

IA INTERNATIONAL ASSOCIATION FOR ENERGY ECONOMICS
EE *Newsletter*

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Third Quarter 1999

President's Message

I AM PLEASED to return to my work. I was unable to perform my duty as IAEE President for most of the first half of this year. This unfortunate incidence was the result of my ignorance of what is meant by lack of the rule of law and by lack of up-holding individual rights. I was in the receiving end of the deplorable phenomena. We, as analysts, know from history that any advancement in socio-economic development is predicated upon strong foundations of the rule of law, property rights and individual choice. I took these for granted, and that was the beginning of bitter lessons. The IAEE members from many parts of the world supported me and stayed with me during the five months of ordeal. I am truly grateful to you. I can write this President's message, albeit six months late, because of your belief in democracy and freedom.

I would like to thank Dennis O'Brien, past president, Charles Spierer, immediate past president and Peter Davies, president-elect. As you all know, they have done superb tasks for IAEE to manage unforeseen situations created by my absence.

The annual conference is most important for the IAEE. I am happy to report you that the 22nd International Conference in Rome was a huge success. Due to the excellent preparation by the Program Committee chaired by Vittorio D'Ermo, the sessions were composed of insightful and stimulating presentations and discussions. Global as well as regional issues were covered in a balanced framework throughout the entire conference. Edgardo Curcio, conference chair, provided leadership for the success of the conference which was the venue for intellectual and cultural encounters for specialists in energy economics and related disciplines. On behalf of our members, I deeply appreciate their dedication and contributions.

During the conference, the awards ceremonies were held. In every year since 1981, the IAEE has awarded an annual prize for outstanding contributions to the field of energy economics and its literature. Professor Colin Robinson, the University of Surrey, became the winner of the 1999 Outstanding Contribu-

tion to the Profession Award. He is an author of numerous books and pioneering papers in energy economics. Another award, the 1998 Best Paper Award was presented to Professor James Smith, Southern Methodist University. Our profession takes great pride in their contributions. The Scholarship Winners were also selected and certificates were given to two students, Tanja Rukavina and Djamila Amimer.

The scholarship program is an important vehicle to encourage young students for advanced studies in energy economics fields. This is an investment in our future profession, and the IAEE will continue to give strong support to the program.

The Energy Journal, under the editorship of Adonis Yatchew and Campbell Watkins, continues to push out the frontiers of our knowledge in economics of energy and environment. The latest special issue, *The Costs of the Kyoto Protocol: A Multi-Model Evaluation*, was "interesting and insightful" and "provide both focus and perspective" as mentioned by guest editors, John Weyant, Henry Jacoby, James Edmonds and Richard Richels, and Campbell Watkins. Considering the growing importance of interdependence between energy and climate change issues, I expect the demand for the special issue will be strong. We wish to give our thanks to Geoffrey Pearce, associate editor, for the hard work to make our Journal a success.

(continued on page 3)

Editor's Notes

This issue opens with a most insightful article by Brian Flannery presenting the Exxon case regarding global climate change. He argues that policy considerations in this area must be driven by sound science and analysis and presents some scientific data worthy of consideration while at the same time pointing out the areas lacking clear scientific understanding.

We're fortunate in having a number of articles from the International Conference in Rome in early June. Luciano Sgubini takes a long-term look at energy markets and presents the case

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!!! MARK YOUR CALENDARS — PLAN TO ATTEND !!!

The Structure of the Energy Industries: The Only Constant is Change

20th USAEE/IAEE Annual North American Conference – August 29 – September 1, 1999
Orlando, Florida, USA – Hilton at Walt Disney World Village

If you're concerned about the future of the energy industry and profession, this is one meeting you surely don't want to miss. The 20th USAEE/IAEE Annual North American Conference will detail current developments within the energy field so that you come away with a better sense of energy supply, demand and price. Some of the major conference themes and topics are as follows:

- Oil Industry Restructuring
- Electricity Restructuring
- The Climate Change Debate
- Global Gas & Power
- Natural Gas Markets in the New Century
- Alternative Fuel Vehicles
- The Global Economy and its Effect on the Energy Industry

Economic upheaval, globalization, privatization and regulatory reform are having significant impacts on energy markets throughout the world. All of the major energy industries are restructuring through mergers, acquisitions, unbundling and rebundling of energy and other services. This conference will provide a forum for discussion of the constantly changing structure of the energy industries, with insights into the causes and likely outcomes of the restructuring efforts that are now underway.

At this time, confirmed speakers include the following:

- J. Christopher Allen, Reliant Energy Wholesale Group
- Mark Bernstein, RAND Corporation
- Robert Campbell, Chairman & CEO, Sunoco, Inc.
- Herman Fransenn, Petroleum Economics Limited
- William W. Hogan, Harvard University
- John Jurewitz, Southern California Edison Company
- Ram Khatti, Valero
- Michael C. Lynch, MIT
- Knut Anton Mork, Svenska Handelsbanken
- Matt Simmons, Simmons & Company
- Ronald Sutherland, American Petroleum Institute
- Barbara Laflin Treat, Bechtel Corporation
- Brad Bates, Ford Motor Company
- Stephen P. Brown, Federal Reserve Bank of Dallas
- Tom Cackette, California Air Resources Board
- Joe Foster, Newfield Exploration
- Karl Georg Jechoutek, World Bank
- Jim Katzer, Mobil Oil
- Prakash Loungani, IMF
- Terrance McGill, Columbia Gulf Transmission Company
- Adam Sieminski, BT Alex Brown, Inc.
- Kyle Simpson, Morgan Meguire, LLC
- Michael L. Telson, CFO, U.S. Department of Energy
- Scott Woronuk, TransCanada Energy

A special added feature of this year's conference is designed to contribute to our understanding of the technical underpinnings of energy markets. On Sunday, August 29, the conference will offer two one-hour tutorials – one entitled "Petroleum Refining for the Non-technical Person" presented by William Leffler (Shell Oil Company) and a second on "The Basics of Electricity" by Stephen Connors (MIT). The closing session is entitled "Looking Ahead by Looking Back." We have brought together three energy industry wise men, John Boatwright, Laney Littlejohn and Onnic Marashian to evaluate current energy market developments against the backdrop of their combined experience in the energy industries.

In addition, 25 concurrent sessions are planned to address timely topics that affect all of us specializing in the field of energy economics. Sessions under development or consideration include:

- Modeling Competitive Electricity Markets
- Doing Energy Business in the Information Age: Removing the Barriers
- Energy Reform in Transition Economies
- Oil Supply Outlook: International Projections
- Evolving U.S. Natural Gas Markets
- Latin American Deregulation
- Globalization of the Electricity Industry
- Energy Modeling: Past, Present and Future
- Market Power in the Transmission Industries – (NG & Electricity)
- Environmental Analysis and Regulation
- U.S. Oil Policy
- The Outlook for Coal and Nuclear Power
- Environmental Issues in the Developing World
- Convergence in the Utility Industries
- Global Change: Economic and Energy Policy Implications
- Energy Efficiency in a Glutted Market
- A New OPEC?
- Distributed Generation

Though the abstract cut-off date has passed, if you still desire to present a paper in a concurrent session, please contact Dave Williams (iaee@iaee.org) to see if there are any available spots still left in the program that may fit your area of energy expertise.

