IA INTERNATIONAL ASSOCIATION FOR ENERGY ECONOMICS
EE

Newsletter

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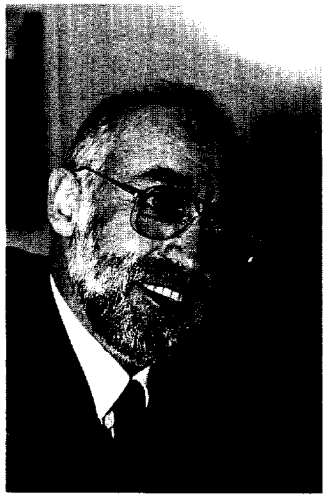
Second Quarter 1998

President's Message



Those of you who attended the 21st International Meeting in Quebec City, Canada will share my enthusiasm for what an outstanding meeting it was. Jean-Thomas Bernard and Andre Plourde are due our sincere thanks for putting it together; and Quebec City and the Chateau Frontenac, what a great city and grand hotel.

For those of you who were not able to attend, we'll be carrying some of the papers from the meeting in coming issues of the *Newsletter*.

A number of important matters were cleared at the Council meeting held just before the International Conference. Three new Affiliates were approved at the meeting: The Czech Republic, Saudi Arabia and Spain. I'd like to officially welcome them in this message. With these new members we now have 35 affiliates around the world and membership has grown to nearly 3400, about a 3% increase over a year ago!

Council approved holding the year 2000 International Conference in Sydney, Australia and the year 2001 International Conference in Houston, Texas. As a reminder, we'll be in Rome, Italy next year.

Council also approved a redefinition of officer responsibilities, combining the office of Treasurer and Vice President for Finance and enlarging the responsibilities of the Vice President for International Affairs, making it Vice President for Development and International Affairs. The primary objective of the latter office is now the expansion of membership and affiliates.

A meeting of affiliate leaders was also held in Quebec. A number of matters were discussed including how headquarters could assist the affiliates; need for better communication between the affiliates and headquarters and the need to develop a checklist for affiliate leaders explaining their responsibilities to headquarters. The meeting was successful enough that another is planned in conjunction with the Berlin regional conference in early September and one is also planned with the Rome meeting.

The Association's finances continue strong. We closed the 1997 year with a surplus on operations of about $56,000 and our net worth rose to a little over $526,000. 1998 has begun at nearly the same pace as we closed 1997 and I am confident we will have another strong year. Our Executive Director and his company, Administrative Management Services, are doing a very good job of handling the business end of the Association's operations. I'm very pleased that Council has renewed their contract for another five years.

I hope many of you have had an opportunity to peruse the special issue of *The Energy Journal* on "Distributed Resources: Toward a New Paradigm of the Electricity Business" I found it very interesting and useful and am delighted that we are able to offer these "bonus" issues from time to time. Our thanks to Yves Smeers and Adonis Yatchew for the editing of this. And while on the subject of *The Energy Journal*, a special word of thanks to David Laughton for his work on the year's first issue that focused on "The Potential for Use of Modern Asset Pricing Methods for Upstream Petroleum Project Evaluation." Headquarters tells me there

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Editor's Note

Guy Caruso spearheaded the assembly of articles for this issue of the *Newsletter* and writes:

"One of last year's most significant events with implications for the energy economics profession was the agreement on the Kyoto Protocol in December 1997. Even a superficial reading of the Protocol clearly indicates that energy is at the heart of the Kyoto program. Energy contributes decisively to the program. Energy will have to bear the brunt of the emission reductions burden. This issue of the *Newsletter* focuses on the energy dimension of climate change by including three articles which discuss the Kyoto agreement from different perspectives. Richard Baron and Lee Solsbery of the

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President's Message *(continued from page 1)*

has been a very high demand for this issue.

We have a number of very interesting conferences coming up, and I call your attention to the announcements for these elsewhere in this *Newsletter*. Our German Affiliate will hold a regional conference in Berlin, Germany on September 9-10, focusing on *Energy Markets: What's New?* And the annual North American Conference will be held in Albuquerque, New Mexico, USA on October 18-21. Its theme is *Technology's Critical Role in Energy & Environmental Markets*. I hope to see many of you at these meetings.

Charles Spierer

Editor's Note *(continued from page 1)*

International Energy Agency provide an overview of the Protocol and its implications for energy. Paul Metz of the European Business Council for a Sustainable Energy Future views the Kyoto agreement as an opportunity for the sustainable energy business. R. K. Pachauri of the Tata Energy Research Institute and a former President of the IAEE provides readers with a view from a developing country's perspective with a particular focus on the clean development mechanism which emerged from the discussions at Kyoto. These articles are supplemented by a summary of the 1997 annual meeting of the British Institute for Energy Economics which was devoted to post-Kyoto energy implications."

There are a number of major conferences on the schedule for the balance of the year and we call your attention to the various ads for these throughout the issue.

As ususal we encourage submission of articles for the *Newsletter*. We're particularly grateful for David Jones' contribution to this issue.

DLW

Future IAEE Events

Regional Conference	
September 9-10, 1998	GEE/IAEE European Conference *Energy Markets: What's New?* Berlin, Germany
Annual Conferences	
October 18-21, 1998	19th Annual USAEE/IAEE North American Conference Albuquerque, NM, USA *Hyatt Regency Albuquerque*
June 9-12, 1999	22nd IAEE International Conference Rome, Italy *Hotel Parco dei Principi*
June 7-10, 2000	23rd IAEE International Conference Sydney Australia
2001	24th IAEE International Conference Houston, Texas, USA

United States Association for Energy Economics

USAEE

IAEE

UNITED STATES ASSOCIATION FOR ENERGY ECONOMICS
INTERNATIONAL ASSOCIATION FOR ENERGY ECONOMICS
Presents

The 19th Annual North American Conference

Technology's Critical Role in Energy & Environmental Markets

Hyatt Regency Hotel - Albuquerque, New Mexico - USA
October 18 - 21, 1998

Session Themes and Topics

Critical Energy and Environmental Issues in the Next Century: Where Can Technology Make A Difference?

Technology Entrepreneurship in the Energy Industries

North American Developments: Technology and Sustainable Futures

Advancements in the Oil and Gas Industries

Electric Power and Technology

Forecasting Circle: Integrating Technology Dynamics and Model Statics

Energy Efficiency and Renewables

Energy and Environment in a Post-Kyoto World

Retail Access: Will it Work?

Use of Information Technology in Energy Markets

25th Anniversary of the Oil Embargo: The Review

*** CALL FOR PAPERS ***

Deadline for Submission of Abstracts: June 30, 1998
(please include your cv when submitting your abstract)

Anyone interested in organizing a session should propose topics, motivations, and possible speakers to:
Arnold B. Baker - 505-284-4462 / abbaker@sandia.gov
Michelle Michot Foss - 713-743-4634 / mmfoss@uh.edu

Abstracts should be between 200-1500 words and must clearly address the theme of the conference and topics above to be considered for presentation at the meeting. At least one author from an accepted paper must pay the registration fees and attend the conference to present the paper. All abstracts/ proposed sessions and inquiries should be submitted to:

David Williams, Executive Director, USAEE/IAEE
28790 Chagrin Blvd., Suite 350,
Cleveland, OH 44122 USA
Phone: 216-464-2785 / Fax: 216-464-2768 / E-mail: iaee@iaee.org

General Conference Chair: Leonard L. Coburn
Program Co-Chairs:
Arnold B. Baker & Michelle Michot Foss
Arrangements Chair: David L. Williams

22nd ANNUAL IAEE INTERNATIONAL CONFERENCE

Grand Hotel Parco dei Principi, Rome, Italy, 9-12 June 1999

Theme

New Equilibria in the Energy Markets: The Role of New Regions and Areas

This three day Conference aims at discussing new relations and agreements between North Africa and Middle East producing countries and industrialised regions in the framework of European co-operation. The Mediterranean basin and Black Sea as well as Middle East markets are showing an ongoing process of increasing energy production and capacity but with some security problems. The oil and gas reserves are vast, but are there outlets to consuming areas? What about the transit and security routes for new pipelines? What role should government, institutions and companies play in this context? How can the new free markets in oil, electricity and gas create new equilibria in Europe and Asia? What will be the impact of Kyoto follow-up on the various Regions? Which scenarios for the world energy market can be outlined?

Rome will be the best meeting point to provide a unique forum where these and related issues will be debated by experts from around the world to examine opportunities, future trends and challenges of the new and old energy areas.

CALL FOR PAPERS

Deadline for Submission of Abstracts: 5 January 1999

Abstracts may be submitted for plenary as well as concurrent sessions. Anyone interested in organising a session should propose topics, objectives, possible speakers to the Programme Chairman well in advance of the deadline for submission of abstracts. Abstracts should be between 300 and 500 words, giving an overview of the topic to be covered. Full details, including the title of the paper, name of the author(s), address(s), telephone, fax, and e-mail numbers, should also be sent. At least one author from an accepted paper must pay the registration fee and attend the conference to present the paper. All abstracts, session proposals and related inquiries should be directed to:

Vittorio D'Ermo, Programme Chairman
22nd Annual International Conference of the IAEE
Vice President AIEE
Via Giorgio Vasari, 4
I-00196 Rome
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DEADLINES

Abstract Submission: 5 January 1999
Notification of Abstract Acceptance: 4 February 1999
Manuscript Submission: 4 March 1999

The Kyoto Protocol and its Implications for Energy

*By Richard Baron and Lee Solsbery**

By now, most readers of this newsletter are probably familiar with the phrase "Kyoto Protocol", and perceive very well that it is bound to be associated with many energy policy decisions to be made in the near and long-term future. In December 1997, Parties to the United Nations Framework Convention on Climate Change agreed to legally-binding commitments on the future greenhouse gas emissions of developed countries. For most of these countries, the brunt of the effort will necessarily fall on the energy sector, from primary supply through end-use. Climate change concerns will need to be reflected in many policy decisions, and virtually all economic activities will be affected. Governments, along with most concerned private actors, are now struggling to elaborate cost-effective and practical policies and measures to meet this challenge. Along with the issue of energy market liberalisation, climate change seems to have become a pillar of energy policy making: energy policy analysts and economists have a lot to contribute to assure that environmental goals are met effectively in the future, while preserving other energy goals.

What Was Agreed at Kyoto

Net Reductions in Annex I Parties

Overall reduction commitments for greenhouse gas emissions accepted by the industrialised countries amount to 5.2 per cent compared to 1990 levels. They are to be reached over a first "commitment period" from 2008 to 2012. All six greenhouse gases are covered, not only carbon dioxide, which accounts for the greater part of emissions, but also methane, nitrous oxide, perfluocarbons, hydrofluocarbons and sulphur hexafluoride. Net reductions or increases in emissions from changes in land use and forestry activities undertaken since 1990 count against national emission commitments.

Despite initial resistance from some Parties, the Annex I Parties (essentially the industrialised world) agreed to differentiated reductions – 8 per cent for most of them, 7 per cent for the United States, 6 percent for Canada, Japan, Hungary and Poland, and 5 percent for Croatia. New Zealand, Russia and Ukraine are to stabilise their emissions at 1990 levels, while Norway, Australia and Iceland were allowed increases of 1, 8 and 10 per cent, respectively.[1] Specific national circumstances and difficult negotiations resulted in this diverse set of commitments. Most striking is the situation of some countries with economies in transition to a market economy (Russia, Ukraine and others), whose current emissions are much lower than the emission level they have been allocated in the Protocol, to reflect their dire economic circumstances and the prospects for recovery.

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* Lee Solsbery is head of the energy and environment division at the International Energy Agency, Paris, France. Richard Baron is a senior analyst in that division with responsibilities which include analyzing the energy dimensions of climate change. The opinions expressed in this paper are those of the authors and do not reflect those of the IEA or its Member countries.

See footnotes at end of text.

Policies and Measures

A core issue of the Kyoto negotiations was related to the adoption of mandatory common policies and measures. The rationale for such an approach could be twofold: alleviate competitiveness concerns from certain segments of industry, and generate possible economies of scale for technologies such as renewables, by sending a broad-based signal to the market. Mandatory policies and measures were not agreed at Kyoto, as the weight of specific national circumstances won over the need for harmonisation. But the Protocol does include a list of priority policy areas, covering energy efficiency, renewable energy sources, market imperfections running counter to the objective of the Convention, and market instruments. Non-CO_2 greenhouse gas emissions such as methane from the production, transport and use of fossil fuels are also stressed.

International policy cooperation is addressed through the need to enhance the effectiveness of policies and measures, and to share related information and experience. Parties to the Convention are encouraged to implement R&D and increase the use of CO_2 sequestration technologies, as well as new and renewable forms of energy, greater energy efficiency and other advanced and innovative, environmentally sound, technologies. The door is still open to further coordination of policies and measures, if Parties decide it could be beneficial to the objectives of the Protocol.

