific Islands, and the Asia-Pacific Security Outlook. He currently co-edits the annual Asia-Pacific Security Outlook series and has been quoted frequently by major news media in the region on issues of regional cooperation, international relations, U.S. Asia policy and trade policies, U.S.-Japan relations, and Asian economic issues. He is the author of a number of books, papers, and analyses and had received his Ph.D. from Johns Hopkins School

of Advanced International Studies (SAIS) specializing in Asian international relations.

Publications in recent years include: *Community Building with Pacific Asia (report to the Trilateral Commission). ASEAN; Forum, Caucus & Community. Asia-Pacific Crossroads; Regime Creation and the Future of APEC. Development Cooperation in the 21st Century; and Implications for APEC. Asia-Pacific Security Outlook: 2003.*

**Oleg Pluzhnikov, Deputy Head, Ecological Department, Ministry of Energy, The Russian Federation**

Responsible for elaboration of the position of the Ministry of Energy on Climate policy issues in Energy sector including JI activities. Over the past 10 years, he has worked in the Ministry of Energy of the Russian Federation, involving in elaboration of the energy strategy of the Russian Federation, energy security concept and energy saving programs. Oleg is an author and co-author of books and articles on Russian Energy sector development and Russian Climate policy. At the moment he participates in elaboration of intergovernmental JI agreements with different countries, development of monitoring system of GHG emissions in Russia, elaboration of Green Investment Scheme (channelling of financial sources from ET to projects) as well as in energy and environmental aspects of EU-Russia Energy dialog. Oleg graduated from Moscow State Technical University.

**Toshiyuki Sakamoto, Director, Global Environmental Affairs Office, Ministry of Economy, Trade and Industry, Tokyo**

**Professional background**

- Ministry of Economy, Trade and Industry (METI) (1986 to present)
- Director, Global Environmental Affairs Office (2003 to present)
- Director for General Affairs, Regional Economy, and Industry Group (2001 to 2003)
- Deputy Director, General Affairs Division, Basic Industry Bureau (1999 to 2001)
- Deputy Director, Guidance Division, Small and Medium Enterprise Agency (1998 to 1999)
- Deputy Director, Brussels Office in Belgium, Japan Machinery Exporters' Association (1995 to 1998)
- Deputy Director, Security Export Control Division, International Trade Administration Bureau (1993 to 1995)

**Educational background**

- M.B.A., the University of Michigan, Ann Arbor, Michigan, USA: graduated with recognition of high scholastic achievement (1993)
- Master's Degree in civil engineering, University of Tokyo (1986)

**Mr. Yasuhiro Shimizu, Director, Climate Change Policy Division, Ministry of the Environment, Tokyo, Japan**

**Education**

- 1975-1980 course work in law and international relations, Tokyo University  
1980 graduation from Tokyo University (B.A.)  
1986 visiting fellow of British Council, London

**Professional career**

- 1980- Staff, Environment Agency, Japanese Government  
1988-1991 First secretary, Embassy of Japan, Washington D.C.  
1991-1993 member of the Japanese negotiation team for UNFCCC  
(Deputy director, Global Environment Division, Environment Agency)  
1994-1996 Deputy director, Water Quality Bureau, Environment Agency  
1996 Secretary to the Minister of the Environment  
1997-2000 Senior policy coordinator, Planning & Coordination Bureau, Environment Agency  
2000-2002 Director, Planning Department, Tohoku Bureau of International Trade and Industry, MITI  
2002-present Director, Climate Change Policy Division, Global Environment Bureau, Ministry of the Environment

**Publications**

- Co-author, *Water Quality Law*, 1986  
Editor, *Keywords to Global Environment Problems*, 1993

**Dr. Terry Surles, Manager, Public Interest Energy Research Program, California Energy Commission, Sacramento, United States**

Dr. Surles is currently the Public Interest Energy Research (PIER) Program manager for the California Energy Commission. This program is designed to bring new renewable energy, other distributed energy resource technologies, and demand side management technologies into the marketplace in order to provide reliable, affordable, and safe electricity to the state. In his role of assistant director for Science and Technology, he is also responsible for coordinating climate change research, assessment, and mitigation activities.