The 20th USAEE/IAEE Annual North American Conference provides a unique opportunity for leading experts from business, government, universities, and research institutions to discuss and debate the future of energy markets in this era of commodization, decentralization, and internationalization. The meeting will emphasize the applicability of the most recent, cutting-edge analysis for helping private and public organizations frame decisions and choose appropriate strategies.

Orlando, Florida is a wonderful and scenic/tourist place to meet. Single nights at the Hilton Hotel are \$139.00 (contact the Hilton Hotel at 407-827-4000, to make your reservations). Conference registration fees are \$475.00 for USAEE/IAEE members and \$575.00 for non-members. Special airfares have been arranged through Continental Airlines. Please contact Continental by calling 281-821-9549 and reference our discount code "IMBGHT." These prices make it affordable for you to attend a conference that will keep you abreast of the issues that are now being addressed on the energy frontier.

There are many ways you and your organization may become involved with this important conference. You may wish to attend for your own professional benefit, your company may wish to become a sponsor or exhibitor at the meeting whereby it would receive broad recognition or you may wish to be considered as a presenter at the meeting. For further information on these opportunities, please fill out the form below and return to USAEE/IAEE Headquarters.

The Structure of the Energy Industries: The Only Constant is Change

20th Annual North American Conference of the USAEE/IAEE

Please send me further information on the subject checked below regarding the August 29 – September 1, 1999 USAEE/IAEE Conference.

Registration Information
 Sponsorship Information
 Exhibit Information
 Speaker Information

NAME: _____ TITLE _____
COMPANY: _____
ADDRESS: _____
CITY, STATE, MAIL CODE: _____
COUNTRY: _____ PHONE/FAX: _____

USAEE/IAEE Conference Headquarters
28790 Chagrin Blvd., Suite 350 • Cleveland, OH 44122 USA
Phone: 216-464-2785 Fax: 216-464-2768

President's Message (continued from page 1)

Sydney will host the 2000 International Conference. Anthony Owen, the University of New South Wales, is preparing the program in cooperation with Michelle Foss, the IAEE Vice President for Conferences. We have high expectations for this meeting. Your input and participation is valuable. Give your insights and ideas to Anthony Owen and Michelle Foss. And mark your calendar for 7-10 June 2000. For the North American conference this year, Michael Lynch has prepared an excellent program for late August in Orlando, Florida. We expect good attendance.

The IAEE grows stronger every year. Our secretariat under the leadership of David Williams is efficient and effective. The IAEE will try to raise the profile of our professions through wider and deeper diffusion of knowledge in our fields. I welcome your suggestions as to how the IAEE can be more effective in achieving its goals and serving you.

Hoesung Lee

Editor's Notes (continued from page 1)

for cooperation among all participants for the benefit of consumers and producers alike.

Next, Ian Miller discusses the role of information technology in energy markets in the coming millennium, noting that as an industry, energy companies are lagging well behind some of their counterparts in other leading industries. He suggests that energy companies ignore IT at their peril.

Mohamed Yousef looks at the Mediterranean oil markets and, after delineating them, describes the effects on the various parts of it by the restructuring occurring in the international oil industry.

Finally, coming out of the International Meeting is a article by Andrea Ketoff describing the oil and gas industries in Italy.

And, last by not least, one of our stalwart contributors, Perry Shioshansi, reports on developments in the UK's competitive residential electricity markets, noting that while consumers will see some savings, it probably is more likely to be on the order of 10% than the 20% seen in the case of natural gas.

Mike Lynch will be joining us for the next several issues

as Guest Editor. He writes:

The IAEE is always seeking to expand its services, and one thing that seemed appropriate was provision of material which is more timely and policy-oriented than The Energy Journal, which is, after all, an academic journal. In Rome, the IAEE Council decided to expand the IAEE newsletter and to try to increase its coverage and utility.

I will be acting as editor, and the primary plans are to try to include broad coverage of specific issues in each newsletter. Authors will represent the membership (and others) as broadly as possible, in an effort to show the many perspectives that are out there. Topics to be covered in coming issues include global warming and the Kyoto Agreement (next issue), the status of deregulation, the role of technology in the energy industry, and the status of the resource debate. (All subject to change.) As in the past, submitted articles will receive due consideration.

A number of other suggestions have been made, including a section on feedback which will allow debates about specific issues to be continued instead of dropped. I will try to arrange for this to be done on the internet, for ease of communication, and then publish the best and/or most representative comments in the newsletter. Suggestions for possible features in the newsletter can be sent to me at wilfrid@mit.edu, or my address in the IAEE directory.

DLW

Future IAEE Events

- August 29-September 1, 1999 20th Annual USAEE/IAEE North American Conference Orlando, Florida, USA *Hilton at Walt Disney World Village*
- September 20-21, 1999 BIEE Energy Conference St. John's College, Oxford, England
- September 30-October 1, 1999 1999 European Conference Paris, France
- June 7-10, 2000 23rd IAEE International Conference Sydney Australia *Sydney Hilton*
- September 24-27, 2000 21st Annual USAEE/IAEE North American Conference Philadelphia, PA *Wyndham Franklin Plaza Hotel*

**Conference Proceedings
22nd IAEE International Conference
Rome, Italy June 9-12, 1999**

The Proceedings from the 22nd International Conference of the IAEE held in Rome Italy, are now available from IAEE Headquarters. Entitled *New Equilibria in the Energy Markets: The Role of New Regions and Areas*, the proceedings are available to members for \$99.95 and to nonmembers for \$119.95 (includes postage). Payment must be made in U.S. dollars with checks drawn on U.S. banks. To order copies, please complete the form below and mail together with your check to: Order Department, IAEE Headquarters, 28790 Chagrin Blvd., Suite 350 Cleveland, OH 44122, USA

Name _____
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Please send me _____ copies @ \$99.95 each (member rate) \$119.95 each (nonmember rate).
Total enclosed \$ _____ Check must be in U.S. dollars and drawn on a U.S. bank, payable to IAEE.

Global Climate Change

By Brian P. Flannery*

I'd like to discuss an environmental, social and economic issue that is surely one of the most important of our time—global climate change. The debate over climate change involves many players with different perspectives and objectives. By and large the media and advocates treat climate change strictly as an environmental issue. They fail to acknowledge the significant trade-offs and social costs required to address the issue. Increasingly, they seek to dismiss the views of those who point out the very real difficulties of proposals such as the Kyoto Protocol.

Of course, all of us are touched by news coverage of natural disasters like floods and hurricanes, and the loss of life, property, and livelihood they can cause. Some would like you to believe these events are evidence of global warming. Others say it's *just like what we can expect* from global warming. They know some listeners will conclude that warming caused the current problem while others will become concerned that future generations will experience more frequent severe events.

Good Advocacy. It goes straight to the heart. Bad Science. The facts aren't there.

But perhaps there is a chance humans may be changing the climate, so shouldn't we be doing something now? Science may never know all the answers... or maybe it will be too late to act when we do? We all want to be environmentally and socially responsible in the way we live... for ourselves and for future generations.

I'd like to address the science and economics of the Kyoto Protocol to put this issue into perspective, and to describe Exxon's position and our actions. In a nutshell, there are underlying concerns about human influence on climate, but also many gaps and uncertainties in the science. Taken as a whole, this suggests we should go forward with care, taking preventive steps that make economic sense while we learn more. It also means we should reject premature international initiatives like the Kyoto Protocol, which have the potential to cause economic harm for most nations, severely impacting some, while doing very little to influence the climate.