Flexibility Mechanisms

Flexibility and provisions for international cooperation in meeting emission reduction commitments are a novel and critical feature of the Protocol. Four articles contain the main elements of geographic flexibility, with different levels of detail and need for more elaboration by Parties. Still, at the end, they all deal with the same matter: reductions towards the quantified emission objectives of developed countries. For this reason, further negotiations on one article are likely to influence negotiations on others, in order to maintain their overall consistency.

Under Article 4, any group of participating countries can agree to reallocate their emission commitments among themselves, so long as the resulting overall reduction meets their combined commitments. This new agreement must be completed prior to the ratification of the Protocol by the involved Parties, and is valid for the duration of the commitment period. This approach commonly known as "bubbling" would allow the European Union, for example, to share the burden among its Member states. If the group of Parties fails to meet its common target, each individual Party will be held responsible against its new objective under the agreement. Such agreement is akin to a form of emission trading, where all transactions occur at government level, and take place before the beginning of the first budget period. Also, no price signal emerges from such transactions, as they represent a political agreement based on elements such as the primary energy mix, emissions per capita, economic development, mutual economic assistance, etc.

Under Article 6, an Annex I Party may transfer verifiable emission reductions achieved through specific projects to another such Party. The Party receiving the reduction would see its allowable emissions increased, while those of the other Party would be reduced accordingly. This is referred to as joint implementation, and only applies to

emission reductions realised over the 2008-2012 period. It is open to the participation of legal entities, based on approval by their government. A central issue here is in the quantification of additional emission reductions compared to what would have happened otherwise (known as the "additionality" issue). The protocol specifies that the contribution of joint implementation projects to the achievement of emission commitments should be supplemental to domestic actions, without defining this notion any further.

Under Article 17, countries may "trade emissions". A Party which over fulfils its Protocol commitment may sell the "surplus" to any other Party. Here again, emissions trading should be supplemental to domestic actions. Other principles and rules for emissions trading have yet to be defined and adopted, however. This issue is on the agenda of the next Conference of the Parties, which will constitute an opportunity for all Parties to have an open discussion on an instrument that was unknown to many at Kyoto. Lack of understanding was the apparent cause of last-minute reluctance on the side of developing countries to accept a tool that seemed to grant emission rights to the developed world. Although Article 17 does not specify whether private companies would be allowed to trade, they are authorised to do so among Annex I Parties under Article 6 on joint implementation. It is therefore highly probable that Parties will allow private entities to participate in emission trading when they come back to this question in Buenos Aires in November 1998, or in subsequent negotiations.

Under Article 12, developing countries may transfer certified emission reductions from sustainable development projects to Annex I Parties. Any such reductions achieved from 2000 onwards may be transferred to, and used by, the industrialised country which acquires them to meet its commitments in the first budget period, from 2008 to 2012. The private sector is explicitly allowed to initiate projects of this type. The device has been dubbed the "Clean Development Mechanism". As with emissions trading, it still lacks a specific code of procedures, the role of its executive board, and the notion of certification. It will be under close scrutiny regarding the assessment of how many reductions are indeed additional; unlike joint implementation projects within Annex I, where one Party's allowed emissions are increased and the other's are decreased, developing countries do not have such overall emission goals against which to assess the real nature of reductions. In spite of these methodological difficulties, the Clean Development Mechanism is a clear and welcome step to a more global approach to climate change.

For many people inside the negotiations, the definition of the Clean Development Mechanism was very much a surprise. It emerged from an original proposal tabled by Brazil, which included a clean development "fund", to be financed by penalties paid by those developed countries who would not fulfil their assigned emission commitments. The fund was to finance sustainable development projects and generate emission reductions. Many elements of the Brazilian proposal were dropped, including, most importantly, the international financial penalty for non-compliance, and the clean development fund evolved into a clean development mechanism, introducing the possibility to generate credits in the developing world, for use by the developed countries. This is a goal many had been pursuing since 1995 under another instrument (so-called activities implemented jointly), the results of which were to be assessed by 1999.

A final important element of flexibility in the Protocol lies in the adoption of a five-year commitment period, rather than a target set for a single year (e.g., a 5 per cent reduction in 2010). Under the actual provision, countries may take actions throughout the five years, when it is most convenient and cost effective to do so. They also have the possibility to save reductions beyond their objective and use them in a future period, an option referred to as "banking". The possibility to borrow future emissions for the current period has been ruled out for now, due to concerns about the inability to ever assess compliance from Parties who would permanently resort to emission "borrowing".

A clear achievement of the Kyoto negotiations was to include mechanisms that can help minimise the overall economic cost of this new carbon constraint. But more work is needed to transform this potential into cost-effective emission reductions.

Where Do Negotiators Go From Here?

The Kyoto Protocol leaves a number of questions hanging and issues unresolved. First and most obvious is the prospect for ratification. The Protocol will enter into force only 90 days after it is ratified by 55 Parties which together accounted for 55 per cent of the industrialised world's greenhouse gas emissions in 1990.[2] Many countries are expected to ratify quickly. But in others, the Protocol is politically controversial and legislative approval is by no means guaranteed. In the United States, for example, a large majority of the Senate has served notice that it would refuse to ratify any agreement unless major developing countries actively participate. In the European Union, a Council of Environment Ministers will decide, at the end of June, the new burden-sharing agreement among EU Member states. There are indications that this new agreement would not depart significantly from the one agreed in March 1997. Still, countries like Germany and the UK, who had agreed to more stringent reductions to offset other Members' growth in emissions, would now be held accountable against these ambitious objectives if the EU "bubble" fails to meet its 8 per cent reduction objective.

What the developing world will do is the second great uncertainty after Kyoto. The UNFCCC process has advanced with this Protocol, there is no question of that. So far, however, it binds only the richer countries – the countries which produced and still produce the lion's share of greenhouse gas emissions. But the developing world is catching up rapidly, through economic development and demographic pressure. Several proposals for developing countries to adopt voluntarily emissions limitation commitments were advanced at Kyoto. The developing countries, also known as the Group of 77 and China, rejected them all, reminding other Parties that the Mandate agreed at Berlin in 1995 was to negotiate towards a Protocol that would not introduce any new commitment for developing countries.

The Clean Development Mechanism is based on projects and as such, is unlikely to significantly alter the growth of developing countries' greenhouse gas emissions. Article 10 of the Protocol does contain recommendations on policies and measures that apply to all Parties, including developing countries, but it remains fairly general at this stage. There

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Implications for Energy *(continued from page 5)*

is no question that a core issue for upcoming negotiations will be the engagement of most advanced and major developing countries towards the adoption of limits to the growth of their emissions.

As for the Annex I countries which will assume commitments under the ratified Protocol, the unanswered question is just how "binding" the document will be. So far, Article 18 on non-compliance has no real teeth, so the Protocol relies mostly on moral suasion. This raises some concerns about the success of instruments like emissions trading, where compliance with the emission cap is critical to the participants's confidence in the system.

Energy Implications: Markets and Policies

Even a superficial reading of the Protocol yields evidence that energy is at the heart of the Kyoto programme. Energy contributes decisively to the problem. Energy will have to bear the brunt of the emission reductions burden.

What Constraint on Energy?

Quantifying the exact level of required reductions in energy-related emissions is difficult at this point. The task is complicated by the wide range of natural and anthropogenic sources of greenhouse gas, as well as by the varying costs and political implications of abating emissions in various sectors. What is incontestable is that carbon dioxide emissions from fossil fuel combustion represent about four-fifths of all greenhouse gas emissions in the industrialised world. Energy production and use is also a source of methane and nitrous oxide. By comparison, the contribution of perfluorocarbons, hydrofluorocarbons and sulphur hexachloride – three other greenhouse gases covered by the Protocol, which are not energy-related – are reported to vary from negligible to 6 per cent of the total.

Because of the absence of any commitments by developing countries, the Kyoto negotiators have not set constraints on worldwide greenhouse gas emissions. As a logical consequence, there is no current prospect of a cap on world consumption of fossil fuels. Yet, what they did achieve was far from inconsiderable. Virtually the entire developed world will take part in the treaty, once it is ratified. Had there been no Protocol, studies by the International Energy Agency (IEA) indicate that energy-related emissions would have risen steeply above 1990 levels in the next decade, and national energy projections confirm this information. The curbs that are now planned will affect both supply and demand; they may well alter energy markets worldwide. As for the developing world, although it has made no commitments of its own, one effect of the Protocol is likely to be a speed-up in the diffusion to them of cleaner, more efficient energy technologies. Their energy demand will most probably go on increasing, but at a slower rate than if there were no Protocol. That is, unless there is major "leakage" of industrial activities from the developed countries to the developing countries, as a result of the greenhouse gas constraint applied on the former.

For the past decade, low energy prices have undercut the motivation to achieve energy savings. In future, the price of energy services is likely to reflect increasingly the social cost of the damage they do to the environment by exacerbating climate change and other local externalities. Such increases would foster efficient market responses. To be coherent and economically efficient, direct and hidden subsidies to fossil fuel production and use should be eliminated.

Carbon constraints will affect coal, oil and gas unequally. Coal releases more CO_2 per unit of energy than does oil; oil releases more than natural gas. Several countries have already introduced, or are considering, carbon taxes that would fall most heavily on coal. So far, these efforts have been limited by lack of political momentum; they now have a better chance of being realised. With or without such taxes, the Kyoto accord provides a clear signal to investors in expensive and long-lived energy-using equipment: unless it is used much more efficiently, coal will be more and more disadvantaged compared to oil and gas. While multiple unpredictable factors will affect future oil markets, nothing in the Protocol is likely to diminish worldwide demand for petroleum or undermine prices. In the medium run, natural gas is likely to gain an increased market share, if infrastructure keeps up with growth in demand.

Sectoral analysis provides additional clues to the Protocol's impact on energy. Emissions from stationary end-uses of fossil fuels in the industrial, commercial and residential sectors (including heating) have remained stable for about a decade and could well decline if new climate policies are enacted, given their relative sensitivity to price changes. Power generation and transport have been the fastest-growing sources of carbon dioxide emissions in IEA countries, both driven by final consumers' growth of income, and relatively stable or decreasing end-use energy prices. Fossil fuels are a major cost component in electricity generation and so utilities will be fully engaged in efforts to meet Protocol emission objectives.

Transport tells a different story. Two-thirds of transport emissions come from personal cars, and fuel costs are a relatively small component of overall transport costs (sometimes declining), even in countries with very high gasoline taxes. At the same time, car ownership and per capita car use in IEA countries appear to be far from saturation point. So the current trend is for CO_2 emissions from transport to continue rising, unless very vigorous new measures are taken; some such measures may be driven by climate change considerations while others may be taken to fight congestion or air pollution. Governments need to encourage further fuel economy, alternative fuels and new modes of transport, which warrants government-industry cooperation on research and development, and probably performance standards to orient markets. But such actions will take time to produce real results, as new technologies will come into play only as vehicle fleets are renewed and consumer psychology shifts. In this context, one can only welcome the agreement reached by European car manufacturers and the European Commission to arrive at an average of 140 grammes of CO_2 per km by 2008 for their marketed fleets (roughly 5.8 litres/100 km or 40 mpg for gasoline cars).

For all energy-related activities, the slow pace of capital stock renewal (half a century for buildings and some industries) will inevitably delay effects of measures to reduce CO_2 emissions. Unlike stop-and-go macro-economic policies, energy policies have considerable lead-time. This is a key reason why the industrialised nations must begin acting now to achieve the Kyoto goals, and further goals that may be negotiated in the future.

The Role of Domestic Actions

As economists, we prefer the use of market instruments to control emissions of greenhouse gas. The introduction of international emission trading should be welcome in that respect. If efficient, this new market will provide some crucial information for the negotiations of future commitments: the market price, i.e., the marginal cost of reductions, will indicate how far our economies can go to reduce our emissions in subsequent commitment periods. But we must make no mistake: the existence of mechanisms for cost-effective reductions at the international level does not guarantee that the ambitious emission goals set at Kyoto will be met. Emission reductions will be achieved through domestic actions; in some cases, these domestic actions and other economic developments will result into more reductions that can eventually be traded internationally. But how many countries are likely to be in that situation, and will they choose to sell or bank these reductions? Under all possible scenarios, no country can afford to rely entirely on others to achieve its Kyoto target.

As policy-makers, we must take a number of other factors into account, as climate change is not the only item on the agenda of energy policy, and energy policy is only one of several major policy questions that governments must tackle, both in the developed and the developing world. Competitiveness, unemployment, poverty in some segments of our societies are pressing issues, and energy responses to the Kyoto Protocol should not play against them, otherwise their political sustainability will soon be at stake. To be successful, climate change policy will have to set an unprecedented case of policy integration across different parts of national administrations, and involve a wide range of different stakeholders, from large industrial energy-users to citizens.

