## Climate after Kyoto: Implications for Energy

***Report on the Twelfth International Conference convened by The Royal Institute of International Affairs in association with The British Institute of Energy Economics and The International Association for Energy Economics 5 and 6 February 1998***

The 1997 Annual Conference of the RIIA, BIEE and IAEE was deferred from the usual date in December to February 1998 so that it could consider the implications of Kyoto for energy. The decision proved more than justified. The subject was topical; the attendance large with many high level representatives of the business community and the discussion lively with outstanding questioners at the end of each session.

The success of the annual conference depends on careful planning of the program, the quality of speakers and participants and also on sponsorship. This year thanks are due to the U.S. Environmental Protection Agency and the Norwegian Ministry of Foreign Affairs who sponsored the Conference, the Guardian newspaper which supported it and PowerGen who sponsored the Conference lunch on the first day.

The Conference fell into three parts. The first day was devoted to assessing the outcome of Kyoto and its implications for countries and for energy markets. On the morning of the second day the Conference considered the instruments for international flexibility in the Kyoto Protocol and the problems which had to be solved to make them effective. The afternoon session looked to the future - the work of the Intergovernmental Panel on Climate Change (IPCC) and the likely strategies of industry and nongovernmental organizations.

**The Outcome of Kyoto**

In his keynote address Dr. Luiz Gylvan, Chairman of the negotiating group on emission commitments, set the scene for the whole conference with a broad political assessment of the achievements of Kyoto and the challenges which remained outstanding. Kyoto marked a clear political decision to take steps to mitigate climate change and to move from the voluntary approach in the 1992 Framework Convention on Climate Change to a regulatory approach. The Protocol covers all the major greenhouse gases. It contains important instruments of flexibility. There were many outstanding economic, political and scientific problems - the treatment of gases with very long lives running into thousands of years, which raised difficult questions of intergenerational equity; improvement of the compliance provisions; the definition of project baselines for joint implementation and the Clean Development Mechanism (CDM); more explicit criteria for the differentiation of commitments; the relationship between emissions and concentrations of carbon; the relationship between the convention bodies and the IPCC; and the securing of signatures and ratifications. Nevertheless, the Kyoto protocol was beginning to create a new consideration in international relations which would always be in the minds of negotiators. It was a step towards a global regime which translated into practice common but differentiated regimes and which at the same time recognized that climate change was a global problem which could not be solved unless all were involved - a sort of "planetary condominium".

The themes identified by Dr. Gylvan recurred repeatedly throughout the conference - a tribute to both his speech and to the skill with which the program had been planned. Bjorn Stigson the Chairman of the World Business Council for Sustainable Development (WBCSD) broadly welcomed the Kyoto Protocol while noting that many uncertainties were still to be resolved particularly in the areas of emissions trading, sinks and the CDM. Before Kyoto, the questions had been - does climate change exist? how bad is it? After Kyoto the question was - how do we respond to climate change in the most efficient way? Business was a key provider of solutions particularly in the area of technology. Most of business now accepted that climate change was real and would take it into account in investment decisions. The WBCSD was working on long term energy scenarios to 2050; the assessment of technology options for meeting the Kyoto targets; technical cooperation with the developing countries; and the promotion of joint implementation in the developed world. Government policy should work with the market and remove subsidies and market distortions - another recurrent theme - although some stimulation of the market for environmentally friendly technologies might be justified. The developed countries must take the lead in implementing Kyoto but the developing countries must at some stage be involved in the process. The Kyoto targets implied major changes in consumer behavior and technology and a major turnover in capital stock. There was a doubt whether they could be realized by 2012 given the scale and rigidity of investment in the energy infrastructure. Achievement would require improvements in resource productivity comparable to the improvements in labor productivity achieved over the last 20 years and major changes in life-style in some countries. This in turn would require dialogue and partnership between all the stakeholders government, business and civil society- leading to dedicated action based on a better public understanding of what was at stake.