What should we be doing now? Let me use Exxon as an example. We have redoubled our own efforts in energy conservation. Cooperative programs are under way with auto companies and others to increase substantially the efficiency of fossil fuel powered vehicles. We also support scientific and technology assessment initiatives and promote active public discussion and debate.

As scientific understanding progresses, we must respond accordingly, but we shouldn't prejudge the outcome now by setting unworkable, legally binding targets and timetables.

Let's start by looking at the science. The essential question is whether the use of fossil fuels—oil, natural gas and coal, will cause the earth's climate to change in ways that present a danger to its inhabitants.

Vostok Ice Core

Earth's climate is affected by many complex variables, such as sunlight, clouds, orbital variations, ocean circulation,

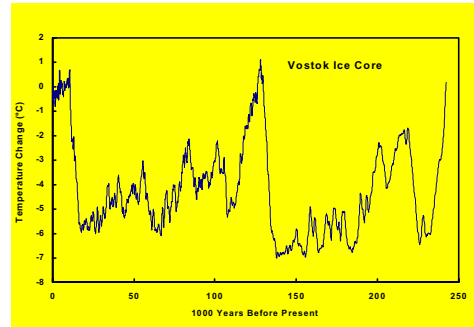
* Brian P. Flannery is Manager, Science & Strategy Development, Exxon Corporation. This is an edited version of a series of speeches given to the European affiliates of Exxon Corporation.

ice, and volcanoes. Climate has fluctuated between periods of cooling and periods of warming. Some of those changes lasted hundreds of years, others hundreds of thousands.

One way scientists can determine temperatures from the distant past is through analysis of cores taken from large, thick and ancient ice masses. Figure 1 shows the substantial fluctuations in temperature over a 250,000-year period indicated by the Vostok ice core in Antarctica.

Figure 1

NATURAL CLIMATE VARIABILITY



- Significant natural variability
- Cannot be explained with current models

More recently, over the past century, there has been a slight warming trend — about one-half degree Centigrade — in surface temperatures. The key questions are whether the use of fossil fuels is contributing to this warming and whether continued warming would be good or bad. On both counts the answer is: we don't know.

Greenhouse Effect

To understand the science behind this issue, we need to talk about a natural phenomenon known as the “greenhouse effect.” See Figure 2.

Figure 2

GREENHOUSE EFFECT

- The balance between solar and IR energy drives Climate system which controls Weather
- Greenhouse gases (GHGs) promote IR energy absorption
- Concern... Increases in GHGs could change “natural” climate system with negative consequences

The earth is warmed by heat from the sun. Nature ensures that the incoming heat is balanced by infrared (ir) radiation flowing back to space.

Some of that heat is trapped by what are called “greenhouse gases,” such as water vapor, carbon dioxide and methane. Without the greenhouse effect Earth would be too cold to sustain life.

Fossil fuels enter the picture because concentrations of CO₂ (and other greenhouse gases) have been increasing in the atmosphere since the 1800s. Concern arises that this accumulation will lead to global warming and climate change with

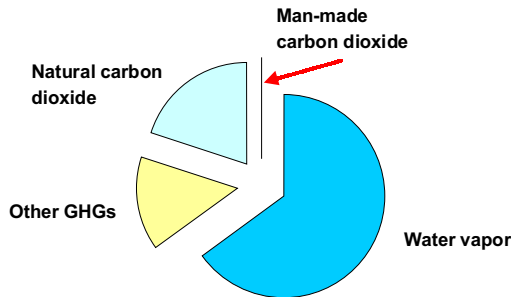
negative consequences for people and ecosystems.

Greenhouse Gasses

Figure 3 shows the relative contribution of various gasses to the present greenhouse effect. Water vapor—or water in the form of a gas, is the predominant greenhouse gas and accounts for about two-thirds of the greenhouse effect.

Figure 3

GREENHOUSE GASSES



Other greenhouse gases, including natural carbon dioxide—or CO_2 , make up most of the rest. The very small sliver on this chart represents the effect of increases in carbon dioxide over the past 150 years, about 0.6% (1.4 out of 240 watts per square meter of radiation.)

Surface Temperature

The buildup of greenhouse gasses has been underway for over a century. So, it is reasonable to ask whether we have detected any warming yet. Figure 4 shows changes in *global average surface temperature*. The most obvious feature is the large year to year variability. This natural “climate noise” arises in part from volcanic eruptions and changes in oceanic upwelling (such as El Niño), and in part from random natural fluctuations. Contrary to what you may believe from media accounts, these observations still do *not* confirm that human activities have led to any global warming.

Figure 4

Warming amounts to about 0.5 °C over the last 140 years. *This increase is entirely within the range of natural variability.* The pattern does not agree with trends in greenhouse gasses. Much of the rise in temperature over the past century

occurred before 1940, but most of the increase in the use of fossil fuels occurred after World War II.

Studies of the warming that would have to occur to confirm “detection” conclude that it will be at least a decade before projected warming would exceed natural variability, *even if models were correct.*

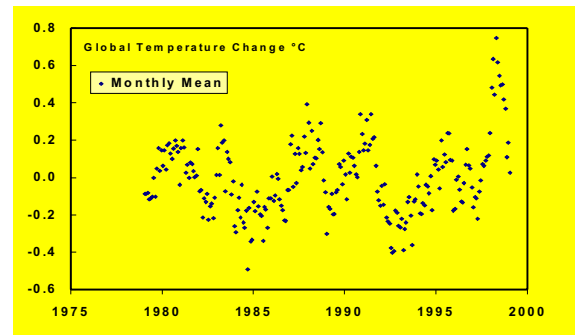
Land-based measurements show several years of record temperature during the 1990s, and 1998 was by far the warmest year on record. Scientists agree that a powerful El Niño had a large influence on warming. However, it remains unclear how El Niño, a natural warming of the tropical eastern Pacific, would be affected by global warming.

Satellite Temperature

Satellite measurements of global average temperature (Figure 5) show little evidence of global warming over the period from the late 1970s through 1997. The data also shows the strong El Niño effect in 1998. However, temperatures have fallen swiftly back into the normal range over the last several months.

Figure 5

DATA: SATELLITE MEASUREMENT OF GLOBAL TEMPERATURE CHANGE



- Microwave signal weighted to mid-atmosphere
- No evidence of warming trend

Satellites measure a signal characteristic of temperature across the lower and middle atmosphere, rather than the surface. However, they are far more accurate and reliable in giving a direct global measurement, and they are calibrated to agree with thermometer-measurements from balloons. While some scientists argue that results from satellite and surface measurements may be consistent within their uncertainty, the continuing and growing discrepancy highlights a major gap in current understanding.

In 1995, a special United Nations panel set up to study global climate change issued an extensive report on the issue. In keeping with the practice of publishing research findings, peers in the scientific community reviewed the report before it was released. The scientists were careful not to make any firm conclusions about the connection between burning fossil fuels and global warming.

However, the executive summary of the report, the part most people read, was heavily influenced by government officials and others who are not scientists. The summary, which was not peer-reviewed, states that: “the balance of evidence suggests a discernible human influence on climate.”