When thinking about potential policy options, it is useful to go back to the signals sent by energy markets over the past few years. In IEA countries, energy prices have generally been going down in real terms, except where countries have introduced new carbon/energy taxes. In parallel, the major policy thrust is towards market de-regulation which, in most cases, will deliver further end-use price reductions; this is a welcome outcome for consumers and our economies. Clearly, we should not count on energy market deregulation to deliver the environmental goals set at Kyoto. What this wave of deregulation does brings about, however, is a more level playing field for energy suppliers, definitely a good basis for a market approach to reduce greenhouse gas emissions. In that respect, some players have already demonstrated that emission trading is feasible, once both parties have an incentive to reduce emissions, e.g., through voluntary agreements set prior to the Kyoto commitments.

Because of the flexibility they offer, domestic emission trading systems appeal more to industrial sources than carbon taxes do, especially if the allocations are based on grandfathered emissions, as opposed to an auction. They also open a door to the possibility of international emission trading, provided governments have reasonable confidence that their domestic entities meet the emission objectives they have been given. Let us not forget that the Protocol will be signed by Parties, not by companies, even though reductions will come from private entities and citizens. This will have clear implications on the conditions under which domestic entities will be allowed to participate in the international system; in that respect, the so-far successful example of the United States SO_2 allowances trading programme[3] does not provide an entirely valid precedent for international greenhouse gas emission trading, as far as the organisation of such a system is concerned. Of course, the insights on the economic efficiency delivered by trading systems are relevant.

The most challenging sectors are probably those for which there are no ready-made policy instruments, or where economic instruments cannot be used as stand-alone policy tools for practical and political questions. For instance, emission trading systems are unlikely to cover all individual sources of CO_2, let alone all greenhouse gases in a country. The economist's alternative is carbon taxation to reflect the external cost of climate change and orient energy choices towards less carbon-intensive uses through competitive market responses. But the political implications of taxation are, in some cases, as complex as the design issues of emission trading systems...

We, at the IEA, observe in our day-to-day activities how energy markets depart often from full competition, from supply to final energy use. Given these inefficiencies, it is difficult to argue that market instruments like taxation alone can deliver reductions at cheapest cost. A pragmatic and rational approach would be to establish fully competitive and transparent energy markets, and send a signal that will then be best transmitted throughout the economy, when necessary. In many cases, governments will have to resort to regulatory approaches to supplement economic instruments. In other cases, regulatory approaches (such as energy efficiency standards) may be sufficient in the medium run, or they may be the only socially acceptable way to move forward.

From Climate Change to Other Global Energy Questions

The magnitude of the Kyoto challenge calls for a close look at all policy options, alone and in combination, to try and assess their cost-effectiveness, and provide practical recommendations to policy-makers on how to tackle the Kyoto commitments from the energy side. Energy economists have tremendous expertise to contribute to solve this problem, especially in a period when energy market uncertainties introduced by the wave of deregulation makes it necessary to master both the deregulation and environmental issues related to energy.

This expertise would also have considerable value added if it helped regions of the developing world in their attempt to address their growing energy needs and alleviate poverty. Instruments like the Clean Development Mechanism have a role to play, but projects, however numerous, cannot substitute for more structural changes that are necessary to meet broader development goals, and remove well-identified barriers to the penetration of cleaner energy technologies. A recent OECD study on fifty years' experience in international aid highlights that real scarcities may be in the domain of governance. In other words, the technology is available, what is required is the enabling environment and institutions for it to be adopted. Development agencies are trying new approaches along those lines: the European Bank for Reconstruction and Development is financing energy service companies (ESCOs), rather than specific energy efficiency projects; these ESCOs then implement cost-saving efficiency projects and pay themselves on the benefits. Investing in

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Italian Association of Energy Economists: First Quarter Activities

In the first quarter of 1998, the Italian Affiliate organised two important conferences in Rome to debate some relevant themes of the energy sector.

The first one organised in cooperation with Price Waterhouse at Banca Nazionale del Lavoro on 26 February 1998 analysed the EU Gas Directive and the related effects on the Italian market. This one-day Conference, in which more than 150 participated, ended with a round-table chaired by AIEE's President, Edgardo Curcio.

Fabio Fontana (British Gas Italia) outlined the possible scenarios that introduction of the new directive might have on the Italian gas market, among which new pipelines built and financed by various operators, the availability of gas releases for third operators that would start selling natural gas in Italy as well as the network access for big users to import and distribute gas.

Massimo Orlandi (Edison Gas) showed the present structure and future development of the Italian gas market, highlighting the growth of some sectors, among which the electric cogeneration is considered the most dynamic.

Philip Nutman (Price Waterhouse) focused on the effects of gas liberalisation, stressing the various steps of this process in other countries and assuming the possible process that will take place in Italy, a scenario characterised by uncertainty, e.g., the role of the main operator, the importance of eligible customers and most important, the problem connected to the role of strategic storage.

Pippo Ranci, President of the Italian Authority for Electricity and Gas gave his contribution, which was followed by a representative of Federgasacqua, Fabio Fantini, who suggested as eligible customers, the Italian public utilities, although they do not present high levels of gas consumption, they nevertheless have homogenous features and provide the country with public services.

Distinguished representatives took part in the Round Table, among whom, Giulio Paini, Managing Director of Edison Gas, Angelo Ferrari, President of SNAM, Giuseppe Gatti, President of UNAPACE and Fabio Fontana, Vice President of British Gas Italia.

Paini stressed the importance of liberalisation after the adoption of the EU directive and he reiterated the need for opening the market and allowing enlarged flows of supply.

Ferrari confirmed SNAM's attitude to use the directive as an opportunity to boost efficiency, to make gas processes much clearer and, therefore, to optimise the role and participation in the domestic market.

Gatti underlined the importance of defining the market of eligible customers that could presumably reach a more than 30 percent share of the overall market. He also reiterated the need for splitting the various phases of SNAM production and distribution processes and enabling network access to third parties.

The second Conference - held in Rome on 26 March - dealt with the theme *The Energy System After Kyoto: Analyses and Perspectives*. Some 140 participants attended the meeting in the XVIIIth century Halls of Palazzo de Carolis, seat of Banca di Roma. The conference addressed all topics relating to the resolutions adopted in Kyoto in occasion of the IInd Communication on climate changes.

As for the oil sector, P. De Simone stated that, provided steadiness of overall fuels consumption, fuels are likely to be involved in the eventual reduction of emissions (also following the further penetration of gas vs. heating gas oil and fuel oil), without leaving out that policies should be coordinated on a European level and be referred to the market.

As for the electrical sector F. De Luca assumed that half of all new plants are more efficient than the existing ones. This goal can be reached only under some circumstances: first of all, the national electric market has to be clearly defined, and secondly renewable and similar sources should be rather competitive with respect to other sources.

The Italian Minister of the Environment, Edo Ronchi, ended the conference declaring that by April 30, the Italian Government will propose a first series of measures to implement the requested CO_2 reduction as set forth by Kyoto. These measures include the incentives for electric cars, the development of the photovoltaic sector and a series of agreements with the motorcar, household appliances and chemical industries.

The Italian Minister also confirmed the objective of a 7 percent reduction of CO_2 emissions in Italy by 2010 compared to 1990, although the Government is still waiting for the EU directives on the distribution of the various engagements taken in Kyoto.

Edgardo Curcio

Implications for Energy *(continued from page 7)*

these companies provides more leverage, lower transaction costs for the lending agency, and develops valuable capacity in countries.

If Parties are to address seriously the issue of global climate change, the Kyoto Protocol is only a first and small step towards a more sustainable energy future, however ambitious it is when compared to ongoing trends in fossil energy demand. More nations will eventually need to come onboard to limit emissions, as their level of economic development allows them. In the meantime, effective policy cooperation between governments and experts can help set the environment right for more efficient energy systems, whether or not climate change is considered an energy priority: price distortions, subsidies, market access and consumer information should be examined and reformed, when necessary. In time, this more efficient energy framework will form the basis for effective responses to climate change and other environmental concerns.

Footnotes

[1] The full list of countries with their respective commitments is contained in Annex B of the Protocol.

[2] For instance, this rule means that the Protocol could theoretically enter into force without the participation of the United States, whose emissions amounted to less than 45 per cent of Annex I Parties total emissions. The environmental effectiveness of the Protocol would, however, be greatly reduced.

[3] See Ellerman, Denny, R. Schmalensee, P.L. Joskow, J.P. Montero and E.M. Bailey (1997), *Emissions trading under the U.S. Acid Rain Program - Evaluation of compliance costs and allowance market performance,* Report, MIT Center for Energy and Environmental Research, Cambridge, Mass.

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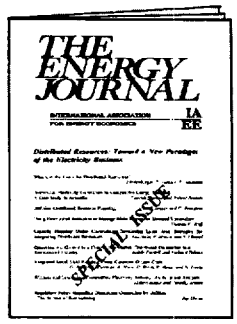

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The Fruits From Kyoto for the Sustainable Energy Business

*By Paul E. Metz**

Introduction

e[5] - the short name of the European Business Council for a Sustainable Energy Future - has participated very actively in the preparations and the Kyoto Summit COP-3 itself. The Council has done so in close cooperation with its sister organisation from the United States and member associations representing a range of renewable energy technologies like solar, wind, geothermal and hydropower, cogeneration and end-use efficiency. The end-use efficiency is an extremely diffuse submarket of probably all economic sectors, ranging from building insulation and bicycles to videoconferencing and multimodal transport services. This newly developing coalition of sustainable energy business interests was supported in Kyoto by the world associations International Association for Public Transport, World Fuel Cell Council and International Cogeneration Alliance. The pro-active position of this group on climate policy clearly differs from the general business associations - that are often dominated by fossil and nuclear energy interests - and attracted strong interest from delegates.

The two Business Councils - from EU and United States - were consulted before and in Kyoto by delegations from many countries, also outside Europe and the United States. The negotiating governments need and want to hear the voice of the business sectors with a realistic and positive vision and practical solutions. In Geneva, Bonn and Kyoto, the conference chairman invited the Councils to address the plenary sessions to explain to all negotiators that climate protection is possible and good for the local and world economy if done in the right way. It is, surprisingly, still necessary to explain that "no-regrets options" are investments with a normal profitability and create business opportunities, more jobs, better health, global economic development and savings on fuel bills. The first stage of emission reduction is not about burden sharing, but about the benefits of the about 25-30 percent no-regrets identified by the IPCC - International Panel on Climate Change - in 1996.

General Analysis after Kyoto

The real impact of the Kyoto Protocol is not yet visible, but it will improve the market for the many already existing carbon-efficient products and services in the near future. The initially very negative reactions of the fossil lobby show that a fundamental barrier has been crossed and that the sustainable energy lobby has successfully shown the possibilities. The Business Councils consider the Protocol the important first step for climate protection that "gives a signal to the market that climate is a real business issue." This step is small and not sufficiently binding for governments, but the direction is right and the Protocol is a good basis for the continuous improvement process, just like the initially weak Montreal Protocol has been the starting point for the ever more effective protection of the ozone layer.

Like in all other environmental issues, it is important to focus the discussion on the real cause of the real problems or risks. In uncontrolled climate change the discussion can and, therefore, should be limited to the emission of all known greenhouse gases, including aerosols. Not energy itself presents risks or is bad, but its associated emissions including solid waste, radiation and noise. The new scarcity of the environmental resource "stable climate" is at stake, not the traditional scarcity of raw materials and fossil and nuclear fuels. The former is still considered an externality in economic models, whereas the latter are well protected by the invisible hand of the price mechanism.

New Business Strategies

It is promising that since Kyoto several big car manufacturers and oil companies have published new strategies. Cars with fuel cells and high fuel efficiency have gained much higher priorities and oil companies are starting to transform themselves into energy companies with renewables business units. The first airline companies have taken interest in rail transport. The stock markets have not collapsed and will most likely from now on start to reward the pioneering companies that supply the world citizens with the most carbon-efficient services, as they offer the highest value for their shareholders and other stakeholders.

The large and rapidly growing contribution of transport to climate change is slowly getting more political attention in the UN-FCCC process. The European Business Council's Working Group on Transport & Communication started last year and attracts pioneering companies that call for market-based climate protecting measures in this sector. All transport modes have enormous potentials for improved fuel efficiencies and ICT - information and communication technology - offers many opportunities for comfortable, energy-efficient services and for the prevention of physical transport by teleworking, distance learning, videoconferencing, etc. Specific transport modes, especially the international transport by air and sea, should not continue to be tax exempt and subsidised as a result of defensive national competitiveness reasons and the inability of governments to agree on a fair and high level-playing-field.

After Kyoto, the first priority for the Business Councils is to work with the EU- and United States - institutions and governments that are responsible for the implementation of the Protocol. Especially the absence of an early target for 2005, which was a key element of the EU-proposal, should be compensated by the quick implementation of policy measures in order to show measurable progress by 2005. We will support the governments to fight delay in the realisation of the many no-regret investments in sustainable energy.