Before joining the Energy Commission, Dr. Surles was the associate laboratory director for energy programs at Lawrence Livermore National Laboratory, following his time at the California Environmental Protection Agency as deputy secretary for Science and Technology. Dr. Surles was at Argonne National Laboratory for a number of years, holding a number of positions in the energy and environmental technology and evaluation area, with his last position being general manager for Environmental Programs.

Dr. Surles had been an environmental consultant to industry for Camp, Dresser, and McKee, and holds a Ph.D. in chemistry from Michigan State University.

**Dr. Fernando Tudela, Director, Program on Water, Environment and Society, El Colegio de Mexico, Mexico City, Mexico; Former Chairman, Inter-Ministerial Committee for Climate Change in Mexico**

- Architect, 1971 (Universities of Madrid and Seville). National Award for best academic record.
- Honorary research fellow, Portsmouth Polytechnic, University College of London (School of Environmental Studies), United Kingdom.
- Doctorate degree, University of Seville, Spain. Doctorate Award.
- Spanish Academy in Rome 1974-75.
- Professor, Iberoamerican University, Mexico City.
- Professor, Metropolitan Autonomous University, Mexico City. Research Award.
- United Nations officer on Human Settlements, consultant to different UN organizations.
- Professor, El Colegio de México. Center for Studies on Population and Urban Development. 1985-1995.
- Academic director, LEAD Program, sponsored by the Rockefeller Foundation.
- Chief of staff, Ministry of the Environment, Natural Resources and Fisheries, Federal Government, México; chairman of the Inter-Ministerial Committee for Climate Change, Mexico 1997-2000. Mexican negotiator UNFCCC-Kyoto Protocol.
- Currently coordinator of the program Water, Environment, and Society at El Colegio de Mexico.
- Author of books/ articles on climate change, environment, and sustainable development.

**Dr. Harlan L. Watson, Senior Climate Negotiator and Special Representative, U.S. Department of State, Washington, DC**

Dr. Watson is senior climate negotiator and special representative at the U.S. Department of State. In this capacity, he served as alternate head of the U.S. delegations at the Seventh (COP7) and Eighth (COP8) Sessions of the Conference of the Parties to the UN Framework Convention on Climate Change in Marrakech, Morocco, and New Delhi, India, respectively. Dr. Watson heads the National Security Council Policy Coordination Committee Working Group on Climate Change, and leads U.S. delegations to meetings of the Subsidiary Bodies of the Framework Convention and the Intergovernmental Panel on Climate Change.

His previous government positions include: staff director of the U.S. House of Representatives Committee on Science's Subcommittee on Energy and Subcommittee on Energy and Environment, science advisor to the secretary of the interior, principal deputy and deputy assistant secretary of the Interior for Water and Science, and professional staff member of the Senate Committee on Governmental Affairs' Subcommittee on Energy, Nuclear Proliferation, and Federal Services. He has also worked as a technical staff member at TRW Inc., project and senior scientist at B-K Dynamics, Inc., and post-doctoral appointee at Argonne National Laboratory. Dr. Watson earned a B.A. in physics from Western Illinois University, a Ph.D. in solid state physics from Iowa State University, and an M.A. in economics from Georgetown University.

**Dr. Tom M.L. Wigley, Senior Scientist, National Center for Atmospheric Research, Boulder, United States**

Dr. Wigley, a senior scientist at the National Center for Atmospheric Research, is one of the world's experts on climate change. He was born and educated in Australia where he trained as a meteorologist with the Commonwealth Bureau of Meteorology. His Ph.D. is in theoretical physics. He has published widely in the field of climatology and related sciences. He is the author of more than 200 refereed journal articles and book chapters and is one of the most highly cited scientists in the field. His main current interests include projections of future climate and sea-level change, carbon-cycle modelling, and the interpretation of past climate changes (including the detection of anthropogenic influences). Recently, he has concentrated on facets of the global warming problem. He has contributed as an author to all assessments of the Intergovernmental Panel on Climate Change and developed the MAGICC coupled with a gas-cycle/climate model that has been used to produce the primary temperature and sea level projections given in these assessments. He has also written "*The Science of Climate of Climate Change: Global and U.S. Perspectives*" published by The Pew Center on Global Climate Change (<http://www.pewclimate.org/>). Dr. Wigley is the former director of the Climatic Research Unit, University of East Anglia, Norwich, the United Kingdom.