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Global Climate Change (continued from page 5)

You'll note that this is a very carefully worded statement, recognizing that the jury is still out, especially on any quantifiable connection to human actions. The conclusion does not refer to global warming from increases in greenhouse gasses. Indeed, many scientists say that a great deal of uncertainty still needs to be resolved.

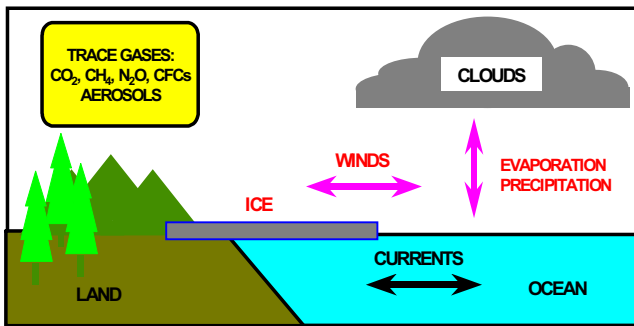
Climate Processes and Feedbacks

So far we have discussed climate observations. Any significant impacts from increasing greenhouse gasses will occur decades from now. To explore the possible consequences of future climate change we require climate models that can account for the complex interactions and feedbacks in the climate system.

Figure 6 illustrates some of the complex processes in climate. From fundamental physics we are certain that the atmosphere must absorb more IR radiation as greenhouse gas concentrations rise, *if nothing else changes*. However, other changes *will* occur. Once absorbed, heat triggers feedbacks that can amplify or reduce warming and climate change.

Figure 6

NATURAL SCIENCE: CLIMATE PROCESSES & FEEDBACKS



Models must account for heat transfer by winds and currents; the hydrological cycle of evaporation, precipitation, runoff and groundwater; formation of clouds, snow, and ice; all of which display enormous variability. *We know* that science today cannot properly describe these processes.

Inability to describe feedbacks dominates uncertainty in predicting climate change. For example, increasing CO₂ traps heat, warming the atmosphere slightly. The warmer atmosphere holds more water vapor, significantly amplifying warming... but this may promote cloud formation that can cool the surface by reflecting sunlight. Cloud changes could significantly reduce warming, or, depending on cloud properties, they might amplify warming. Other effects not well understood, like changes in ocean currents, aerosols, and the biosphere, could also amplify or reduce warming.

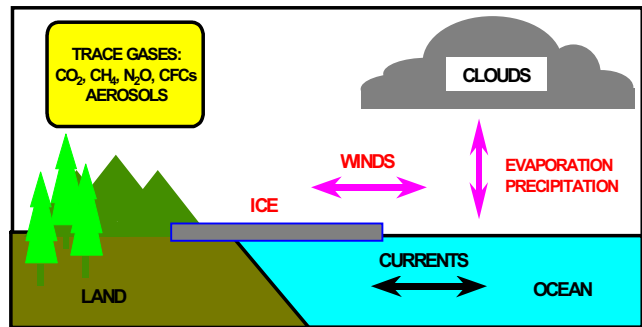
Predictions rely on computer models known as General Circulation Models (GCMs). They have serious and well-known limitations:

- GCMs have limited resolution. Even in the most advanced computers, resolution is limited to grid blocks hundreds of km on a side, say one block for Germany, several for the United States. Models must approximate effects, such as clouds and hydrology that occur on smaller scales.

- GCMs are incomplete in their scientific basis. Clouds are a most serious gap. Observations show that GCMs represent clouds poorly in *current climate*... yet the more complex need is to understand how clouds change if climate varies. Evaluation of climate change over decades requires far more reliable representations of oceans and the response of the biosphere than are available today.
- Data and methods to validate models are incomplete. Oceans especially lack adequate measurements. This is a critical scientific need.

Figure 7

NATURAL SCIENCE: CLIMATE PROCESSES & FEEDBACKS / CLIMATE MODELS



- **Model limits**
 - Coarse resolution
 - Missing science
 - Incomplete data
- **Uncertain predictions**
 - Magnitude
 - Timing
 - Regional distribution

Consequently, GCMs do a poor job matching past climate trends and current climate. They are well known to have limited ability to predict the magnitude, timing, and regional distribution of future climate change. Lack of reliable regional forecasts prevents meaningful assessment of most potential impacts of climate change. Different GCMs produce significantly different results, especially for critical factors such as precipitation, soil moisture, drought, and storms.

The many uncertainties in the science of climate have led one leading researcher, Professor Ronald Prinn of the Massachusetts Institute of Technology, to conclude "there is no doubt that our present understanding of climate—and our ability to predict climate—are inadequate to provide a sharp focus for policymaking."

The Precautionary Principle in the Climate Convention

The precautionary principle is often invoked for guidance in situations filled with this level of uncertainty. Clearly climate change presents the potential for serious long-term impacts. Equally, little is known about the actual risk today. Figure 8 quotes the precautionary principle in full, as referenced in the climate treaty.

The issue facing society is not a choice between action and inaction. The issue is how do we make choices under uncertainty? Knowing what we know today about the risks of climate change and the consequences of possible response actions, what decisions can we make?

Recognize that the precautionary principle provides no guidance on what actions to take in response to uncertain risk. Society must analyze proposed response options to determine whether they are effective, feasible, affordable, and equitable.

In climate change the stakes are especially high because many of the proposed *precautionary measures* come with very high, near-term economic and social costs.

Figure 8

THE PRECAUTIONARY PRINCIPLE IN THE CLIMATE CONVENTION

ARTICLE 3.3. The Parties should take **precautionary measures** to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects. **Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures, taking into account that policies and measures to deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost.** To achieve this, such policies and measures should take into account different socio-economic contexts, be comprehensive, cover all relevant sources, sinks and reservoirs of greenhouse gases and adaptation, and comprise all economic sectors. Efforts to address climate change may be carried out cooperatively by interested Parties.

PRECAUTIONARY MEASURES MUST BE TESTED FOR:
EFFECTIVENESS FEASIBILITY
AFFORDABILITY EQUITY

The Kyoto Agreement

In December 1997, representatives from many governments met in Kyoto, Japan. Ultimately, they put together an agreement... a legally binding agreement... to curb carbon dioxide and other greenhouse gas emissions in some countries. See Figure 9. The agreement would commit 38 developed countries, including those in Europe and the United States, to reduce their combined emissions an average of 5 percent below 1990 levels in the next 10 to 14 years. The protocol excludes more than 130 developing countries from any commitments at all. For the protocol to take effect it must be ratified by at least 55 countries, and these must include countries responsible for at least 55 percent of 1990 CO₂ emissions from developed countries.

Figure 9

KYOTO AGREEMENT

- Commits 38 industrialized nations to cut emissions to ~ 5% below 1990 levels by 2008-2012

6% Japan 7% US 8% EU

- No emissions commitments for developing countries
- Entry into force requires
 - Ratification by 55 countries
 - Including developed countries with at least 55% of 1990 CO₂ emissions

While 5 percent may sound like a small amount, it is important to understand that emissions are growing in nearly all countries as a result of economic growth and increasing populations. Relative to where emissions are projected to be, the target will be extremely difficult to meet in most countries.