It is the firm belief of the Councils, supported by an increasing number of studies and professional associations of economists, that the allocation of the now scarcer capacity for greenhouse gas emissions must be organised by activating the free market price mechanism. This can only be achieved by market-based policies like emission trade, joint implementation, reform of subsidies and taxes and by high carbon-efficiency standards for energy using products. Many governments still underestimate and do not sufficiently understand these instruments that can be very effective. The internal use of emission trading in countries and in Europe is a good policy and measure that helps share the benefits and limit the burdens, if any, and will make visible how cheap the no-regret emission reductions are. The Earth Council and

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others have published alarming inventories of perverse subsidies and tax benefits that should and can relatively easily be stopped in the first place.

Finally, the public and business attention for the Kyoto Summit has helped to expand the Business Councils. In the first two years of its existence, the European Business Council has grown from 30 to almost 100 members, including associations with thousands of members. Many more companies all over the world will – once they hear about this lobby that promotes their business interests – join the voice of sustainable energy business. With more members from more countries and from more business sectors the Councils will have a constructive impact on the broad policy frameworks for sustainable energy.

Developing and Oil Exporting Countries – Winners or Losers ?

For many developing countries the cost of imported fossil fuel is a burden, while solar energy is abundantly available. These countries will soon benefit from the transformation of the world energy structure. Absence of large-scale energy generation units and power grids can then be turned into an advantage when research and development, international emission trade and financing mechanisms are synchronised to leap-frog and avoid the now outdated fuels-based development model.

Some oil and coal exporting countries are already investing an increasing part of their revenues from these natural, but not eternal, resources in the renewable energy technologies. Those countries with good conditions for solar, wind, geothermal and biomass can build new competitive advantages on the energy supply market. The same strategy is followed by coal and oil companies that diversify to less carbon-intensive natural gas, renewable energy sources and energy services in order to become less vulnerable and sustainable energy companies. It fits the same strategy for oil exporting countries to gradually reduce the exported quantities when the world demand is modest during warm winters or economic downturns and the oil price level falls as a result. A too low oil price will also harm their capacity to invest in the transformation.

These pro-active responses can reduce and probably completely avoid losses when the transformation strategy is started in time. Waiting and fighting the development of climate change policy can cost time and management focus that leaves the first mover advantages for the greener competitors. The European Business Council believes that no intelligent country or company needs be a loser, while many prosperous countries have no own fuel resources and all companies can and should switch their cash-flows in time to new opportunities. No "free lunch" will be served forever, but solar energy and efficiency will offer good lunches for all.

History repeats itself: a century ago the horse-traction of carriages was replaced by steam and later internal combustion engines to solve the environmental problem of "horse-emissions", now this motor is again replaced by emission-free fuel-cells using solar-produced fuels.

Ratification of the Protocol

Great political uncertainties are surrounding the ratification of the Protocol. The countries of the threatened ocean islands by their number and China and the United States by the weight of their votes can decide about the entering into force. In all three cases good reasons for ratification are already available – as presented in this article – and they will hopefully be recognised in time by their political leaders.

In the United States the political leaders will later this year have many more reports about the positive environmental, economic and employment results of climate policy. The public opinion in the United States has been little aware of the no-regrets character of climate protection measures as a result of strong lobby efforts by self-perceived losing business sectors. The White House has indicated on several occasions that public education on climate science and economics has started too late, has been dominated by selective information and needs more time to improve and ultimately change the attitude of the parliamentary representatives. In view of the first series of realistic reports from the Worldwatch, Tellus and World Resources Institutes and the Department of Energy the vote on ratification can be expected with optimism, though not on short term.

Free Market Approach

The reduction target of 15 percent in 2010, as proposed by the European Union, was realistic when first formulated in 1996 and would generate many benefits for the innovation, employment and sustainable economic growth, not only in Europe. The delay caused by seeking worldwide consensus in Kyoto should not result in postponement of this target more than the time this has taken: about two years. In the follow-up conferences starting in Buenos Aires, the 15 percent reduction – originally agreed within the EU and supported by many other countries – can and must be the next target for industrialised countries in the budget period after 2012.

The desired transformation of our energy structure can be achieved most efficiently and effectively by stimulating innovation instead of legally prescribing solutions. Our business view on some barriers and the best policy instruments is based on lessons from past innovations. The natural resource "nature and environment" is a market factor, just like land, raw materials, labour and capital. The parallels between the historical efficiency improvements of each production factor are striking.

The price of labour has increased continuously during the past century as a result of scarcity and this was strongly accelerated by regulations and taxation on employment and income. This price incentive attracted innovators by the price mechanism to perform on mechanisation, automation, information and computerisation. Labour efficiency – productivity – is not our only priority and "eco-efficiency" has gained higher priority: for energy that means we must increase the "carbon-efficiency".

The carbon-efficiency of our societies can most easily be improved when we first exploit the no-regrets, the profitable, about 25 percent reduction, options for greenhouse gas emissions. Using the investment opportunities of normal business that can be achieved in 10-15 years with considerable savings and additional benefits, such as much more employment and increased international stability thanks to reduced fuel demand. Though it is not necessary to have international consensus for saving money, the legally binding Kyoto Protocol will accelerate this transformation and realise these benefits in industrialised countries. At the same time, the new market pull will stimulate business and other research and development institutions to generate a next range of

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The Fruits From Kyoto *(continued from page 11)*

carbon-efficient technologies with a future no-regret character. Just as labour-efficiency has increased by a factor of more than 100 and is still improving, this process will continue as long as the political priority and corresponding strategies for carbon-efficiency exist. The international recognition of the possible eco-efficiency improvement of economic activities is rapidly spreading under attractive names like "dematerialisation", Factor-4 and Factor-10. For climate stabilisation it is about improving carbon-efficiency.

Competitiveness

In addition to all differences in command-and-control legislation, the worldwide subsidy and tax practices cause fundamental market distortions in favour of fossil and nuclear energy at the expense of the environment. The Earth Council estimates the amount of perverse subsidies in excess of 700 billion U.S. dollars – including many uses of energy but not the subsidies for aviation. As a result, unfair conditions for competition – no "level playing field" – handicap the sustainable energy business. These distortions explain the – in theory very surprising – existence of the many no-regret options that would not occur in an efficient, perfect and really free market.

At this moment the competitiveness argument usually is used to defend the dominant existing business interests that sometimes even dominate the national competitiveness of countries. These business sectors are strongly related to the energy structure of the fossil and nuclear era and do not yet represent the sustainable energy options that have little or no greenhouse contribution. Fair conditions and competitiveness for the sustainable energy business is an essential condition for the market-led transformation of our energy structure to the requirements of the sustainable future. The institutional barriers to this transformation must be eliminated and new incentives created that use money of the energy users, not the money of taxpayers. Market-based instruments shift public policy from a market distorting to a market improving approach as clearly argued by the Wuppertal and World Resources Institutes. Such instruments make sustainable energy more competitive and will move the innovation process in an optimal direction.

Market-based approach

e^5 underlines the importance of adequate behaviour of governments and investors to make this happen. Existing free market conditions have not prevented all problems with the externalities and need be improved. Therefore, market based policies are required to make emissions a hard factor in all economic decisions of public, business and private actors. Good reasons to choose this type of measures are:

- The main parties to the Kyoto Protocol – EU, United States and Japan – have embraced them as a principle.
- Market based measures activate the market and create flexibility in a way that needs no detailed political decisions. An example: emission trade can help avoid new negotiations on burden sharing within the European Union.
- Such measures contribute to a high-level-playing-field, stimulate innovation for carbon-efficiency, do not discriminate against specific technologies, are more efficient in public management than command-and-control regulations and are more effective than voluntary actions or negotiated agreements in the vast majority of economic sectors, especially on the demand side.

Governments have the leading role in this adjustment of free market conditions by taking market-based policy measures. Many governments have hesitated to take such measures since the previous Climate Summits due to fear for loss of competitiveness. The Kyoto Summit was necessary to achieve the higher level playing field and eliminate this fear. Now governments can start to take their responsibility as the prime market maker and introduce the market corrections that will give greenhouse gas emissions a realistic price on the free market. This will trigger the other, private market makers: investors, energy service companies and traders in carbon credits and quota.

Emission Trade

In theory, the trade of scarce emission quota within a well-defined and controlled maximum quantity can completely solve the problem in the most efficient way. However, there are some difficulties in the just allocation of emission rights, which will determine who will benefit and who will pay more. The Business Councils strongly support all efforts to study, test, introduce and evaluate emission trade mechanisms on national levels and later also on European Union and Annex-1 levels. This should provide the know-how to expand the trade mechanism to bilateral international trade, Joint Implementation and under the Clean Development Mechanism.

As this development and implementation process will take many years, other market-based measures should be taken urgently and in parallel to eliminate the many wrong market signals and activate the market for carbon-efficiency.

Subsidy and Tax Reform

Within the market-improving measures, the reform of subsidy and taxation structures has a key role. The European Business Council proposes the following actions in parallel on EU and national levels. Much can and should be done short term nationally, but much more must be done on the level of the European Union. In the United States and Japan this discussion is taking place in a similar way, but there are many differences in the cultures of subsidies and taxation.

- Review the existing system of subsidies, taxation and tax allowances and start the gradual, but quick elimination of those with negative climate and other environmental side effects.
- Use the principle "tax human vices, not human virtues". That creates synergy between taxation, subsidies and other government interference and results in better and cheaper government.
- Use ecological taxation as a means for reduction of other taxes and for introduction of stable social security structures. At least in countries with a total tax level above the EU-average the new revenues must be fully recycled. Options are the substitution of social security premiums, the reduction of income taxes or the introduction of a Citizen's Income.
- Use the reform for EU-harmonisation and convergence of subsidy and tax policies. It should contribute to early establishment of a high-level-playing-field for economic development and social, environmental and fiscal policies in the candidate member states.
- During the introduction on a national scale the internation-

ally competing energy-intensive industries can be temporarily exempt, like currently done in the leading countries of Austria, Denmark and the Netherlands. Until the EU develops common approaches, these sectors should work with negotiated agreements that guarantee a comparable level of commitment and contributions to emission reductions.

For businesses several typical advantages of fiscal environmental management are often overlooked:

- Less command-and-control regulation requires less staff and experts for compliance procedures. Price incentives activate all functions in every company and cost-conscious line managers and their controllers become environmental managers instead.
- Environmental and social management become more integrated in hard bottom line business management, get shareholder value and loose their soft ethical, stakeholder and charity character.
- More market demand for energy efficient products and services creates a competitive advantage for many suppliers and activates their marketing staff to sell environmental protection as a new unique sales proposition for existing and new market segments.
- The reduction of labour costs as the new tax revenues are recycled, will change the perspective of labour-intensive activities and create new employment opportunities. Many existing business as well as non-profit activities will achieve a better competitiveness and can develop new growth.

Conclusion

The application of market-based measures will improve the functioning of the free market. The existing market failures can be eliminated and the no-regrets harvested. The resulting savings will benefit local and global society and bring a number of dividends:

1. Limit the risk and costs of climate change and improve environmental quality;
2. Strengthen global stability and increase diversity of energy supply;
3. Stimulate business to innovate and offer more carbon-efficient solutions;
4. Create many new and secure many existing jobs all over the world;
5. Motivate citizen energy awareness and reduce their energy bills;
6. Achieve all these benefits efficiently with minimum government in free markets.

Governments should act; business is ready to supply carbon-efficient products and services. A transformation to a sustainable energy structure is an evolution that should be started soon in order to have the time to do it gradually. The perspective of more proof for climate change risks or scarcity of fuels may be additional good motivators to apply the precautionary approach for savings and making money.

Appendix 1 - Policy Priorities for 1998

Before the Kyoto Summit the European Business Council for a Sustainable Energy Future supported the EU-proposal and called for Annex-1 consensus in line with it:

1. Put a cap on CO_2 emissions from industrialised countries through legally binding reduction obligations by 7-1/2 percent in 2005 and 15 percent in 2010 compared to 1990,
2. Agree on market-based measures to create a level-playing-field, including emission trade to let the market allocate the adaptations in the cheapest way and place.

The Kyoto Protocol for global climate management meets these points to a large extent. This framework for legally binding obligations gives nations and the EU the opportunity to protect the climate without risking their - real or perceived - competitiveness.

Now the Business Council has set two parallel lines of action for European climate policy:

1. Within the EU the implementation of policies and measures must start quickly to ensure measurable progress by 2005 and the reduction by 8 percent in 2008-2012. Before Kyoto the member states have agreed on nationally differentiated reduction percentages for an average 9.1 percent EU-reduction. New negotiations on these percentages now threaten progress on the decision making for implementation of measures. It seems easier to keep the agreed percentages and voluntarily accept the 9.1 percent reduction. Instead, the national and intra-EU emission trade should be started short term. That would accelerate and economically optimise the urgent implementation: don't negotiate, but trade.
2. Completion of the Kyoto Protocol and improvement of its open ends and loopholes are a necessary UN-process; for example, Joint Implementation, Clean Development Mechanism, the range of gases, future involvement of non-annex-1 countries, international transport and the concept of sinks need much more detailed study for future agreement. This requires active participation in Bonn in June and in Buenos Aires in November.