Michael Zammit Cutaiq, the Secretary General of the Climate Change Secretariat, opened a question and answer session by identifying four views of the Kyoto Protocol:

- The environmentalist view which saw it as a small precautionary step beyond the Framework Convention on Climate Change and asked questions about the credibility of the commitments and the reliability of the compliance mechanism.
- The economist view which saw it as a reentry by the UN into the issue of sustainable development and raised questions about how far reductions would be achieved by domestic action in advanced countries? and how far elsewhere?
- The financial operators view which saw new market opportunities for emissions trading and which asked if there would be clear rules and how far governments collectively would be ready to leave the private sector freedom to act within those rules?
- The political scientist's view which saw a new topic on the international politicalagenda but asked if the Protocol would ever enter into force?

The short subsequent discussion raised three points of interest:

- How far had the attitudes of those sections of business which had been flatly opposed to agreement at Kyoto changed? There was a sharp distinction between attitudes

in U.S. and European industry, perhaps because of a belief that implementation of Kyoto would require far bigger changes in life-styles, consumption patterns and the position of industry in the United States. Nevertheless, business generally, including business in the United States, was reassessing its position after Kyoto.

- The possibility in the long term – 100 to 200 years ahead – of equal per capita emissions entitlements across the world as a basis for global solutions – a far cry indeed from the difficult political agreement on targets reached at Kyoto.
- A "corridor" approach under which there would be an absolute limit on climate change, a limit on the rate of change in the climate so that ecosystems did not disappear and at the same time boundaries for the rate of change in the economy.

**National Perspectives**

A series of speakers, including some in later sessions, outlined the perspectives of different countries or groups of countries. There were common themes but also interesting differences not just in substance but in approach; for example, emphasis on procedures in the case of the EU, or the substantive problems of meeting the Kyoto targets in the case of Japan and oil political issues in the case of the United States. This no doubt reflects the varying circumstances in which progress has to be sought.

Peter Unwin of the UK Department of the Environment, Transport and the Regions described the view from the European Union. The EU inevitably had not achieved all its objectives for Kyoto but the outcome was reasonably satisfactory. The main uncertainty was about how the flexibility mechanisms would operate and on this the jury was still out. The UK would be making climate change one of the priorities of its Presidency of the EU during the first half of 1998. Objectives would be to agree on the allocation between member states of the EU-wide target reduction of 8 percent and to prepare the EU position for the meeting of the parties to the Protocol in Buenos Aires in November 1998. Much of the reduction in EU emissions would be achieved through national measures but there could be scope for common or coordinated action in areas like renewable energies, transport and standards. The main issues in the preparation for Buenos Aires were likely to be emissions trading where the EU would need to be convinced that real reductions in emissions and not just trading of "hot air" were being achieved; the development of rules for the CDM which would ensure that it did not undermine the agreement; and more work on sinks. At some point it would be necessary to do more work on verification, monitoring and compliance and on involving the developing countries in the reduction of greenhouse gas emissions while recognizing that their priority must be economic growth and the eradication of poverty. The EU and its member states would probably wish to sign the Kyoto Protocol soon but to see more rules and arrangements in place before moving to ratification.

Katsuo Seiki of the Global Industrial and Social Progress Research Institute described the measures which Japan planned to take to achieve its Kyoto target of a 6 percent reduction in emissions which represented a 15 percent reduction from the 1996 level and a 23 percent reduction on a business as usual scenario that assumed a degree of economic growth. A major expansion of nuclear energy had a key role in Japan's plans but there was a question whether this expansion would be achieved. In addition, the government had adopted a comprehensive program including strong energy saving measures, the reduction of other greenhouse gas emissions, increases in carbon sinks, research, development and marketization of innovative technologies, and encouragement of the voluntary participation of citizens to modify their life-style. The key problems which Seiki saw in dealing with global environmental issues were the harmonization of environmental measures with the deregulation of economies as a result of globalization; the construction of a global partnership between north and south; and the building of a new governance structure able to address long term global issues and with the participation of governments, international organizations, multinational companies and non-governmental organizations.