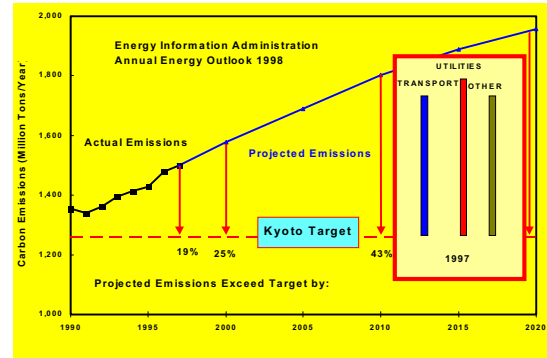
Projected U.S. Emissions and the Kyoto Target

For a moment let me focus on the United States, a critical country in this process. The target is to cut carbon dioxide

emissions 7 percent below 1990 levels. Figure 10 puts the target in an entirely different light. U.S. government forecasts project that emissions in 2010 will exceed the Kyoto target by 44 percent. Already at the end of 1997 they were 19% above the target.

Figure 10

US CARBON EMISSIONS: PROJECTED & THE KYOTO TARGET



The insert panel shows the target relative to emissions from various sources in 1997. To reach the target, the United States would have to stop all driving, or close all electric power plants or shut down every industry, or reduce emissions in each area by over 1/3. I leave you to consider whether this enormous change in emissions could be achieved in ten years.

A related economic analysis found that meeting the targeted reductions in fossil-fuel use would mean a 45-percent increase in gasoline prices and similar increases for other fuels. These and other price hikes could cost the average American family of four about \$2,700 a year.

At least some developed countries would probably have to impose significantly higher fossil fuel taxes, rationing, or lifestyle changes such as mandatory carpooling.

Recognizing these difficulties in the United States, diverse groups—including labor, farming, consumer groups and many industries, have serious reservations about the agreement.

The U.S. Senate dramatically reflected those concerns before the Kyoto conference in the fall of 1997 when it voted 95-0 to oppose any agreement that excluded developing countries or that seriously harmed the U.S. economy. The Kyoto agreement fails both tests. Note that, in the United States, it must be ratified by the Senate to have force of law. Nonetheless, the Clinton administration signed the treaty in November at a conference in Buenos Aires.

Carbon Emissions/Kyoto Target: 2010 VS. 1990

Consider how the world might limit CO₂ emissions.

One way is to use less energy voluntarily. Energy conservation is always prudent, but the emissions reduction targets are so severe that voluntary actions alone won't be enough.

Countries can also look for alternative energy sources that produce fewer greenhouse gases. Nuclear energy is one and could help fill the gap over the long term, but public opposition to nuclear shows no signs of abating. Another possibility includes renewable energy sources such as solar power, biomass, or wind. After three decades of research, however,

(continued on page 8)

Global Climate Change (continued from page 7)

renewable sources still make up only about 1 percent of the world's energy supply. It could be quite some time before renewables contribute in a significant way.

Selective "fuel switching" can also help. This simply means moving to lower-carbon fuels when possible — for example, from coal to natural gas in the electricity sector.

It is possible to offset emissions of greenhouse gases. This could be partially accomplished through reforestation, since trees absorb carbon dioxide. In addition, technologies to separate and dispose of the gas are feasible, but costly, with today's technology.

Governments could impose new energy consumption taxes to *force* lower demand.

They could also invent complicated schemes of emissions permits, which are a form of energy rationing,

They could impose forced standards for energy efficiency, or limit fuel availability or driving hours.

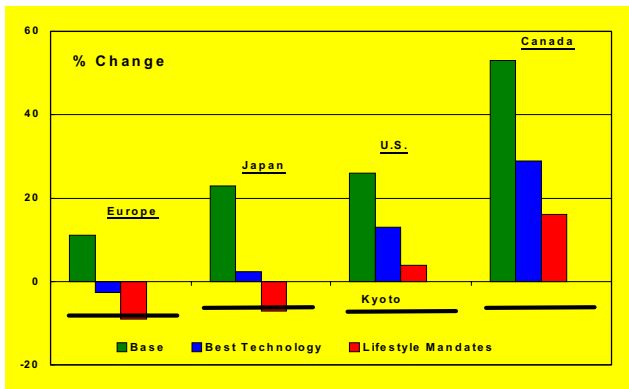
Or they could provide incentives, such as tax credits, for industries that develop or install energy-efficient technologies.

Some of these measures would have a noticeable impact on our quality of life and cost of living. But would those measures allow countries to reach the Kyoto reduction targets? That's another story.

Figure 11, showing results for several countries and for Europe, is based on a typical energy forecast. Here we see the Kyoto emission reduction targets, compared with 1990 levels, for several developed areas of the world.

Figure 11

CARBON EMISSIONS: 2010 VS 1990



The left-hand bars show projected increases in CO₂ emissions in the years ahead, assuming no Kyoto agreement or any other initiative. Note the substantial increases anticipated to occur by 2010.

The middle bars reflect the changes in emissions we might expect with full adoption of the best technology available. This assumes immediate turnover of energy-consuming devices. If a more efficient refrigerator than your two-year-old model comes on the market, this assumes you replace your old one right away. Technology turnover makes a substantial difference, but it still doesn't achieve the Kyoto targets.

The right-hand bars assume full adoption of the best technology as well as mandated lifestyle changes to limit energy use. These would include steps such as keeping your house warmer in summer and cooler in winter, mandatory car

pooling or substantial improvements in new car fuel efficiency.

Europe and Japan could come close to their targets. But the United States, Canada, and Australia would still be far away. Here's why. The Kyoto agreement calls on participating countries to reduce emissions below 1990 levels. Since 1990, the United Kingdom has converted much of its coal-fired electricity generation to gas. In Germany, highly polluting factories and generating plants in the former East Germany have been shut down. And Japan proposes to rely increasingly on nuclear power.

Another factor is population growth, which was not taken into account in setting the Kyoto targets. U.S. population is projected to rise, which means more energy use. Little population growth is expected in Europe.

All in all, Kyoto will have a significant impact on most countries and it is difficult to imagine what practical policies would allow them to achieve the targets.

Effects on Developing Countries

Projections of future emissions show that most growth will come in the developing countries, including China, Mexico, Brazil and India. See Figure 12. Those four nations alone hold about 40 percent of the world's population. If burning fossil fuels proves to be a significant factor in global climate change, then excluding developing nations from the agreement raises the question of whether or not it is fair — and more important, whether or not it will work.

Figure 12

DEVELOPING COUNTRIES

- Predominant source of future emissions
- Energy producing countries: large negative impacts
- Other developing countries: wide variation, but most hurt by reduced exports & trade effects

For developing countries, the impacts would be mixed. Energy exporting countries would suffer serious losses.

Kyoto restrictions would lower demand for goods in industrialized nations, decreasing the imports from most developing countries. That could significantly disrupt global trade and economic growth. Because they would be exempt from requirements to cut carbon dioxide emissions, developing nations may attract more industry and jobs from industrialized countries that do restrict fossil fuel consumption. That means fewer jobs in countries that do impose such limits.

Bear in mind that developing countries face enormous challenges, such as alleviating poverty and raising living standards, extending life expectancy, and expanding educational opportunities. Meeting these basic human needs requires economic growth. And economic growth requires energy.

Exxon is in the energy business, and most of that energy is in the form of fossil fuels. Obviously, adopting the Kyoto agreement would have a tremendous impact on our company. But I think it's clear it would have an equally harsh impact on many segments of society in many parts of the world.