In both processes e^5 continues to promote market-based policy instruments that improve the level-playing-field and the efficiency of the free market by making GHG-emission reductions a hard factor in all investors and demand-side decisions of public, business and private actors. Good reasons to choose these measures are:

- The main parties to the Kyoto Protocol - EU, United States and Japan - have embraced them as a principle. Their implementation will stimulate the use of renewable and low-carbon energy sources as well as efficient energy use in all sectors, especially the energy supply and the demand side in buildings, housing, appliances and transportation.
- Such measures activate the market and create flexibility without detailed political decisions. An example: emission trade helps avoid new negotiations on burden sharing.
- They bring a high-level-playing-field, stimulate innovation for carbon-efficiency, do not discriminate against technologies, are more efficient in public management than command-and-control regulations and are more effective than voluntary or negotiated agreements in the majority of economic sectors.

The preferred market-based measures include:

- A trade mechanism for emission quota or emission reduction credits within each member state and the EU: establish public GHG-exchange markets in each country. Quickly

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starting the emission trade within the EU brings a competitive advantage for Europe.

- The renewable-portfolio-obligation for all energy service companies, starting in 2000 and annually increasing to achieve 15 percent in 2010 with EU-wide tradable quota.
- Free access of small and decentralised energy suppliers with fair compensation for avoided investments and externalities. This can be integrated in the liberalisation of energy markets with open and transparent pricing structures, including prices for peak supply and load management contracts.
- A demand side management standard and its – voluntary ? – obligation for all ESCOs.
- Dynamic - "self-sharpening" as new technologies develop - emission standards for all products that cause a certain percentage of total energy use, such as airplanes, motor vehicles, ships, trains, houses, buildings, leisure equipment, office/home appliances for heating, cooling, lighting, etc. e.g., the "4-litre car" by 2005 and "3-litre" by 2010.
- On the extension from 3 to 6 gases, the EU should publish the inventory and consequences on short term. A very relevant issue for the cooling and air conditioning markets is the phase-out of HFCs through substitution by the available HCs or Stirling-systems.
- Equal treatment for all modes of transportation within the EU with differences only justified by externalities. Options are: normal taxation of aviation and shipping and road-pricing for trucks or, if not yet possible, equal exemption of taxation and rail-pricing for trains. End hidden subsidies like tax-free shopping, free car parking and non-compensation of the impact of transport noise and hazards on property values.
- Inclusion of international aviation and shipping in the Kyoto Protocol process with equal obligations for reduction of greenhouse gas emissions. Only innovative political decisions can break the present deadlock that cannot control these transboundary economic activities. One complex option is the participation of ICAO and IMO as parties to the Convention with the same status of industrialised nations, including the right to trade emission quota.
- Integration of sustainable energy considerations in all relevant policy areas, including internal EU-market, research and innovation, taxation, social security, employment, education, land use, infrastructure and city planning, international security and development cooperation.
- Revision of the existing systems of subsidies, taxation and tax allowances. Use the taxation for internalisation of environmental costs and reduction of other taxes. Introduction on a national scale is possible if the internationally competing energy-intensive industries are exempt, until EU-harmonisation is achieved. In each country with a tax-level above EU-average the new revenue must be fully recycled.
- If the initial 15 percent EU-reduction target for 2010 is really abandoned, it should at least be the new target for 2015 with all gases included.
- On the new and little mature issue of carbon sinks EU proposals are needed before decisions can be taken without great risks.

Natural Gas and the Four E's of Finnish Energy Policy

Almost one hundred energy experts celebrated the Finnish Association of Energy Economists' tenth anniversary at a seminar entitled *The Changing Market for Natural Gas*, on 5 February in Helsinki.

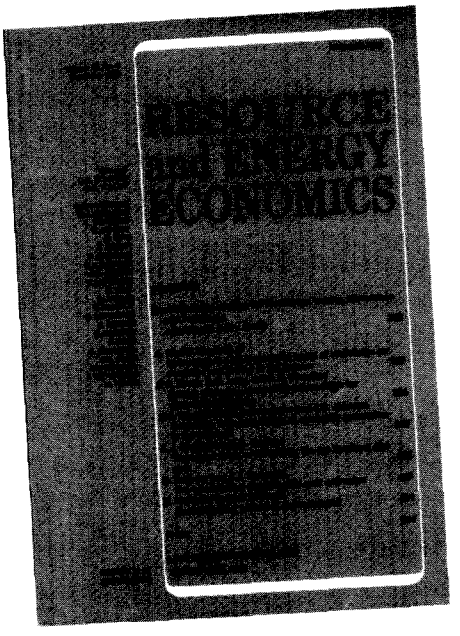
Antti Kalliomäki, Minister of Trade and Industry, in his opening speech, presented the four E's as the main pillars of government's energy policy: Energy, its security; Economy, its competitiveness; Environmental considerations; and Employment, connected not only to the development of competitiveness but also to energy and environmental technology as sources of job opportunities. He saw a radical increase in the use of natural gas as an important precondition for Finland's ability to meet her international contractual obligations to restrict the emissions of greenhouse gases.

The IAEE had its first Finnish members in 1982, but a decisive push to start a Finnish chapter was made in March 1983, when Jane Carter visited Finland. (Legal formalities for registration as an association were considered necessary only a few years later, in 1987.)

The FAEE was respecting its international roots with the inclusion of three eminent professionals from abroad as speakers at the seminar. Cristóbal Burgos, from the European Commission, gave a wide view of the place of natural gas in EU's Energy and Climate policy. Wolfgang Ziehengraser, from the Austrian OMV, presented his estimates with a calm assurance, not only for Western European gas demand and supply but for some supply costs as well. Ottar Rekdal, from the Norvegian Statoil, gave many interesting examples of how Statoil is participating in the development of technology and studying various alternatives and combinations for gas production, transfer and use in the Nordic Region.

Even the Finnish section of the seminar also had its international aspects. Tapio Harra, from Neste, put Finland forward as the energy bridge between East and West. Jouko Varjonen, from MTI, considered how the Nordic Gas Grid study and the closing down of the Barseback nuclear power station in Sweden could be a starting point for a Nordic natural gas market. Erik Malkki, from the Finnish affiliate of the Swedish power company Vattenfall, examined natural gas in power production in Finland, and described his company's plans to build a 900 MW natural gas power station near the Eastern frontier of Finland. Markku Tapio, from MTI, explained the owner's view of the planned linking of resources of the two energy companies, electricity company Imatran Voima (IVO) and oil, gas and chemicals company Neste, both with wide international connections.

Ilkka Lavonius



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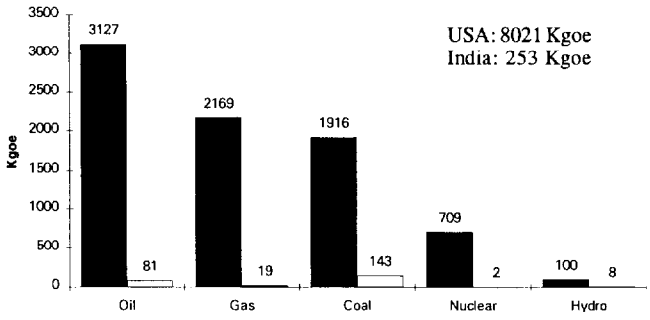
The Clean Development Mechanism: Some Developing Country Perspectives

*By R. K. Pachauri**

The Protocol adopted at Kyoto came after a prolonged period of negotiations including two prior Conferences of the Parties (COPs) at Berlin and Geneva, respectively, and several other meetings of subsidiary bodies, such as the Adhoc Group on the Berlin Mandate (AGBM) that attempted to develop a protocol that would be accepted by all the Parties to the Framework Convention on Climate Change (FCCC). However, progress in arriving at an agreement was slow right up to the final hours of the extended Kyoto meeting. In fact, at a stage just before the conference, several voices of doubt were raised on whether Kyoto would actually produce a protocol. The differences between the position of the European Union which had advocated a targeted reduction of 15 percent by the year 2010 versus no reductions suggested by some other countries, were the most dominant reality slowing down the process of negotiations and stalling a consensus among all the Parties. Fortunately, the spirit at Kyoto was one of determination to arrive at some agreement, however large may have been the divergence between the stated positions of the most important groups participating in the COP.

There were, of course, several areas of difference that dominated the debate and discussions at Kyoto, but three issues seemed to create a great deal of concern among the developing countries. The first related to the insistence of the United States on "meaningful participation" by key developing countries, and the others arose out of the issues of emissions trading and joint implementation, which the developing countries felt would provide the developed countries a convenient way out of meeting their commitments on limitation of emissions of greenhouse gases (GHGs). The developing countries were also very disappointed at the reluctance on the part of countries with the most energy intensive economies in the world to accept commitments commensurate with their historical and current responsibility in causing climate change. This was at great variance with the general approach favouring targets for reducing GHG emissions by 20 percent as actually specified in the Toronto Conference in 1988, which were to be achieved by the year 2000. As it happened, in several statements and debates leading up to Kyoto, the United States put forward support for its own position of not favouring any targeted reduction on the plea that even holding emissions at 1990 levels by the year 2008 to 2012 amounted to a virtual reduction of 30 percent. This was put forward on the premise that 30 percent increase in GHG emissions would normally take place by that period over 1990 levels, on a business as usual basis. This, of course, was a dangerous argument, because the same logic could be applied by the developing countries to state that given their low levels of per capita energy consumption, they would under normal circumstances increase their emissions by several hundred percentage points in the coming decades as a result of economic growth. Hence, this projected increase should form the benchmark for any future commitments. As it is, the disparities in energy consumption between the developing and developed world are so substantial that any insistence on "meaningful participation" (a delightfully vague and undefined term) really seems devoid of logic or ethical basis. Figure 1 indicates the levels of per capita energy consumption between different countries. These disparities are hardly known in decision making circles and, of course, are seldom discussed even by well meaning and fair minded analysts in several developed countries.

Figure 1
Per Capita Commercial Energy Consumption
United States and India



In a very useful article by Walter Reid and Jose Goldemberg published by the World Resources Institute, the authors persuasively established the fact that the developing countries are doing a substantial amount to cut down the growth of GHG emissions even in the absence of binding targets. Several examples are mentioned of programmes pursued by the developing countries which have resulted in a decline in the growth of emissions. For instance, as the authors mention, since the 1980s China has substantially reformed energy prices, with coal subsidies falling from 37 percent in 1984 to 29 percent in 1995 and petroleum subsidies falling from 59 percent in 1990 to 2 percent in 1995. It also mentioned that even though annual carbon emissions grew by 228 million tonnes of carbon (MtC) between 1980 and 1990, emissions would have been 155 MtC higher in 1990 if the energy efficiency gains achieved over this period had not taken place. It should also be recalled that China had set an ambitious goal of improving energy efficiency as far back as in the early 1980s when it launched its "Four Modernizations", one of which clearly specified that China would quadruple its GDP by the year 2000, but increase energy consumption only twice the level existing at the time.

In the case of India, Mexico, South Africa, Saudi Arabia and Brazil, fossil fuel subsidies have been cut substantially. In the case of Brazil, the ethyl alcohol programme based on sugarcane has grown to production levels of 200,000 barrels a day replacing one-half of the gasoline that would have been used otherwise. The effect of this is that 9.45 MtC per year or approximately 15 percent of Brazil's total emissions have been avoided. In the case of India, it needs to be mentioned that this is the only country in the world that has a separate Ministry for Non-Conventional Energy Sources, and among its various achievements, it needs to be noted that the biogas programme has resulted in 2.5 million biogas plants being installed in the country. The Indian wind energy programme has recorded a total installed capacity of over 1000 MW. Future plans of the Government of India and the rapid growth

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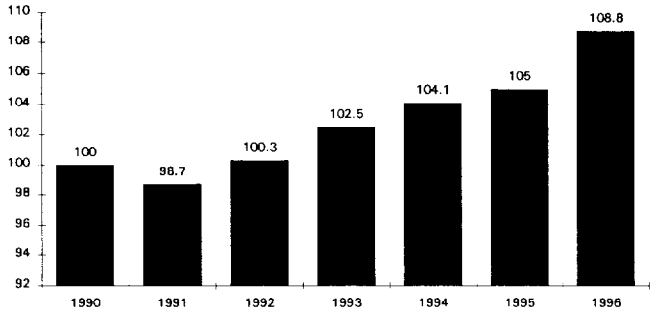
of a renewable energy industrial base in the country point to much greater achievements in the years ahead. All the measures taken, as described in the Reid - Goldemberg paper, show the developing countries in a much better light than say the United States. In fact, the record of the United States in energy use during the 1990s has been very discouraging as shown in Figure 2.