Rafe Pomerance of the U.S. Department of State, like earlier speakers, stressed that we were in the early stages of a global process affecting the future of the world climate and energy systems and many aspects of the world economy. It was essential to find an economically optimal path to stabilize and then reduce emissions of greenhouse gases. For the United States, the key aspects of Kyoto were the flexibility arising from the five year target period (2008-2012) and the inclusion of the six gases and of sinks; the acceptance of emissions trading and the CDM; and the fact that there had been some progress towards commitment by all parties. The previous week President Clinton had announced the first stage of a U.S. implementation plan. This involved tax credits of $3.6 billion for such things as fuel efficient cars, photovoltaics and combined heat and power and an increase of $2.7 billion in R&D spending on climate friendly technology like new generation automobiles and renewable energies. The United States envisaged tradeable permits as part of its domestic system for limiting greenhouse gas emissions. Congressional hearings on Kyoto were now starting. The ratification process would be long and difficult and would require high level leadership from the President and other leaders of society. The key to ratification was the participation of the developing countries.

Alexey Kokorin of the Institute of Global Climate and Ecology described the main programmes which Russia was undertaking:

- The Federal Target Program for the Prevention of Dangerous Climate Change. This was a broad framework program comprising six subprograms dealing with the creation of monitoring systems, adaptation measures, mitigation measures and the preparation of a long term strategy.
- Preparation of a National Action Plan.
- Federal Target Program for Energy Saving 1998-2005. This involved an expenditure of about US$9 billion of which the bulk would come from commercial financing and the internal resources of enterprises.
- A World Bank study of Russian national action for reducing emissions of greenhouse gases.

Russia had some experience with joint implementation projects. The results were mixed but the experience showed that JI was feasible and useful.

Tuiloma Slade of Samoa, Chairman of the Alliance of Small Island States (AOSIS), was unsurprisingly one of the speakers most critical of the Kyoto Protocol. There were achievements – notably the adoption of legally binding

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quantified targets and the introduction of innovative flexibility mechanisms. However, the agreed reductions were inadequate for long term protection of the climate; the increases in emissions allowed to some developed countries were morally questionable and sent the wrong signals; and tracking and monitoring of movements under the innovative mechanisms presented a new challenge. There was considerable uncertainty about the future with a real possibility that the Protocol would not come into force or that the United States would not ratify. The problem of the developing countries was marked by all the pressures and hangovers of the North/South relationship. The developed countries needed to be more circumspect in their approach and to establish through their own efforts and through the transfer of technology the right environment for developing country participation.

Rajendra Pachauri of the Tata Energy Research Institute in Delhi, in a broad approach to the implication for developing countries, identified some key points, many of which were also relevant to the developed countries:

- the importance of analysis and policy research on such issues as the macroeconomic consequences of measures to mitigate climate change;
- the diversity among developing countries – a factor which developed countries needed to take into account in their policies;
- the scope for regional initiatives by developing countries towards sustainable use – for example cooperation on natural gas and hydroelectricity in south Asia;
- the need to take into account the costs of inaction – a point reiterated by a number of speakers;
- the need to adopt principles which would move towards convergence on energy consumption per capita: developed countries must redirect their economies and technologies drastically and developing countries must start to do so as well; and
- addressing local environmental problems which were becoming increasingly severe in developing countries could often, although not always, help to mitigate global problems; emphasis on these problems could be more productive than pressing developing countries to take action on greenhouse gas emissions; it could also provide business opportunities.

Mohammed Al-Sabban of the Saudi Arabian Ministry of Petroleum and Mineral Resources, speaking in a later session explained the concerns of oil producing countries. They had not blocked adoption of the Protocol as they could have done and they liked such features as the inclusion of six greenhouse gases and the fact that economic sectors other than energy were expected to play a part in mitigating climate change. They welcomed references in the text to implementing policies and measures in such a way as to minimize adverse effects and the call to phase out market imperfections. It was unfortunate that OECD countries were at the same time considering tax proposals which did not reflect the carbon content of each energy source, but were encouraging greater production of fossil fuels and in some cases considering an expansion of nuclear energy which was not viable. Al-Sabban highlighted several points in the Protocol which could be built on to help protect the interests of oil producers.

Xu Huaquing of the Energy Research Institute of the Chinese State Planning Commission, also speaking in a later session, pointed out that China was at the primary stage of industrialization with very low per capita income and energy consumption. Both were bound to rise. However, China was making a major contribution to the mitigation of climate change through its policies to reduce population growth, improve energy intensity by vigorous implementation of the Energy Conservation Law, develop renewable energies, increase forest coverage and enhance sinks. China had also slashed tariffs on 4800 commodities which should improve the country's economic and energy efficiency. China feared that the Kyoto Protocol was too flexible, that the developed countries would not fulfill their commitments, that there would be little progress on technology transfer and that emissions trading would transform government commitments into commercial transactions.