Gaps in the Kyoto Protocol

Many provisions of the Kyoto Protocol remain to be resolved in future negotiations:

- The protocol is silent concerning compliance, a factor that many governments regard as essential before making commitments that affect their economic security.
- Kyoto authorizes nations to utilize emissions trading and credits from projects with developing countries to meet commitments. However, procedures must be negotiated.
- Similarly, procedures to account for changes in forests and other sinks must be agreed.
- Finally, the issue of how to involve developing countries in future participation in emissions commitments has not been resolved.

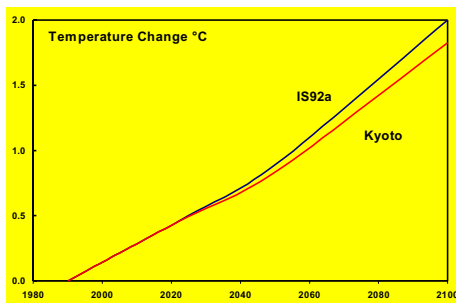
Nations met last November in Buenos Aires to further develop concepts agreed in Kyoto, but they made very little progress — an indication of how complicated and unworkable the protocol really is. They did develop a plan for future negotiations that looks toward taking decisions two years from now.

Climate Implications of the Kyoto Protocol

Climate change is truly a long-term issue that requires a long-term approach. Figure 13 shows projections for global temperature change through 2100 with and without the Kyoto emissions restrictions. The net effect on global temperature is quite small. In effect, the protocol slows warming in 2100 by only about ten years.

Figure 13

CLIMATE IMPLICATIONS OF KYOTO



- **Conclusion: Kyoto achieves very little**
- **Additional steps may be needed**

Difficult as the Kyoto limits may be to achieve, far more onerous emissions reductions would be necessary if climate change proves to be serious. Clearly, any effective approaches would need to limit global emissions and that must involve developing countries. Such severe limits would also require the development and global deployment of new, currently non-commercial technologies for energy supply and use.

Professor Richard Schmalensee, a noted economist at the Massachusetts Institute of Technology and dean of MIT's Sloan School of Management, points out: "With our current understanding of the science and economics of climate, we know enough to take the global warming issue seriously. We don't, however, know enough to do anything drastic."

Fortunately, all indications are that climate change is a very long-term phenomenon. The U.S. Congressional Office

of Technology Assessment concluded, "Delaying the implementation of emissions controls for 10 to 20 years will have little effect on atmospheric concentrations of greenhouse gas emissions."

We can make good use of that time. Researchers need to be able to gain a better understanding of climate science. There is a lot of research going on—about \$2 billion worth a year in the United States alone. Exxon itself has funded studies by several major research organizations.

Exxon's Position

Exxon's position on climate change is consistent with sound scientific and economic analyses.

We oppose the Kyoto Protocol because:

- the science is uncertain,
- it achieves little environmental benefit, but
- it entails large near-term costs.

We favor a long-term approach that

- provides for global involvement,
- includes R&D for innovative technology,
- is responsive to evolving knowledge,
- involves viable near-term actions.

Finally, we call for an open debate that acknowledges the powerful trade-offs involved in responding to climate change.

Exxon's Actions

Exxon does not believe that uncertainty is an excuse for doing nothing. We acknowledge that global climate change is a legitimate concern and we are taking steps now that we believe will lead in the right direction.

First, reducing the scientific uncertainties is essential. We must have a strong scientific foundation on which to base policy. Exxon has participated in and supported scientific and economic research in climate change for nearly two decades. We have supported research to improve understanding of oceans and clouds, policy options, and health impacts, among others.

Second, implementing options that make economic sense *now* can make a significant contribution to addressing climate concerns. At Exxon, our refineries and chemical plants are 35 percent more energy-efficient today than they were 25 years ago. In addition, we operate or have an interest in 26 cogeneration plants around the world. Cogeneration makes steam and electricity simultaneously, using 30 percent less energy than making them separately. Exxon has undertaken a new energy conservation initiative to insure that our performance is second to none in our industry. Some steps are relatively simple. Planting trees provides a natural means of absorbing carbon dioxide, and numerous other benefits. Exxon has been supporting reforestation programs for more than a decade. By the year 2000, we will have helped plant more than two million trees throughout the world.

Third, we are involved in long-term research on vehicles and fuels to improve transportation efficiency. One example is the partnership between Exxon and General Motors to develop gasoline-powered fuel cells for automobiles. Fuel cells may double a car's gas mileage and sharply reduce emissions. Another is our strategic alliance with Toyota to investigate options for advanced vehicles including hybrids.

(continued on page 10)

Global Climate Change (continued from page 9)

Fourth, we seek to promote clear assessments and an open debate on the merits and trade-offs of various policy proposals to address climate change.

Finally, we are actively communicating our views to employees, shareholders, and the public.

Public Policy Systematic Approach—Principles

The public has long looked to Exxon, among others, to supply the quality energy products that people want and need. We have done our best to do so responsibly, efficiently and economically—our track record stands up well against anyone's. Our approach to public policy issues is no different than our approach to our business. We apply what some may call an obsession with the hard, cold facts. We believe that when a claim is made, the data should be there to back it up. We would be irresponsible corporate citizens and poor stewards of our owners' investment if we took any other attitude. These are qualities we've long held that we believe give us substance and credibility in the public policy debate.

Looking ahead, as the debate on climate change continues, I hope it will be shaped by some important principles that at times have been lacking.

Policy considerations must be driven by sound science and policy analysis. Policy options must be considered in terms of the best available science—not based on assumptions leading to dramatic but improbable forecasts. Science is not a consensus process. Answers are not determined by vote or the prestige of the scientist. They are found by testing theory against actual information—exposing hypothesis to the acid test of real-life data.

It's also very important to understand that policy analysis does not result from consideration of a single set of drivers alone. One has to consider the impact on energy, the environment, risks to the public and the costs of implementing various policies. While the Kyoto Protocol is portrayed as an environmental agreement, in fact it would affect economic growth, employment, trade, and investment while doing very little to address climate change. Integration identifies the need for balance between environmental and economic factors. Trade-offs are usually necessary. They need to be considered using the best analyses available.

Finally, the debate needs to involve all sectors of society—most certainly individual citizens like us who will have to live with whatever policy is finally crafted. That makes it all the more important to have a debate that is open and respectful of all views. Throwing bricks at each other just doesn't do any good. The debate over climate change is not a battle between good and evil. It is, or should be, a rational discussion among those with differing views looking to find the right way to approach an important issue.

This requires that we get solid information on the table, discuss and analyze it fully and openly, then make the proper decisions and get on with workable solutions.

Climate change is a long-term issue. Decisions should be taken now based on current understanding including its uncertainty. Our approaches should be flexible and responsive to new information. Exxon's actions and position on climate change have evolved over the years. They will continue to be responsive to emerging scientific and technical understanding in the future. Exxon has been in business for over 100 years and we intend to remain a profitable, responsible supplier of energy

through the next century. As the climate change debate progresses, so too will our actions.

Report of the 1999 Annual General Membership Meeting and the Year 1998

President Hoesung Lee called the meeting to order at 6:40 pm, June 11, 1999 at the Grand Hotel Parco dei Principi, Rome, Italy and introduced Council members present.