Figure 2
Relative United States CO_2 Emissions
1990=100



The figure shows percentage change in U.S. CO_2 emissions relative to a 1990 base-line. For example, emissions in 1996 were almost 9 percent greater than in 1990.

Source: World Resources Institute, *Climate Notes*, July 1997.

In the case of emissions trading, the developing countries' concerns relate essentially to the opportunity that this might provide developed countries to not reduce their own emissions and meet their commitments only through the trading route. Somewhat similar is the concern with joint implementation, but, in this case, it is also felt that joint implementation may take away some of the most attractive and low cost options that developing countries may have for implementing emissions limitation measures. However, this fear is largely unfounded, because there is no reason why developing countries should accept payments only at the level of actual costs incurred by them in such projects and not treat the alternatives that the developed countries themselves would have pursued as the benchmark for seeking funding for such projects. The argument that the "lowest hanging fruits" would be plucked by the developed country Parties, thereby depriving the developing countries of such options when in the future they themselves may have commitments, is unfounded. The evolution of technology will bring several other fruits to hang lower than the levels that are seen today. Joint implementation can elicit enthusiastic participation from the developing countries, if confidence is built on a record of good intentions and commitment from the developed countries. Unfortunately, some misunderstanding has been created since the FCCC was agreed on at Rio through the excessive interest in joint implementation by several developed countries. This was clearly a case of "overkill", which only led to the feeling that the developed countries were not interested in doing something that is politically difficult and which required some hard choices in their own domains. Joint implementation should be seen as a supplement and not as a substitute for actions by the developed world in their own territories.

Mitigation of climate change would require several initiatives which have important implications for the energy sector. Based on the principle of historical and differentiated responsibilities, the FCCC included the possibility of joint implementation as a means to implement mitigation measures in non Annex-I (developing) countries which could be funded by Annex-I (developed) countries in return for credits based on the reduction of emissions consequent on such measures. Essentially, joint implementation projects would lie mainly in the fields of energy efficiency improvements, fuel switching, including greater use of renewable energy technologies and in the creation of sinks, such as forests. Forests also could have an important implication for energy use, because in a number of developing countries biomass is still a major source of energy. Hence, sustainable harvesting from an expanded stock of forests could not only create a sink for carbon dioxide, but also enhance the availability of biomass energy for a significant part of the population in these countries.

Joint implementation did not quite take off following the coming into force of the FCCC, mainly because modalities for implementation of such projects and the monitoring of results in terms of emissions limitation could not be finalized in the first two Conferences of the Parties held in Berlin and Geneva. Also, in the absence of any emissions reduction targets, there was no incentive for the developed countries to fund projects of this nature in the developing countries. However, a pilot phase of Activities Implemented Jointly (AIJ) was approved in the Berlin COP, so that experience with all the elements of such projects could be generated adequately before launching a phase that would allow for credits against commitments and actions to reduce emissions. But, several developing countries have been less than enthusiastic even in the pilot phase, mainly because they have been turned off by the "overkill" referred to earlier and the tardiness on the part of Annex-I countries in reducing their own emissions.

One of the significant provisions agreed to in the Kyoto protocol to the Framework Convention on Climate Change relates to the establishment of a Clean Development Mechanism (CDM). This particular subject has received considerable attention and criticism since Kyoto, but has also provided several observers and analysts focussing on the climate change debate with a great deal of promise. However, what was agreed to at Kyoto is little more than a concept, on which considerable work and consensus would be required if the CDM is really to deliver as an active mechanism. The concept itself builds on a proposal that was put forward by Brazil, almost six months before the Kyoto Conference of the Parties, for a Clean Development Fund (CDF). However, the CDM differs substantially from what was intended and outlined in the Brazilian proposal.

The Brazilian proposal takes off from the emphasis provided to the polluter pays principle. It specifies that "the departure from the temperature increase ceiling allowed for an individual party, measured in terms of the induced change in climate be used as a quantitative basis for establishing a contribution to a non Annex-I Clean Development Fund to be managed by the financial mechanism of the Convention for the promotion of precautionary measures in non Annex-I Parties". The Brazilian proposal also allowed for trading among Annex-I Parties such that any single party that exceeds

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The Clean Development Mechanism *(continued from page 17)*

its temperature ceiling over a specific period can compensate it by purchasing, at a market value, an equivalent temperature credit from another Annex-I Party that induced a temperature increase lower than its temperature ceiling. The proposal further specified that the financial resources of the CDF were to be directed preferentially to the non Annex-I Parties that have a larger relative contribution to climate change. Implied in this was the expectation that the larger developing countries would be able to implement projects that would essentially be financed through this fund. There was also a provision for non Annex-I countries applying for funds to implement mitigation projects on a voluntary basis. Still another provision, which in fact, has been retained in the Kyoto protocol relates to the use of financial resources for climate change adaptation programmes, but this was seen as not a very large window, because as the proposal stated, only a small portion of the resources would be assigned to such activities.

The key provisions of the Brazilian proposal for a CDF were to ensure that, in essence, penalties for non compliance with agreed targets for reduction of GHG emissions by Annex-I Parties would be the major source of financing for this fund. Other provisions essentially included the possibility of emissions trading among Annex-I countries using the resources of the fund and a minor activity with respect to adaptation measures financed by the fund, presumably in the worst affected states, such as the small island states.

The CDM agreed on at Kyoto is also designed to assist non Annex-I Parties, but has some built-in contradictions. It broadens the scope of the CDM to helping non Annex-I Parties achieve sustainable development and in contributing to the ultimate objective of the Convention. This is clearly stated in Article 12 para 2. Yet, under Para 3a the concept of sustainable development is restricted by stating that Parties not included in Annex-I will benefit from project activities resulting in certified emissions reductions. This restricts the interpretation of sustainable development to a narrower focus. Para 3b relates to Annex-I Parties and states that they may use the certified emissions agreed from such project activities to contribute to compliance with part of their quantified emission limitation and reduction commitments under Article 3. No mention has been made of any limits to the share of quantified emission limitations allowable under the CDM. Undoubtedly, this would be a subject of some debate, and a clear resolution of this issue could take considerable time of the negotiators. Para 4 under Article 12 specifies the governance of the CDM by stating that this would be under the authority and guidance of the COP serving as the Meeting of the Parties (MOP) to the Protocol. Para 5 mentions that emissions from each project actively shall be certified by operational entities to the designated by the COP serving as the MOP, on the basis of:

a) Voluntary participation approved by each Party involved;
b) Real, measurable, and long term benefits related to the mitigation of climate change and;
c) Reductions in emissions that are additional to any that would occur in the absence of the certified project activity.

It is obvious from this paragraph that not only would the identification of "operational entities" authorized to certify emission reductions take some effort, but even the methodology and approach by which such certification takes place would have to be developed. Clearly, it would perhaps make the Climate Change Secretariat much too large and top heavy if these entities were to be part of the Secretariat itself. What would be a far more effective and workable approach should involve institutions that the Secretariat could carefully select and empower with this responsibility, preferably on a regional basis. The other issue that arises from this provision is one relating to the diversity of projects that could be eligible for certification. A project dealing with forestry activities for instance, would require expertise and methodologies for certification different from, for instance, an energy efficiency project in a textile factory. Considerable scientific and technical work will have to be done for taking care of these requirements.

The timing of CDM and its effectiveness are also issues that need to be considered in some detail. The modalities and procedures for implementation of CDM are to be elaborated at the first Meeting of the Parties to the Protocol, which could very well not happen before the year 2003 to 2004, on the assumption that the protocol receives adequate ratification by the requisite number of Parties by then. As such, there could be a risk that some emission reductions from projects completed after the year 2000 may not be allowed if they do not conform to the requirements that are approved at the First Meeting of the Parties to the Protocol. The fear that such claims and liabilities could very well be disapproved could result in some Parties being discouraged from taking any action on joint implementation projects. However, overall, CDM does provide opportunities for carrying ahead the implementation of mitigation measures with participation of both Annex-I as well as non Annex-I Parties. The key, however, would lie in being able to devise institutional arrangements and measures that would create confidence among all groups of countries, such that they take advantage of the CDM opportunity in fullest measure.

Overall, the CDM, if it is structured globally, can provide an opportunity whereby developing countries could implement projects for mitigation of GHG emissions in a manner that creates a win-win situation for both Annex-I as well as non Annex-I countries. However, the full involvement of the developing countries can only come about if a greater degree of confidence is created by actions that the developed countries have to take with some urgency. Considerable damage has been done by completely ignoring the Berlin Mandate which clearly required no further commitments on the part of the developing countries and by raising demands for "meaningful participation" by them even before a protocol could be agreed on at Kyoto. Arguments now being put forward are harping on the fact that the worst impacts of climate change would be felt by the developing countries, and hence, they should come on board and implement rigorous measures to limit their own emissions. This line of thinking may not work, simply because while the Second Assessment Report of the IPCC does show that the developing countries would suffer much greater losses in relation to economic output than the developed countries, the science behind this is still very uncertain.

It would be wrong for any group of countries to believe that there are real winners and losers in the area of climate change impacts. Many surprises may be in store as the science unfolds in the Third Assessment Report and beyond.

Secondly, as mentioned above, the developing countries are taking several measures that help in mitigating global climate change, but these are understandably being taken for entirely national or local reasons. If the CDM is structured properly and functions in a manner that creates all-around confidence, these national initiatives in the largest developing countries would be enhanced considerably through joint implementation projects processed under the CDM. One hopes that the debate in the next COP in Buenos Aires is not made any more contentious than it already is through insistence on the "meaningful participation" bit. The developing countries are already participating far more meaningfully than some developed countries who cannot possibly earn the respect of the global community by using economic and political power and subjecting the poorest countries in the world into submission. Surely this cannot happen in a world moving into the 21st century.

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The Potential for Use of Modern Asset Pricing Methods for Upstream Petroleum Project Evaluation

Guest Editor David Laughton *(University of Alberta)*

Written by a coalition of scholars and active industry consultants, this edition of the Journal describes the latest developments in modern asset pricing (MAP) for use in upstream petroleum project evaluation. MAP was initially developed for application in derivative securities markets, where it is now widely used. The importance of this was recognized by the award of the 1997 Nobel Price in Economics. When applied to project evaluation, MAP offers an alternative that mitigates many of the problems that organizations face when they depend on traditional discounted cash-flow (DCF) methods for financial analysis.

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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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BIEE Conference Report *(continued from page 21)*

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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New Shape Of Things: From Regional Utilities To National Energy Companies

*By Perry Sioshansi**

The introduction of competition in the wholesale, and increasingly retail, electricity markets brings major challenges to the traditional way of doing business. While the status quo will remain in place for the poles and wires segment of the industry, the same cannot be said about generation or energy retailing. This brings a great deal of anxiety to the hearts of many within the industry who are struggling to reinvent themselves into whatever will be profitable and sustainable in the future. The problem is, nobody knows for certain what will be profitable, and what the critical assets, skills, and core competencies for success will be in the new environment.

However, a few major players are moving along, with an abundance of confidence (and usually abundant cash) that they know how to succeed in the restructured energy markets of the new millennium. It is too early to say if their strategies will lead to profitability in the post-restructured markets, but at least they are not sitting idle. Moreover, the options available to these well-endowed players are not generally available to the smaller, less imaginative players.

One of the companies redefining what the future energy business in the United States may be like is PG&E Energy Corp. It has all the necessary ingredients for being a major player. With over $30 billion of assets, it has the clout and resources to emerge as a dominant player. Its chairman, president and CEO, Robert Glynn Jr., is proactive and driven. It already is active in one way or another in 28 states, in anything it can get its hands on: generation in the Northeast, natural gas pipelines in Texas, and natural gas holdings in the Pacific Northwest, to name a few.

Mr. Glynn has chartered a course for where he wants to lead PG&E Corp. In a special issue of the San Francisco Chronicle (March 22, 1998), he made a simple observation – perhaps the most obvious first step for any *traditional* utility, namely the acceptance of the fact that the status quo is no longer an option. Mr. Glynn said, "an energy company either has to get into the new business world or will likely disappear as the industry consolidates over time." Many analysts expect a major consolidation and industry shakeout over the next several years, leaving perhaps as few as 20 dominant mega players with national presence across the country.

How will PG&E Corp. make certain that it is not one of

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PG&E Corp.
Parent Company
Based in San Francisco, CA

PG&E	PG&E Energy Services	PG&E Energy Trading	PG&E Gas Transmission	US Generating Company
Regulated Subsidiary	Unregulated Subsidiary	Unregulated Subsidiary	Unregulated Subsidiary	Unregulated Subsidiary
Based in San Francisco, CA	Based in San Francisco, CA	Based in Houston, TX	Based in Houston, TX	Based in Bethesda, MD
The old PG&E minus most of fossil-fueled generating plants. Subject to CPUC regulations.	New energy service company competing with retailers & ESCOs in CA and elsewhere.	New wholesale energy company trading in electricity and natural gas.	New gas transmission company with 10,000 miles of natural gas pipeline, 7 Bcf of natural gas storage & 9 gas processing plants.	Has been in operation for several years, major growth in the last 2 years. Maintain & operate fossil plants nationwide.
Primary Business	**Primary Business**	**Primary Business**	**Primary Business**	**Primary Business**
Maintain & service poles, wires & pipes, transmission lines and provide retailing & service for customers who do not switch suppliers.	Provide energy services in competition with retailers and ESCOs nationwide.	Trading in wholesale electric & gas, providing risk management and other services to other divisions of PG&E Corp. and others.	Transmission, supply, distribution, and storage of natural gas nationwide.	Own & operate generation facilities in major regional markets, including Northeast and possibly elsewhere.