**Implications for Global Energy Market**

This was a session of contrasting presentations. Those on the fossil fuels were mainly restatements of well known positions. In contrast, Michael Grubb of the Royal Institute of International Affairs speaking on non-fossil energy sources raised some major policy points.

The session was opened by Walter van de Vijver of Shell International Gas who followed other speakers in stressing that government policies must work with the market, that the introduction of new technologies could bring commercial success as well as climate benefits and that the improvement of energy efficiency in developing countries could offer mutual benefits. There were, however, no easy answers. Shell's long term studies suggested that although technology could provide new solutions, global use of fossil fuels would increase but might peak toward the middle of the next century. The relative carbon content of world energy use would continue to decline and carbon dioxide emissions could peak earlier in the period 2020 to 2030. The share of natural gas in world energy demand, now about 20 percent, was likely to continue growing in both developed and developing countries. The main problem would be to deliver gas to the market over increasing distances and in face of the political complexities of cross border pipelines. Transport costs were declining but the industry needed a firm framework for major long term investments. The Shell group was developing upstream gas resources and downstream gas businesses on a world wide basis. One major project was the development of the Camisea gas field in Peru. This posed a classic set of sensitivities. The site was in a rain forest, close to a pristine area of biodiversity and in the neighborhood of indigenous peoples. Shell was shaping the project in a dialogue with a wide spectrum of people both inside and outside Peru. In conclusion, van de Vijver suggested provocatively that while the 19th century had been the Age of Coal and the 20th century the Age of Oil, the 21st century would be the Age of Gas.

Ron Knapp, the Director of the World Coal Institute, stressed that the coal industry could deliver significant improvements in energy efficiency and low emissions of greenhouse gases for each unit of energy produced. The Kyoto protocol had focused on partial solutions rather than global outcomes. It brought a bagful of uncertainties for the coal industry. The outcome would depend on who signed, the level of emissions trading and the extent of "bubbling". The

Protocol was likely to be an important factor in decisions in the European Union where reductions in coal use were seen as a soft way of reducing greenhouse gas emissions. Coal use elsewhere, particularly in the developing countries, would continue to increase but the extent of this increase would depend particularly on the extent of improvements in efficiency.

Michael Grubb noted that nearly 40 percent of world electricity was produced from nonfossil fuels. The bulk came from conventional hydro schemes and nuclear energy. The new forms of energy, provided only 1.3 percent. In much of the world, expansion of hydro and nuclear was blocked although some expansion would occur in the developing countries. There was scope for expansion of the "new" renewables in the EU which was probably 3 to 5 years ahead of the United States and Japan in this area. Capacity had roughly doubled between 1992 and 1996 but still only constituted 1 percent of electricity supply. The European Commission's recent White Paper set a target of 12 percent penetration of renewable energies by 2010. This would be a central part of the EU's implementation of the Kyoto Protocol. It would require gross capital investment of 165 billion ECU (95 billion ECU net of investment saved on fossil fuels). Compared with a business as usual scenario it would reduce $CO_2$ emissions by 400 million tons a year and create 500,000 to 900,000 new jobs. The economics of renewable energy, however, raised a whole new set of issues - the classical environmental externalities but also issues of rural income, the structural benefits of introducing new energy sources into the less developed parts of the Union, and the advantages of flexibility, modularity and embedded (distributed) generation. A major expansion of renewable energies would require a modern, decentralized and dispersed energy system. To achieve this would require an integration of energy, environmental, agricultural and structural policies. The Treaty which established the European Coal and Steel Community would expire in 2002. Could it be replaced by a new Treaty on land use and energy which would bring together policies which were at present disconnected?

**Instruments for International Flexibility**

In a keynote address to these sessions Leiv Lunde, State Secretary in the Norwegian Ministry of Foreign Affairs, said that his government regarded the Kyoto Conference as a notable success in the adoption of quantified targets for reducing greenhouse gas emissions and such innovations as the comprehensive approach, flexibility and differentiation. The task now was to bring the flexibility mechanisms, which the Norwegian Government saw as the key element in the Protocol, into operation as soon as possible. If this were done well, the flexibility mechanisms could help to combat climate change and advance the spread of environmentally friendly technologies. More work was needed on the institutional arrangements for the CDM and the criteria for emissions trading. The detailed mechanisms would need to be adaptable to different national circumstances. The Norwegian Government would be presenting a White Paper on its position to Parliament in late March.