Vice President and Secretary, Arild Nystad reported that membership stood at a little over 3300 and was stable. He cited several countries with significant membership numbers in which an affiliate could be formed. President Lee noted that at the Council meeting earlier in the week, a Long-Term Strategy committee had been formed to focus on membership development as well as future objectives of the Association. Peter Fusaro will chair this committee with Peter Davies, Michelle Foss and Mike Lynch as members.

Vice President and Treasurer, Jean-Thomas Bernard reported that 1998 had been a good year for the Association and subsequent to the meeting provided the following income and expense report for the year and balance sheet for the end of the year:

1998 Statement of Income and Expense

	<u>Income</u>		<u>Expenses</u>
Dues	\$146,000	Admin. & Office Oprs.	\$111,000
Meetings	33,000	Publications	110,000
Publications	92,000	Other	29,000
Interest	32,000	Total	\$250,000
Other	13,000		
Total	\$317,000	Net Income	\$67,000

December 31, 1998 Balance Sheet

<u>Assets</u>		<u>Liabilities & Fund Balance</u>	
Cash & Equivalents	\$658,000	Accounts Payable	\$10,000
Accounts Receivable	15,000	Deferred Dues &	
Total	\$673,000	Subscriptions	69,000
		Total	\$79,000
		Fund Balance	594,000
		Total	\$673,000

Note was made of a number of unpaid affiliates and that Council had decided to provide these groups with one last change to pay their dues and if they were not forthcoming to inactive them and offer direct membership to their individual members.

The success of the scholarship program offered last year was noted as well as Council's decision to continue the program this year.

Some discussion occurred on the possible need to offer a jobs posting program, but no decision was made. Discussion also occurred on how to handle the problem of gratis registrations at the international meeting.

The meeting was adjourned at approximately 6:55 pm.

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**1999 EUROPEAN CONFERENCE OF ENERGY ECONOMICS
- TECHNOLOGICAL PROGRESS AND THE ENERGY CHALLENGES -**

Paris, 30 september - 1 october 1999

The energy sector is the field of rapid technological progress under the effect of the competitive strategies of companies and technological policies. Technological forces allow changes in institutions and industrial organisation, and stimulate the development of competition. Technology can also make a difference on long-term energy challenges: foreign oil dependence, resources exhaustion, environmental protection, risk of climate change.

The conference aims at providing an opportunity to look back on the economic, industrial and environmental effects of the technological development of the last twenty-five years and assess the respective efficiency of the private innovation strategies and public policies. This past experience can give indications on the future direction of the technical change, its elements of dynamics and the possibilities to act on it to face the critical energy and environmental issues that will affect us in the next century.

Co-Chairmen of the Conference

Georges BOUCHARD
(Gaz de France)

Denis BABUSIAUX
(Institut Français du Pétrole),

Members of the Scientific Committee

Ezio ANDRETA - Science, Research and development - Director
Energies - European Commission - Belgium

John CHESHIRE - University of Sussex - UK

Edgardo CURCIO - Italian Association for Energy Economics - Italy

Wilfried CZERNIE - Ruhrgas - Germany

Georges DUPONT-ROC - Shell - UK

Spain,

Fritz VAN OOSTVOORN - Netherlands Energy Research Foundation -

Arnulph GRUBLER - International Institute for Applied Systems
Analysis - Austria

Jean-Eudes MONCOMBLE - Electricité de France - France

Gérard SARLOS - Ecole Polytechnique de Lausanne - Switzerland

Yves SMEERS - Université Catholique de Louvain - Belgium

Antonio SORIA - Institute for Prospective Technological Studies -

Dominique FINON - Chairman of the Scientific Committee - France

The Netherlands

THEMES OF THE CONFERENCE

Driving factors and constraints on technical progress in the energy sector:

- Relationship between energy and growth,
- Role of the cultural and political environment (environmental constraints, geopolitics, etc.),
- Role of energy, R & D and fiscal policies,
- Role of corporate strategies and industrial structures,
- Role of cross-fertilization and spillovers from equipment industries.

Technical progress and changing structures of energy industries and markets:

- Emergence of decentralised systems (economies and externalities),
- Impact of new information and production technology,
- Competition and innovation strategies in the production processes,
- Changes in the supply induced by innovation and competition : from the energy commodities to the energy service.

Technical progress at the service of sustainable growth:

- Technological innovation as an answer to the climate change issue,
- Incentives and barriers to technical progress in enhancement of energy supply resources,
- Development conditions for renewable energies and efficient technologies,
- Scope for technology transfer (e.g., by joint implementation, tradable permits, etc.)
- Liberalised markets: what incentive for long term R & D for sustainable development ?

Technological progress, energy modelling and prospects:

- Advances in the integration of technological progress in different types of modelling (sectorial, macroeconomic; bottom-up versus top-down; etc.),
- Integration of technical progress in long term scenarios and forecasting,
- Methods for the analysis of efficiency of market-based instruments and R & D policies.

English and French will be the languages of the conference with simultaneous translations for plenary sessions, and English the language for other sessions.

All inquiries should be directed to :

Dominique FINON, Programme Chairman of the Scientific Committee

Institut d'Economie et de Politique de l'Energie - B.P. 47 38040 GRENOBLE CEDEX 09 - FRANCE

finon@iepe.upmf-grenoble.fr

BIEE Conference:

A New Era for Energy? Price Signals, Industry Structure and Environment

St. John's College, Oxford, 20 & 21 September 1999

Programme

Monday 20 September, 1999

10:00 Registration: Accommodations-Residential Main
Porter's Lodge; Conference-Foyer, Main Lecture
Theater
12:00 Formal Opening
12:30-13:00 Plenary Session - **Dr. Dieter Helm**
13:00-14:30 Lunch
14:30-16:00 Parallel Sessions
Topic 1 ***Oil Prices: Fiscal Regime & Trade***
Dr. Kirsten Bindemann, Mr. Peter Greenhalgh
and Dr. Bernard Mommer
Topic 2 ***European Power Markets and Environmental
Regulation***
Prof. Colin Robinson, Ms. Melinda Acutt, Ms.
Caroline Elliot, Mr. Michael Morrison and Mr.
Vivi Mathiesen
Topic 3 ***Renewables***
Mr. Paul Appleby, Mr. David Hart and Dr.
Catherine Mitchell
16:00-16:30 Tea
16:30-18:15 Parallel Sessions
Topic 4 ***Oil Industry Structure & Price Impacts***
Prof. Alex Kemp, Ms. Linda Stephen, Mr. Mike
Lynch and Prof. Paul Stevens
Topic 5 ***Kyoto Implications & Modelling Policy
Options***
Mr. Dennis Anderson, Mr. Demetrios
Papanthanosiou, Ms. Claudia Kemfert and Mr.
Peter Read
Topic 6 ***Power & Utilities: Industry Structure and
Competitive Behaviour***
Dr. Myriam Davidovici-Nora, Ms. Margaret
Carson, Mr. Rafael Macatangay, Mr. John
Peirson and Mr. Alan Pack
19:00 Bar
19:30 Dinner - Speaker: **Robert Mabro**