An examination of the chart points out a few other significant things – not just about PG&E Energy Corp., but where the industry as a whole may be heading. To be successful as a major integrated energy service company with national presence in the future, one needs to invest beyond the traditional utility business. If all goes according to the script, the five divisions can buy, sell, and trade with each other in ways that may be hard for other, smaller players to match. New synergies may evolve between the subsidiaries that would save time and money. Not every utility, of course, has the will and the resources to do what PG&E is trying to do. Mr. Glynn is philosophical about the changes in the industry. He told the Chronicle, "to put the coming change in perspective, consider that the natural gas and electricity industry is roughly the same size as the nation's long-distance telephone market, plus the domestic airline market, plus the computer software market."

Jane Carter Prize Awarded

The essays submitted for the 1996-97 award of the *Jane Carter Essay Prize* were judged anonymously by Gordon MacKerron, Chairman of the British Institute of Energy Economics; David Jones, past Chairman of the BIEE and Dick Tinson, Director of the National Energy Foundation, acting for the Association for the Conservation of Energy. The judges commented as follows:

"A number of interesting essays were submitted, one stood out - *Implementation of the Home Energy Conservation Act. A Review of Progress and Proposals for Facilitation.* This is a well structured report on an interesting piece of original research into the reports and bids made under the Act which came into force in England on 1 April 1996. Although some aspects of the essay might have been more fully developed, it is, in general, knowledgeable and professional and makes a range of useful policy proposals It is in a tradition of which Jane Carter would have approved and we recommend that it should be awarded the Jane Carter Prize for 1996-97."

The prize-winning essay was written by Emma Jones, being an abridged form of her Msc thesis submitted as part of her Msc in Environmental Technology, undertaken at Imperial College.

The BIEE, IAEE and ACE have decided that the *Jane Carter Essay Prize* should, in the future, be awarded every two years. The next prize competition will be in 1999. The invitation to submit essays will be issued later in 1998.

Environmental/Water/Energy Economist Central Asian Republics

The Harvard Institute for International Development seeks an economist with expertise in water and/or energy resources to serve as a resident policy advisor in the Central Asian Republics. The position begins in early summer, 1998 and is located in Almaty, Kazakhstan. It is funded under a contract with the U.S. Agency for International Development.

Required education, experience, and skills: Advanced degree in economics, public policy, or related field. Ph.D. with focus on environmental, water, or energy economics strongly preferred. Minimum three years' experience as an advisor on economic development or environmental, water, or energy policy issues in transition or developing countries. Experience in the former Soviet Union or Eastern Europe and proficiency in Russian highly desirable.

Duties and responsibilities: Assists national, regional, and local governments in the Central Asian Republics in formulating and implementing policies, laws, and regulations that integrate economic development and environmental protection, particularly in the areas of water and energy resource management. Manages activities under workplan, conducts policy analysis and supporting research, coordinates local working groups, organizes and leads workshops, and recruits consultants. Ensures recommendations are appropriate in the national and international context. Coordinates activities with other organizations and USAID projects. Frequent travel within Central Asia required.

Contact: Human Resources Office, Harvard Institute for International Development, 14 Story Street, Cambridge, MA 02138 USA, fax (617) 495-0527.

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It might not be possible to ignore it indefinitely in Europe and North America.

- Government policies and measures should work with the market - a recurrent theme but what does it mean? As was pointed out, the removal of market distortions alone is not sufficient to promote efficiency in the use of energy and the introduction of innovative technologies like renewable energies. Government action is needed to counterbalance those aspects of market structure which work against environmentally friendly developments.
- It will be necessary to find ways of involving the developing countries in global measures to mitigate climate change. This will require a sensitive approach which recognizes that the priorities of these countries are economic development and the alleviation of poverty and which builds on the synergies between solutions to local, national and global environmental problems. It was encouraging that the need for this sensitive approach was recognized by speeches from EU and other governments and from business. It is to be hoped that political pressures in the United States will not prevent the U.S. government showing similar sensitivity.
- The flexibility mechanisms of the Protocol were an essential part of the political compromise reached at Kyoto. They offer prospects of mitigating climate change in the most cost effective way and of a transfer of resources and technologies to the developing countries but they also constitute a potential loophole which could undermine the Protocol. The detailed rules to be negotiated must close the loopholes while retaining the advantages of flexibility and political support for the Protocol.
- The policies being developed at both the global and national level post Kyoto cannot be considered in isolation from the wider context. Emissions trading raises a whole set of issues about the distribution and transfer of wealth between the developed and the developing countries. National policies for the promotion of energy efficiency and renewable energies have to be coordinated with social, agricultural, transport and land use policies. It was encouraging to hear how the IPCC plans to broaden its analysis into the social and economic fields.
- Implementation of Kyoto and further development of policy requires more and better data and analysis and consistency of data between countries.
- Business has an important part to play. The attitude of the business speakers at the conference was positive. How far is this typical of business as a whole? Examples were given of changing attitudes particularly in large business but it was disturbing that, as several speakers pointed out, at the Davos Economic Forum a meeting on climate change attracted a derisory audience.

Resolution of these and other issues will require much effort combined with political realism and sensitivity on the part of governments, business, NGOs and the wider environmental community. Above all, it will require clear and fresh thinking. In the words of Einstein quoted by one speaker, "the problems we have today cannot be solved by thinking the way we thought when we created them."

David Jones

The Energy Sector: Towards New Scenarios/ Dimensions

*By Edgardo Curcio**

The energy sector is passing through significant changes more and more linked to environmental problems. Market liberalisation is one of the main features of the energy policies of industrialised countries as well as of developing countries that are adapting their markets to global rules.

The development of new technologies and lower production costs from the North Sea are determining a new scenario for mining investments.

Another change is represented by the new structure of the former USSR that offered Caspian Republics the opportunity to set forth independent policies regarding their considerable oil and natural gas resources.

Great changes are in progress as far as the OPEC countries' attitude towards the adoption of policies not purely "political" are concerned. Despite the apparent progress and exceptional economic growth connected to unilateral decisions on prices, producing countries have realised the narrowness of such policy. Oil companies of these countries developed new downstream strategies (refining and distribution) through an integration process with the economies of consuming countries.

The increased number of operators from producing countries marketing to consuming countries, including the Europeans, offer the prospect of a more reliable supply relationship to countries that are the most dependent on oil imports.

Even the Gulf crisis showed that the move towards downstream integration of countries such as Saudi Arabia, Kuwait, Venezuela, Mexico and Libya is well-grounded and their policies are no longer based on the simple control of mineral resources, but on a more complex strategy to protect the role played by oil.

Europe's trend towards liberalisation is increasing more and more: in the framework of large offerings and favourable conditions for buyers, the energy business is opening again to private initiatives which have bought shares of public, privatised companies or undertaken new projects.

The United Kingdom played a key role in public company privatisation as well as in market liberalisation.

In other countries, privatisation was more gradual: first of all, through the opening of private investments of public-controlled companies and/or the change of public bodies into private ones.

The liberalisation process of European energy markets was undertaken not only by national governments; the European Commission played and keeps playing a fundamental role even after the coming into force of the European Union's Treaty, signed in Maastricht on February 2nd, 1992.

Many initiatives are being promoted to harmonise the various realities, e.g., the fiscal system, standards, price transparency, the adoption of directives on specific markets characterised by poor competition such as electricity and natural gas.

The harmonisation of these two sectors will take place in the next few years with the adoption of the electric and gas directives (respectively, on December 1996 and December 1997), based on progressive systems involving the reduction of thresholds for eligible customers and/or increasing the percentages of market opening.

In particular the gas directive provides for a market opening based on a progressive system involving the reduction of the thresholds for eligible customers and increasing of the percentages of market opening (20% as the directive comes into force, 28% after 5 years, 33% after to 10 years) (art. 18).

On the critical issue of take or pay contracts, the directive provides for a system of derogations by governments or national independent bodies in close consultation with the Commission (art. 25).

Finally, on the matter of temporary derogations for emerging regions an agreement was reached (art. 26).

The differences between national markets did not facilitate the search for a compromise.

On one side, North Sea discoveries and the coming on stream of a series of fields not far from the coasts of Great Britain and other North European countries, in addition to solving energy dependency problems there, created, in that area, the best conditions for the development of competition in sectors that spread from upstream operations to thermoelectric production, to industry, and civil uses markets.

Most of the areas of Southern Europe have kept long term contracts for gas supply with producing countries that are not members of the European Union. This represents a structural peculiarity that is likely to affect gas market growth in the framework of the forthcoming adoption of the above directive.

The transition of the Italian market represents a very interesting case.

This has led to the revision of the traditional institutional set-up with the dismantling of many of the energy sector's policy and control structures to the privatisation of public owned companies, i.e., the transformation into shareholding companies open to a wide range of investors of the bodies which had operated with various responsibilities until the 1980s.

Up to 1998, Italy focused on a planning policy, but once the Energy Plan was approved for 1998, it was absolutely clear that the creation of a new structure of the energy market could not be postponed.

Even the development of the hydrocarbons sector has been significant due to the removal of exclusive rights of ENI in Valle Padana for hydrocarbons production and transportation, the abolition of ENI's right of first refusal with respect to the purchase of natural gas produced offshore Italy, and the implementation of a third party access system for the domestic transportation of natural gas. According to Law no. 474 on July 30, 1994 (the "Privatisation Law") November 1995 brought the placement on the market of a first *tranche* of shares (15% of stock capital) of the oil and gas company ENI, whose structure had been changed into a shareholding company earlier. In November 1996 and June 1997 two other *tranches* were sold for a total of 49% of the company shares.

As for the structure of the electrical sector and the terms of ENEL's shares placement on the market - both being respectively connected - many issues seem to be still unsolved.

Although no definitive approach has been adopted, the

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In today's economy you need to keep up-to-date on energy policy and developments. To be ahead of the others, you need timely, relevant material on current energy thought and comment, on data, trends and key policy issues. You need a network of professional individuals that specialize in the field of energy economics so that you may have access to their valuable ideas, opinions and services. Membership in the IAEE does just this, keeps you abreast of current energy related issues and broadens your professional outlook.

The IAEE currently meets the professional needs of over 3300 energy economists in many areas: private industry, non-profit and trade organizations, consulting, government and academe. Below is a listing of the publications and services the Association offers its membership.

- **Professional Journal:** The *Energy Journal* is the Association's distinguished quarterly publication published by the Energy Economics Education Foundation, the IAEE's educational affiliate. The journal contains articles on a wide range of energy economic issues, as well as book reviews, notes and special notices to members. Topics regularly addressed include the following:

Alternative Transportation Fuels	Hydrocarbons Issues
Conservation of Energy	International Energy Issues
Electricity and Coal	Markets for Crude Oil
Energy & Economic Development	Natural Gas Topics
Energy Management	Nuclear Power Issues
Energy Policy Issues	Renewable Energy Issues
Environmental Issues & Concerns	Forecasting Techniques

- **Newsletter:** The *IAEE Newsletter*, published four times a year, announces coming events, such as conferences and workshops; gives detail of IAEE international affiliate activities; and provides special reports and informationon an international basis. The newsletter also contains articles on a wide range of energy economics issues, as well as notes and special notices of interest to members.
- **Directory:** The Annual *Membership Directory* lists members around the world, their affiliation, areas of specialization, address and telephone/fax numbers. A most valuable networking resource.
- **Conferences:** IAEE Conferences attract delegates who represent some of the most influential government, corporate and academic energy decision-making institutions. Conference programs address critical issues of vital concern and importance to governments and industry and provide a forum where policy issues can be presented, considered and discussed at both formal sessions and informal social functions. Major conferences held each year include the North American Conference and the International Conference. IAEE members attend a reduced rates.
- **Proceedings:** IAEE Conferences generate valuable proceedings which are available to members at reduced rates.

To join the IAEE and avail yourself of our outstanding publications and services please clip and complete the application below and send it with your check, payable to the IAEE, in U.S. dollars, drawn on a U.S. bank to: International Association for Energy Economics, 28790 Chagrin Blvd., Suite 350, Cleveland, OH 44122. Phone: 216-464-5365.

Yes, I wish to become a member of the International Association for Energy Economics. My check for $60.00 is enclosed to cover regular individual membership for twelve months from the end of the month in which my payment is received. I understand that I will receive all of the above publications and announcements to all IAEE sponsored meetings.