**Dr. ZhongXiang Zhang, East-West Center, Honolulu, United States; Chinese Academy of Social Sciences, Beijing; and Peking University, Beijing**

Dr. Zhang is a fellow at East-West Center; an adjunct professor of economics at both the Chinese Academy of Social Sciences, Beijing, China and Peking University, Beijing, China; and an affiliate professor of economics at the University of Hawaii at Manoa. He is the author of numerous articles in a wide variety of international outlets in the fields of energy and environmental economics, trade and the environment, public finance, and macroeconomic modelling, wrote the book *The Economics of Energy Policy in China: Implications for Global Climate Change* (New Horizons in Environmental Economics Series, Edward Elgar, 1998), and co-authored *International Rules for Greenhouse Gas Emissions Trading* (United Nations, 1999). Currently, he serves on the editorial boards of seven international journals (*Climate Policy; Energy Policy; Energy and Environment; Environmental Management and Policy; Environmental Science and Policy; International Environmental Agreements; and Mitigation and Adaptation Strategies for Global Change*) and one Chinese journal. He has served on many high-level panels and as an expert/consultant to many national and international organizations, including UNCTAD, UNDP, UNEP, UNESCO, OECD, ADB, IPCC, CEC, the World Bank, and WRI, and presented research findings in more than 25 countries over the past six years. He has been included in the Marquis *Who's Who in Science and Engineering*, *Who's Who in the World*, and *Who's Who in America*.

His work has drawn the attention of peers around the globe as evidenced by the huge volume of downloads that his papers on emissions trading and clean development mechanism, GHG market prospects, the involvement of developing countries, and interactions between climate policies with trade policy have generated. That body of work is among the all-time top 10 most-downloaded papers (since January 1997) in the areas of *International Trade, Environmental Economics*, and *Agricultural and Natural Resource Economics* at the Economics Research Network; *Environmental*

*Law and Policy* at the Legal Scholarship Network; and *FEEM Climate Change Modelling & Policy*. His work on China's climate policy was reported in *Nei Bu Can Kao (Internal Reference)*, and China's then Vice Prime Minister (and current Prime Minister) Wen Jiabao had made suggestions for further investigations on that topic based on that report.

Dr. Zhang's previous affiliations include: visiting fellow, Pennsylvania State University at University Park and Stanford University; senior fellow, Faculty of Economics and Faculty of Law, University of Groningen, The Netherlands; research fellow, Department of Economics, Wageningen University, The Netherlands; research fellow, Policy Studies Department, Netherlands Energy Research Foundation; and researcher, Energy Research Institute, National Development and Reform Commission, Beijing, China. He had received his B.S. and an M.S. degrees in energy engineering and systems analysis from Tianjin University, China, and a Ph.D. in economics from Wageningen University, The Netherlands.

**Tilly Zwartepoorte, Director, Department of Climate Change and Industry, Ministry of Housing, Spatial Planning, and the Environment, The Hague, The Netherlands**

Since February 2001, Mrs. Zwartepoorte has been director of the Department of Climate Change and Industry within the Netherlands Ministry of Housing, Spatial Planning, and the Environment. This directorate is in charge of a broad range of environmental policies and measures: climate change, acidification and transboundary air pollution, industry covenants, and product and consumer policies.

In this capacity, Mrs. Zwartepoorte is responsible for developing policies and measures to combat climate change in order to meet the Netherlands' obligations under the Kyoto Protocol.

Before that, she has worked in various capacities for the Netherlands Ministry of Traffic, Public Works, and Water Management, in which the last position that she held was acting director for Transport Sectors.

Mrs. Zwartepoorte holds a degree in law. She is married and has two children.