**Evolution of Trading and Enforcement**

Denny Ellerman of the Center for Energy and Environmental Policy Research in the United States opened this session by highlighting the potential inconsistency between the "wholesome embrace of the spirit of emissions trading" in the Kyoto Protocol and "troublesome details" such as the unclear relationship between "emissions trading" as referred to in Article 17 and the other flexibility mechanisms in the Protocol, particularly "bubbling"; the emphasis on emissions trading being supplemental to domestic action; and the meaning of additionality in connection with emission reduction units. The guiding principle in developing rules should be to provide for trade only in what could be measured. In practice emissions can be measured. Emission reductions are the difference between what is and what would have been and can only be estimated.

Ellerman's introduction was followed by accounts of work under way in three international organizations. Fiona Mullins described what the Organization for Economic Cooperation and Development was doing to develop rules and guidelines for trading. There were conflicting pressures - a sense of urgency because ratifications would be delayed until rules were defined and some parties might start trading in the meantime and a sense of caution because this was the first time emissions trading had been done on an international scale and it was essential to design a system which was simple and cost effective but also environmentally watertight. If rules for trading were not to be circumvented they had to be linked to guidelines for project level credits and to the development of the CDM. The first step might be to establish broad principles and political guidelines for all the flexibility mechanisms.

Richard Baron of the International Energy Agency examined the links between the developing international trade in electricity and the Kyoto targets which capped national emissions of greenhouse gases. Electricity trade, which could be volatile, increased the emissions of exporting countries and reduced those of importers. There were various possible solutions - "bubble" agreements which, however, once agreed could not be changed; the pursuit of joint implementation and the CDM by generators which, however, would only reap benefits after a considerable delay; and international emissions trading by generators. Baron was optimistic that a solution could be found. What was unclear was whether there was a problem. How did trade in electricity differ from trade in other commodities which were produced using energy? Did the scale of emissions in the generation of electricity constitute a difference in kind from other commodities?

Frank Joshua said that UNCTAD's work was mainly concerned with emissions trading under Article 17. They were preparing a report which they hoped would contribute to the Buenos Aires meeting. They were also setting up an Emissions Trading Policy Forum in which ideas on implementation could be shared between interested parties. Priorities for UNCTAD's work would be the development of international legal instruments, the design of trading contracts and the building of market institutions.

The session was marked by a lively discussion. Main points were:

a. Emissions trading had to be based on an effective compliance system which had still to be developed. Indeed, the whole credibility of the Protocol rested on a strong compliance mechanism. National compliance systems should be put in place before a country was allowed to trade.
b. There was a problem of consistency of data between

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countries. A country selling emissions might use a different data methodology from the country buying them.

c. Emissions trading could worsen north/south inequalities. On the other hand, the flexibility mechanisms could prove to be a means of moving resources from the north to the south. The developing countries were well represented in the climate negotiations but they did need help to improve their skills in the technical issues involved.
d. Emissions trading would introduce business concepts into public policy. There was a potential cultural conflict between the attitudes of businesses used to short term action, trial and error and those of the public sector used to careful analysis and long term preparation.

**Technology Transfer and the Clean Development Mechanism**

Farhana Yamin of the Foundation for International Environmental Law gave a lucid and succinct account of the CDM. Its introduction into the Protocol had been a surprise of Kyoto, born out of political necessity and without preparation although it drew on various earlier proposals. The purpose of the CDM was to assist non-Annex I countries to achieve sustainable development and Annex I countries to achieve compliance. Annex I countries undertaking projects in Developing Countries could obtain "certified emission reductions" (CER) which they could use towards achievement of their targets in accordance with rules to be determined by the Conference of the Parties (COP). The COP is also to designate operational entities to certify projects. CERs certified between 2000 and the beginning of the first commitment period in 2008 could be brought into account. The CDM is to be subject to the authority and guidance of the COP and to be supervised by an Executive Board. The CDM is thus a multilateral arrangement different in character from joint implementation. Issues to be resolved are how to assess whether the CDM results in real reductions in emissions which would not otherwise have occurred; the impact on the Global Environmental Facility and financial flows already mandated by the Framework Convention and the Kyoto Protocol; the fit, if necessary, with other flexibility mechanisms; the roles of the COP, Executive Board and operational entities; and the sharing of the proceeds of the CDM between administration and helping the developing countries to adapt.