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The Energy Sector: *(continued from page 28)*

attitude seems to be the separation between the various phases - production, long-distance transportation and distribution.

Particularly, the production phase has seen great initiatives on the industrial level through new Italian and foreign operators that will probably bring about considerable changes both industrially speaking and through the setting up of a more competitive market for big industrial users, eligible customers as set forth by the EU Electricity Directive adopted on December 1996.

New scenarios are also envisaged for the natural gas sector where the application of the European directive will undoubtedly facilitate a stronger activity of foreign and domestic operators.

As for prices, many changes took place: industrial prices of oil products, except for fiscal tariffs, are no longer fixed by public administration bodies, while the compliance with market rules and the control of opposing attitudes by the various operators have been assigned to the antitrust authorities.

Issues relating to electricity and natural gas prices are also marked by evolution, following Law 481 of 14 November 1995, establishing the Authority in charge of managing public services, of setting electricity and gas tariffs according to efficiency criteria for noneligible customers who will have the opportunity to choose their suppliers of electricity and natural gas on the EU market.

The objective of having a market with many competing companies, in which only the most advanced and those meeting customers requirements with respect to environmental rules will obtain greater market shares, is no longer a long shot.

Latvian Affiliate Has Busy Schedule

The Latvian Affiliate of IAEE has organized two workshops on DHS. Latvia, as other CEE countries, have so-called "SU type" DHS systems which work with considerable losses and low efficiency, resulting in excessive fuel consumption and high energy prices. In the first workshop, attention was focussed on heat pipeline grid reconstruction based on western technology. The second workshop discussed the possibility of small CHP installations as a way to improve DHS.

The affiliate has also taken part in the EFCEE study on *The Integration of the Central and Eastern European Countries in European Energy Economics* under Pieter Vander meiren. The *Country Analysis: Latvia* was completed in 1997. The latter touched on the problems of Latvia's integration in European energy economics and how to solve them. A special report on energy market liberalization in Latvia was presented at the December BIEE conference.

Victor Zebergs

GEE/IAEE European Conference on:

Energy Markets: What's New?

Berlin, September 9-10, 1998

Topics Include:

- How to define a new corporate strategy in a deregulated framework?
- How to cope with new environmental policies?
- How to take advantage of spot, options and futures?
- How to reduce CO_2 emissions through joint implementation?

Participants in this GEE/IAEE European Conference will have the opportunity to attend the 64th International Conference of the Applied Econometric Association on *Modeling Energy Markets* at a reduced fee. This conference will be held in Berlin on September 10-11, 1998, immediately following the GEE/IAEE European Conference. For more information contact Georg Erdmann at the above address/ fax.

For more information contact:

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Conference Chairman
Technical University TAB
D-10587 Berlin, Germany
Fax: +49-30-314-269-08
e-mail:erdmann@ensys1.fb10.tu-berlin.de

New Shape Of Things: *(continued from page 26)*

those disappearing into oblivion? For one thing, PG&E Corp. has reorganized its corporate structure into what may be a model for successful operations in the post-restructured market: five more-or-less autonomous divisions each focused on a new business area (see chart). Only one of these divisions will remain regulated and relatively risk-free (and, therefore, subject to a capped earnings potential). More importantly, as time goes on, the non-regulated divisions are expected to grow, perhaps to the point of dwarfing the regulated subsidiary – which is currently the country's largest investor-owned electric and gas combination utility.

* Perry Sioshansi is a Partner with Convector Consulting Inc. in Menlo Park, CA. He edits and publishes the *EEnergy Informer*, a monthly newsletter on the North American electric power industry. This is an edited version of an article which appeared in the April 1998 issue.

Publications

Electricity in South-East Asia. Price: $616.00. Contact: FT Energy Publishing, Maple House, 149 Tottenham Court Road, London W1P 9LL. Phone: 44-171-896-2241. Fax: 44-171-896-2275. E-mail: eninfo@pearson-pro.com

Electricity in South Asia. Price: $616.00. Contact: FT Energy Publishing, Maple House, 149 Tottenham Court Road, London W1P 9LL. Phone: 44-171-896-2241. Fax: 44-171-896-2275. E-mail: eninfo@pearson-pro.com

Independent Power Producers in Asia. Price: $650.00. Contact: FT Energy Asia Pacific, 159 Telok Ayer Street, Singapore 068614. Phone: 65-323-6373. Fax: 65-323-4725. E-mail: ppsing@singnet.com.sg

Environmental Modeling & Assessment. Price: $235.00. Contact: Baltzer Science Publishers, PO Box 37208, 1030 AE Amsterdam, The Netherlands. Phone: 31-20-6370061. Fax: 31-20-6323651. E-mail: publish@baltzer.nl

China's Role in Central Asian Oil and Gas Scene. Price: $8.00. Contact: Xiaojie Xu, Huayan Beili, #49-905, Chaoyang District, Beijing 100039, P.R. China. Phone: 86-10-6238 8219. E-mail: xiaojie@iname.com

Geopolitics of Oil and Gas in the New Century (in Chinese, 1998). Price: $480.00. Contact: Xiaojie Xu, Huayan Beili, #49-905, Chaoyang District, Beijing 100039, P.R. China. Phone: 86-10-6238 8219. E-mail: xiaojie@iname.com

Calendar

1-2 June 1998, Economic Restructuring: Paradigm Shift in the Asian Oil & Gas Insutry. Shangri-La Hotel, Kuala Lumpur. Contact: AOGC '98, Registration Desk, Level 34, Tower 1, PETRONAS Twin Towers, Persiaran KLCC, 50450 Kuala Lumpur, Malaysia, Phone: 603-5813654. Fax: 603-5811543.

8-11 June 1998, PQA '98 North America: Power Quality in a Competitive Advantage. Phoenix, AZ. Contact: Megan Boyd, EPRI, 3412 Hillview Avenue, Palo Alto, CA 94304. Phone: 650-855-7919. Fax: 650-855-2166. E-mail: mboyd@epri.com

8-11 June 1998, 9th Global Warming International Conference & Expo. Hong Kong University of Science & Technology. Contact: Dr. Sinyan Shen, Chair, International Program Committee, Global Warming International Center, PO Box 5275, Woodridge, IL 60517-0275. Phone: 630-910-1551. Fax: 630-910-1561.

11-12 June 1998, Selling Environmental Impaired Utility Real Estate Assets. Philadelphia, PA, USA. Contact: King Communications Group, Inc., 627 National Press Building, G-29, Washington, DC 20045. Phone: 202-662-9710. Fax: 202-662-9719. E-mail: kingcomm@kingpublishing.com

14-18 June 1998, National Energy Conference CNE'98: Energy for Tomorrow - Reconciliation of Efficiency and Competitiveness with the Sustainable Development. Neptun, Romania. Contact: Mrs. Ella Ratcu, CNE'98 General Secretariat, 8 Energeticienilor Blvd., 79619 Bucharest 3, Romania. Phone: 401-321-4465. Fax: 401-321-1010. E-mail: srai@mail.gsci.vsat.ro

15-26 June 1998, Fourth International Training Program on "Utility Regulation and Strategy." Gainesville, Florida. Contact: Public Utility Research Center, PO Box 117142, Matherly Hall 205, University of Florida, Gainesville, FL 32611. Phone: 352-392-6148. Fax: 352-392-7796. E-mail: purcecon@dale.cba.ufl.edu

17-19 June 1998, EPRI's 1998 Innovative Approaches to Electricity Pricing Conference: Pricing in the Competitive Business Environment. Washington, DC, USA. Contact: Ms. Lori Adams, EPRI, 3412 Hillview Avenue, Palo Alto, CA 94304-1395. Phone: 415-855-8763. Fax: 415-855-2041.

22-23 June 1998, Private Power in Central America. Miami, Florida, USA. Contact: Registration Dept. The Center for Business Intelligence, 500 W. Cummings Park, Ste 5100, Woburn, MA 01801. Phone: 781-939-2438. Fax: 781-929-2490. E-mail: registrar@cbinet.com

23-25 June 1998, E3 - Electricity and Energy Congress '98. Hotel Intercontinental, Berlin. Contact: ICBI, 8th Floor, 29 Bressenden Place, London SW1E 5DR. Phone: 44-171-915-5103. Fax: 44-171-915-5101.

24-25 June 1998, Gas in Central & Eastern Europe: Consumption and Transit. Kempinski Hotel Corvinus, Budapest. Contact: Business Seminars International, Ltd., Sussex House, High Street, Battle, East Sussex, TN33 OAL, England. Phone: 44-

(continued on page 32)

Calendar *(continued from page 31)*

171-490-3774. Fax: 44-1424-773334.

28-30 June 1998, 1998 CERI International Petrochemical Conference. Alberta, Canada. Contact: April Wright, CERI, Conference Division, Suite 150, 3512 - 33 Street, NW, Calgary, AB T2L 2A6, Canada. Phone: 403-282-1231. Fax: 403-289-2344. E-mail: ceri@ceri.ca

6-7 July 1998, European Electricity. Europa Inter-Continental Hotel, Brussels. Contact: Business Seminars International, Ltd., Sussex House, High Street, Battle, East Sussex, TN33 OAL, England. Phone: 44-171-490-3774. Fax: 44-1424-773334.

15-16 July 1998, South Asia LPG Markets. Sukhumvit, Bangkok. Contact: Ms. Sukita, Administrator, 5/7 Sala Daeng Road, Bangkok 10500. Phone: 662-266-7767-8. Fax: 662-237-2189. E-mail: BKKCMT@mozart.inet.co.th

9-10 September 1998, Energy Markets: What's New?. Berlin, Germany. Contact: Georg Erdmann, Conference Chairman, Technical University TA8, D-10587 Berlin, Germany. Fax: 49-30-314-269-08.

13-18 September 1998, 17th Congress of the World Energy Council. Houston, Texas. Contact: United States Energy Association, 1620 Eye Street, N.W., Suite 1000, Washington, DC 20006. Phone: 202-331-0415. Fax: 202-331-0418. (http://www.wec98congress.org)

4-8 October 1998, BioEnergy '98 Conference: Expanding Bioenergy Partnerships. Madison, Wisconsin, USA. Contact: Fred Kuzel, Council of Great Lakes Governors, 35 E. Wacker Dr., Ste. 1850, Chicago, IL 60601. Phone: 312-407-0177. E-mail: fkuzel@cglg.org

18-21 October 1998, USAEE/IAEE 19th North American Conference. "Technology's Critical Role in Energy & Environmental Markets." Albuquerque, New Mexico, USA. Contact: USAEE/IAEE Headquarters, 28790 Chagrin Blvd., Ste. 350, Cleveland, OH 44122. Phone: 216-464-2785. Fax: 216-464-2768. E-Mail: iaee@iaee.org URL: www.iaee.org

19 October 1998, SNS Energy Day 1998: Taxation of Energy in an Increasingly Interdependent World. Stockholm, Sweden. Contact: Susanne Rothschild-Lundin, SNS Energy, PO Box 5629, 114 86 Stockholm Sweden. Phone: 46-8-453-99-50. Fax: 46-8-20-50-41.

27-29 October 1998, Externalities in the Urban Transport: Assessing and Reducing the Impacts. Milan, Italy. Contact: Prof. Sandro Furlan. E-mail: evi@feem.it Web-site: www.feem.it

27-29 October 1998, Power Mart 1998: Conference & Exhibition. Houston Astrohall, Houston, TX. Contact: Pasha Publications, 13111 Northwest Fwy., Ste. 520, Houston, TX 77040. Fax: 713-460-9150.

9-11 November 1998, PQA '98 Southern Hemisphere: Power Quality in a Competitive Environment. Cape Town, South Africa. Contact: Marsha Grossman, EPRI, 3412 Hillview Avenue, Palo Alton, CA 94304. Phone: 650-855-2899. Fax: 650-855-8576. E-mail: mgrossma@epri.com

11-14 November 1998, EP China '98, 7th International Exhibition on Energy & Power. Beijing, PR China. Contact: Adsale Exhibition Services Ltd., 4/F Stanhope House, 734 King's Road, North Point, Hong Kong. Phone: 852-2811-8897. Fax: 852-2516-5024. E-mail: aes@adsaleexh.com

19-21 November 1998, 7th International Energy Conference and Exhibition - ENERGEX '98, Manama, Bahrain. Contact: Dr. W.E. Alnaser, Conference Secretariat, Dean, Scientific Research, University of Bahrain, PO Box 32038, Bahrain. Phone: 973-688381. Fax: 973-688396. E-mail: EA607@isa.cc.uob.bh

9-11 December 1998, Power-Gen '98. Orlando, Florida. Phone: 918-831-9160.

12-17 December 1998, 2nd International Non-Renewable Energy Sources Congress and Exhibition - INRESC '98. Tehran, Iran. Contact: URL: http://www.uic.edu/~mansoori/INRESC.98_html

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