**International Conference on  
“Climate Policy After Marrakech: Towards Global Participation”  
September 4-6, 2003, Honolulu, Hawaii, USA**

**List of Participants**

**Mr. Steven Alber**

Energy Planner  
Strategic Industries Division  
Department of Business,  
Economic Development, and Tourism  
State of Hawaii  
P.O. Box 2359  
Honolulu, HI 96804  
U.S.A.  
Tel: +1-808-587 3837  
Fax: +1-808-587 3839  
Email: [salber@dbedt.hawaii.gov](mailto:salber@dbedt.hawaii.gov)

**Dr. Faisal Al-Hothali**

Ministry of Petroleum & Minerals  
P.O. Box 11550  
Dhahran  
Kingdom of Saudi Arabia  
Tel: +966-3-874 7002  
Fax: +966-3-873 9963  
Email: [faisal.hothali@aramco.com](mailto:faisal.hothali@aramco.com)

**Mr. Chen Li-chun**

Associate Professor  
Faculty of Economics  
National Yamaguchi University  
1677-1, Oazayoshida  
Yamaguchi City, 753-8514  
Japan  
Tel/Fax: +81-83-933 5578  
Email: [lichun@po.cc.yamaguchi-u.ac.jp](mailto:lichun@po.cc.yamaguchi-u.ac.jp)

**Dr. Chen-Kong Chou**

Associate Director  
Lawrence Livermore National  
Laboratory  
P.O. Box 808, L-638  
Livermore, CA 94550  
U.S.A.  
Tel: +1-925-422 4950  
Fax: +1 925-422-0096  
Email: [choul@llnl.gov](mailto:choul@llnl.gov)

**Dr. Jefferson Fox**

Coordinator, Environmental Studies  
Research Program  
East-West Center  
1601 East-West Road  
Honolulu, HI 96848-1601  
U.S.A.  
Tel: +1-808-944-7248  
Fax: +1-808-944-7298  
Email: [FoxJ@EastWestCenter.org](mailto:FoxJ@EastWestCenter.org)

**Mr. Tetsuo Ito**

Visiting Fellow  
Research Program  
East-West Center  
1601 East-West Road  
Honolulu, HI 96848-1601  
U.S.A.  
Tel: +1-808-944 7713  
Fax: +1-808-944 7298  
Email: [ItoT@EastWestCenter.org](mailto:ItoT@EastWestCenter.org)

**Ms. Elise Kamphuis**

Department of Economics  
University of Groningen  
P.O. Box 800  
9700 AV Groningen  
The Netherlands  
Tel: +31-50-363 7182  
Email: [e.kamphuis@eco.rug.nl](mailto:e.kamphuis@eco.rug.nl)

**Professor Hisakazu Kato**

Professor  
Graduate School of Law  
Nagoya University  
1 Furo-cho, Chikusa-ku  
Nagoya 464-8601  
Japan  
Tel: +81-52-789-2340  
Fax: +81-52-789-2340  
Email: [hkato@nomolog.nagoya-u.ac.jp](mailto:hkato@nomolog.nagoya-u.ac.jp)



**Professor John Kirton**  
Principal Investigator  
EnviReform Project  
University of Toronto  
91 Roe Avenue  
Toronto, Ontario M5M 1H6  
Canada  
Tel: +1-416-946 8953  
Fax: +1-416-588 7078  
Email: [john.kirton@utoronto.ca](mailto:john.kirton@utoronto.ca)

**Ms. Madeline Koch**  
Managing Editor  
EnviReform  
248 Albany Avenue  
Toronto, Ontario M5R 3C8  
Canada  
Tel: +1-416-588 3833  
Fax: +1-416-588 7078  
Email: [mad.koch@utoronto.ca](mailto:mad.koch@utoronto.ca)

**Mr. Maurice N. LeFranc, Jr.**  
Market Policy Branch, Clean Air  
Markets Division  
Office of Atmospheric Programs  
Office of Air and Radiation  
U.S. Environmental Protection Agency  
1200 Pennsylvania Ave., NW, MC  
6204N  
Washington, DC 20460  
U.S.A.  
Tel: +1-202-564 3997  
Fax: +1-202-565 6673  
Email: [Lefranc.Maurice@epamail.epa.gov](mailto:Lefranc.Maurice@epamail.epa.gov)

**Dr. Nancy D. Lewis**  
Director  
Research Program  
East-West Center  
1601 East-West Road  
Honolulu, HI 96848-1601  
U.S.A.  
Tel: +1-808-944 7245  
Fax: +1-808-944 7399  
Email: [lewisn@EastWestCenter.org](mailto:lewisn@EastWestCenter.org)