In the first of three short comments, Jackie Krieger of the U.S. Environmental Protection Agency described the U.S. pilot program set up in 1993 for activities implemented jointly with developing countries. Projects were judged against six criteria - compatibility with host country goals; additionality of project benefits; quantification of project costs; measurable reductions in emissions of greenhouse gases; identification of other project impacts - and satisfactory arrangements for monitoring, reporting and verification. All but the first of these criteria were difficult to apply. Krieger claimed that U.S. experience showed that they could be applied. Not all her audience were convinced.

Malik Amin Aslam of ENVORK, an environmental NGO in Pakistan, saw opportunities for developing countries in the CDM but noted that the experience of activities implemented jointly was that private sector involvement was scarce and the geographical distribution of projects was uneven. This was a result of skepticism in developing countries, weak institutional support and complex and varied project development methodology. The CDM had the potential to overcome these difficulties provided that it was focused towards the private sector and avoided political linkages and bias. At present there was a "confused development mechanism". Much needed to be done to turn it into a "clean development mechanism".

Jean-Charles Hourcade of CIRED saw the CDM as an attempt which only partly succeeded to resolve the conflict between the desire of the south to secure more public aid and the emphasis of the north on flexibility and private capital flows. The key difficulty was that any mechanism for joint implementation dealt with specific projects but most of the problems in the developing countries were concerned with infrastructure. A trading system made it easier to resolve problems but did not resolve them all. Inclusion of the CDM was, however, essential to persuade the developing countries to accept the Kyoto Protocol as a whole.

**Looking to the Future**

**The Work of the ILPCC**

The Conference was given an authoritative account of the work of the IPCC by Robert Watson, its chairman, and Bert Metz the cochairman of Working Group III. Watson saw the absence of debate about the science of climate change as all important and a positive feature of Kyoto. Governments now recognized that they knew enough to take meaningful first steps to mitigate climate changes. This was a tribute to the scientific consensus reached through the IPCC. Its job was to make policy relevant assessments but not policy recommendations. It was now developing three special reports on:

- sonic and subsonic air transport;
- possible emission scenarios on the basis of different structures of world governance; and
- technology transfer and cooperation.

The IPCC was also starting to design the Third Assessment Report to be completed by the end of 2000. This would put more emphasis on the regional aspects of climate change and on socioeconomic factors, seeking to integrate the natural and social sciences. Special attention would be paid to the production of short, simple and policy relevant summaries both to help policy makers and to educate public opinion.

Metz added a fuller description of the ongoing work of Working Group III. The special report on emission scenarios would look at four different worlds covering globalization vs. regional development and a materialistic vs. a social approach. The story lines and assumptions had been developed and the modelling of emission profiles was under way. The Special Report on Technology Transfer to be produced by mid 1999 would cover both mitigation and adaptation. It would examine all relevant pathways for transfer. There would be both a general analysis of institutional and legal issues and sector by sector analysis. The Third Assessment Report would cover the technical, economic and market potential of technology, including sinks and carbon removal; policy instruments to harness this potential and promote the diffusion and transfer of technology; emission scenarios to achieve stabilization; cost benefit profiles of different emission scenarios including the costs of not acting; the social, economic and environmental impacts of mitigation actions; and decision making frameworks. All stakeholders would be

involved in the preparation of the reports. A special effort would be made to involve experts from the developing countries.

The two statements from the IPCC were supplemented by one from Tom Downing of the Environmental Change Unit at Oxford on how to study climate change. The analysis of abatement and adaptation were very different. The former rested on long term scenarios, assumptions about extreme events and subjective valuations of difficult questions of equity. The latter involved work with local stakeholders which emphasized risk assessment and cut across sectoral boundaries.