**Dr. Giorgio Mattiello**  
Science Attachè  
Embassy of Italy  
3000 Whitehaven Street, N.W.  
Washington, DC 20008  
U.S.A.  
Tel: +1-202-612 4437  
Fax: +1-202-518 2143  
Email: [mattiello@itwash.org](mailto:mattiello@itwash.org)

**Mr. Tatsuya Nagata**  
Graduate Student  
Rutgers University  
5H 25-50 30 Road  
Astoria, NY 11102  
U.S.A.  
Tel: +1-718-204-1174  
Email: [tatiprat@yahoo.com](mailto:tatiprat@yahoo.com)

**Dr. Peter Read**  
Department of Economics  
Massey University  
Private Bag 11222  
Palmerston North  
New Zealand  
Tel: +64-6350 5972  
Fax: +64-6350 5660  
Email: [pread2@attglobal.net](mailto:pread2@attglobal.net)

**Professor James Roumasset**  
Department of Economics  
University of Hawaii, Manoa  
Saunders Hall, Room 514  
Honolulu, HI 96822  
U.S.A.  
Tel: +1-808-956 7496  
Fax: +1-808-956 4347  
Email: [jimr@hawaii.edu](mailto:jimr@hawaii.edu)

**Mr. Rafael Seña**  
Climate and Energy Policy Officer  
WWF-Philippines  
LBI Building 57 Kalayaan Avenue  
Diliman  
Quezon City 1101  
Philippines  
Tel: +632-433-3220 (up to 22)  
Fax: +632-426-3927  
Email: [rsenga@wwf.org.ph](mailto:rsenga@wwf.org.ph)

**Ms. Eileen Shea**  
Project Coordinator  
Research Program  
East-West Center  
1601 East-West Road  
Honolulu, HI 96848-1601  
U.S.A.  
Tel: +1-808-944-7253  
Fax: +1-808-944-7298  
Email: [SheaE@EastWestCenter.org](mailto:SheaE@EastWestCenter.org)

**Mr. Satender Singh**  
Senior Policy Analyst  
Climate Change and Non-Nuclear  
Energy  
Policy Section  
Department of Foreign Affairs  
and International Trade  
Old City Hall, 111 Sussex Drive  
Ottawa, Ontario, K1N 1J1  
Canada  
Tel: +1-613-944 1455  
Fax: +1-613-944 0064  
Email: [satender.singh@dfait-maeci.gc.ca](mailto:satender.singh@dfait-maeci.gc.ca)

**Mr. Kentaro Tamura**  
Research Associate  
Institute for Global Environmental  
Strategies (IGES)  
2108-11 Kamiyamaguchi, Hayama,  
Kanagawa 240-0115  
Japan  
Tel: +81-46-855-3812  
Fax: +81-46-855-3809  
Email: [tamura@iges.or.jp](mailto:tamura@iges.or.jp)

**Ms. Melissa Tipping**  
Policy Officer  
Australian Greenhouse Office  
GPO Box 621  
Canberra ACT 2601  
Australia  
Tel: +61-2-6274 1631  
Fax: +61-2-6274 1439  
Email: [melissa.tipping@greenhouse.gov.au](mailto:melissa.tipping@greenhouse.gov.au)

**Professor Stephen Van Holde**  
Fei Ming Professor  
Hopkins-Nanjing Center for Chinese  
and American Studies  
East-West Center  
1601 East West Road  
Honolulu, Hawaii 96848-1601  
U.S.A.  
Email: [vanholde@kenyon.edu](mailto:vanholde@kenyon.edu)

**Mr. Naoyuki Yamagishi**  
Policy Officer  
Climate Change Program  
WWF-Japan  
Nihon-seimei Akabanebashi Bldg.,  
6<sup>th</sup> Fl.  
3-1-14 Shiba, Minato-ku  
Tokyo 105-0014  
Japan  
Tel: +81-3-3769-3509  
+81-90-6471-1432 (mobile)  
Fax: +81-3-3769-1717  
Email: [yamagishi@wwf.or.jp](mailto:yamagishi@wwf.or.jp)