Issues raised in the subsequent discussion were:

a. Most of the actions needed to mitigate climate change would only be possible if the public were persuaded of the need for them. This emphasized the importance of clear and simple explanations of the work of the IPCC.
b. Private capital flows rather than official development assistance were now the prime means of technology transfer. Foreign direct investment was, however, going mainly to twelve countries. Africa remained dependent on official development assistance. There was a need to see how the two fit together taking a regional as well as a global approach.
c. The emphasis on policy and instruments might make the reports of the IPCC more political and more subject to lobbying. But what was new about this?

**Industry and NGO Strategies**

John Browne, the Chief Executive of the British Petroleum Company, skilfully wove together discussion of policy themes with an account of what BP was doing to mitigate climate change. Kyoto and the debate around it had shown that climate change was being taken seriously by both governments and industry. At the recent meeting of the World Economic Forum in Davos, strong support for action had been expressed by the heads not only of BP and Shell but also of Texaco. The Kyoto Protocol set a framework for further development and posed a number of challenges. The governments which had set themselves targets for emission reductions had to find policy instruments which would achieve the objectives – rather than some other objective like raising revenue – would give consumers additional choices and would ensure that resources were used in the best way. Ways had to be found for involving the developing countries which recognized that for them the priority was development. Progress would require a constructive solution to immediate problems. Business which was used to tackling complex problems before all the facts were known could do much, but no single company could solve the problem. Emissions of greenhouse gases from BP's activities and sales totalled one percent of human emissions. But each company could do something. BP was working with the Battelle Institute on climate technology. It was developing its solar business and seeking to reduce its own emissions with maximum efficiency. A recent survey of BP's 350 leading managers had shown that there were many win-win solutions in which environmental logic and commercial logic coincided. There was also potential in lateral thinking. BP was seeking to develop an internal $CO_2$ trading system. The company intended to make the results widely available and hoped that its experience would be of value not only to other companies but also to those negotiating international emissions trading. It had been shown that companies could respond positively to a difficult global problem which affected us all. Browne concluded with some advice to governments: end subsidies to polluting energy sources; develop work on energy efficiency where there was a role for national laboratories; support new and innovative energy sources; and sort out complex and confusing systems of energy taxes.

In the concluding Panel Discussion, Andrew Warren, Director of the European Association for the Conservation of Energy, pointed out that the single most cost effective and publicly acceptable response to the climate change problem was to use less fuel by using it more efficiently. The technologies to do this in a cost effective way were available. Why were they not being used? There were big interests which made money from selling more and more fuel. Electricity and gas were increasingly, though wrongly, being sold as commodities when consumers wanted to buy energy services. The answer was not to block liberalization but to take "counter structural" measures which would counterbalance the incentives for increased use of energy.

J. R. Spradley of Campbell and Graves reinforced Warren by stressing the importance of electricity and the scope for increased electricity efficiency in countries like China and India. The flexibility provisions of the Kyoto Protocol were essential. Effective use of them could bring the costs of reducing emissions in the United States down from $100 to $10 a ton.

Bill Hare of Greenpeace International gave notice of the issues on which the environmental NGOs would be focusing: closing the loopholes in the Kyoto Protocol and working for strong compliance and certification arrangements.

Michael Brown of COGEN Europe saw Kyoto as the beginning of a massive new opportunity for cogeneration. COGEN would seek to change thinking on the way electricity was produced, with a switch from centralized to decentralized production. Climate change, if handled properly, could bring about a win-win situation leading to the introduction of new technology, greater efficiency in energy production and use and less traffic congestion and pollution.

Andrew Papageorgi of Eurelectric and Unipede said that the electricity industry was discussing with the European Commission how to develop concrete actions to improve energy services and electricity efficiency measures.

**Conclusions**

The RIIA conference was nearly unanimous that the Kyoto Protocol was an important step forward. It was, however, a political compromise which inevitably left many points unclear and questions unanswered. The discussion at the conference showed the value of wider debate in identifying the issues for further attention. Seven main themes emerged:

- Achievement of the targets accepted by the developed countries at Kyoto would be difficult even though there were many win-win situations in which the pursuit of measures to mitigate climate change would bring other benefits. There was a need for strong government action in many countries to promote energy efficiency and renewable energies. The role of nuclear energy was already an issue in Japan and in some developing countries.

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