Tuesday 21 September, 1999

0900-10:15 Plenary Session
Prof. Peter Davies and Dr. Michelle Foss
10:15-10:45 Coffee
10:45-12:15 Parallel Sessions
Topic 7 ***Gas Markets and Structure***
Mr. Andrew Barton, Mr. Tony Vermeire, Mr.
Michael prior, Dr. Dan Rutledge and Dr. Philip
Wright
Topic 8 ***Energy Price Trends, Energy Demand &
Technology***
Mr. Lester Hunt, Mr. Guy Judge, Mr. Yasushi
Ninomiya, Mr. Sarath Delpacitra, Dr. Roger
Fouquet and Prof. Peter Pearson
Topic 9 ***Efficiency and Fuel Flexibility in Power***
Mr. Yucel Calbay, Mr. Torsten Sundmacher,
Asst. Prof. Patrik Soderholm, Mr. Brian Tilley
and Prof. Tom Weyman-Jones
12:15-13:30 Lunch
13:30-15:00 Parallel Sessions
Topic 10 ***Climate Change, Kyoto Mechanism and
Tradeable Permits***
Ms. Kristina Oertel, Mr. Manuel Frondel, Mr.
Dirk Rubbelke, Mr. Reinhard Madlener, Dr.
Roger Fouquet and Mr. Anthony Owen
Topic 11 ***International Power and Industry Reform***
Mr. Reza Fathollahzadeh, Prof. Carina
Guzowski, Prof. Liliana Cerioni, Tuija Mannila,
Kimmo Laitinen, Jari Hovila and Leena
Korpinen
Topic 12 ***Nuclear Power & Coal***
Mr. Michael Parker, Mr. Stephen Kidd, Dr.
Julio Pena-Torres and Prof. Peter Pearson
15:00 Summing Up - Speaker: **Gordon MacKerron**
16:00 Conference Close

Sponsored by:

BP Amoco, DTE, National Grid and Oxera

The conference fee is £220 including VAT (\$US 365 / Euro 315) for BIEE and IAEE members. For non-members, the fee is £240 including VAT (\$US 400 / Euro 345).

(A concessionary rate is available to academics, students and pensioners at a rate of £140 [\$US 230 / Euro 200])

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A Perspective on Energy Markets

By Luciano Sgubini*

It is with great pleasure that I accepted the invitation to speak at the beginning of this international conference, to discuss the details of a process of transition and transformation of the energy industry so widespread and so profound that it is without historical precedent.

The energy markets are going through a period of great change which are having, and will have even more in the coming years, considerable consequences for the future, not only for operators but also for consumers.

The way companies are structured will be modified so as to better respond to the market's challenges; the integration between oil, natural gas and electricity will develop so as to better employ technology with the objective of more efficiently producing energy for the final consumer.

The level of competition will rise with the opening of many national markets. Prices and tariffs with which one will be confronted will be to the consumers' advantage.

The phenomenon we are facing is a global issue, but at the same time it is particularly evident at a regional level.

The representation of the Mediterranean area on the logo of this Conference is not a coincidence, it represents a great laboratory for the birth of new market equilibria, new strategies, and new alliances.

Since the fifties when oil was about to become the dominant resource, the Mediterranean area has been at the crossroads of energy flows.

Today, during a transition phase, moving towards the globalization of energy markets, this area offers new aspects of interest both for traditional relations with the countries that produce oil in the Middle East and Africa, and for new relations with the Caspian Region that is about to enter international oil markets by opening up to new operators and by realizing large new transport projects.

Further, from the point of view of the development of international gas markets, the Mediterranean, which has seen the creation of some of the most important production and transport projects, represents an important area for new projects relating to supplies from the North, the South and the East.

The changes we can observe in the Mediterranean area take place alongside other important modifications in international energy markets.

In Western Europe the market liberalization trend has become more and more accentuated: in the new context of abundant supply and buyer-market conditions, the energy business has gone back to being open to private investors who have acquired shares of the privatized public companies or developed new enterprises on their own.

The United Kingdom model, for some years in the forefront of privatization of public companies and liberalization of markets, has expanded to most European countries.

The process of liberalization of the European energy markets has not, moreover, been entrusted exclusively to the initiative of National Governments; the European Commission has played and continues to play a fundamental role.

There are various lines of intervention through which the

* Luciano Sgubini is Chief Operating Officer, ENI, Italy. This is an edited version of his keynote address at the opening of the 22nd annual IAEE international meeting, June 9-12, Rome Italy.

different realities are being brought closer together: taxation systems, standards, price transparency projects, and the adoption of the two directives on the liberalization of electricity and natural gas markets.

Another major factor of change is the new dimension taken on by Eastern European and Central Asia countries.

The republics of the Caspian region are developing policies for the development of their sizeable resources of oil and natural gas.

American, European, Russian and Chinese oil companies are thus launching projects for the development of large fields of hydrocarbons in Azerbaijan, Kazakhstan and Turkmenistan, and for their transport to the West and, eventually to the East.

New strategic alliances are also emerging in the Russian Federation, which maintains a primary role in energy markets and, in particular, in those of oil and natural gas.

The process of energy market liberalization also coincides with the growing appearance of Asian countries on the world scene, in spite of the recent crisis.

In this area the growth in energy demand represents a great opportunity for operators called upon to work in an environment characterized by challenges of a new nature.

The type of population settlements, tending to concentrate in large metropolitan areas, the development of transportation and rapid industrialization make it necessary to find innovative solutions in primary source choices and transformation plants, chiefly refineries and thermoelectric plants, to limit environmental impact and increase efficiency. In this sense the combination of gas and high-efficiency plants is one of the most effective tools currently available to meet the needs of these countries.

Also in other countries, those of South America, for instance, once characterized by state control and ownership, the liberalization of markets is moving ahead with the opening to private capital of companies once controlled by the public sector, and the setting up of regulatory bodies.

The Environment Dimension

Another factor of change which is deeply influencing the energy industry and its strategies is the increasingly greater awareness of public opinion regarding environmental problems and its pressure on governments.

From a phase of growing attention to the problem of the presence of polluting agents (dusts, sulphur oxides and nitrogen oxides, etc.) in the atmosphere, with the resulting pressing demand for measures to reduce them, a more extensive dimension has been reached, with the request for the limitation of CO₂ emissions, which are, by contrast, a combustion product, impossible to eliminate.

In order to obtain a stabilization of the CO₂ emissions, more profound changes will be necessary in the choice of sources and transformation and utilization technologies.

One MWh of energy produced by natural gas in a combined cycle plant entails an emission into the atmosphere of 115 Kg of CO₂. The same quantity of energy produced starting from coal, with the best technologies available today, causes the emission of 273 Kg of CO₂.

The nature of the imbalances is such that it limits the effectiveness of unilateral steps by single nations, while it imposes a limitation on national sovereignties and the overcoming of excessively restrictive geographic solutions.

(continued on page 14)

A Perspective on Energy Markets *(continued from page 13)*

The 1992 Rio Conference, with the signing of the Convention on the climate and the founding of the Global Environment Fund, moved in this direction. This approach was confirmed further at the Kyoto Conference in December 1997. The signals coming from this conference indicate that, in spite of the uncertainties on the formalization procedures, a process of reconsideration of the connections between economic development and the use of energy sources has been initiated.

The more industrialized countries have agreed to reduce the emissions of gases responsible for the greenhouse effect from the 1990 levels by the year 2010; the commitment of these countries must, however, be accompanied by measures in developing countries also, in order to avoid nullifying the overall result.

This is, moreover, a difficult task, since it is a matter of avoiding routes which may lead to a reduction of emissions coupled with a reduction in the development rate of the world economy. It is, however, necessary not only to export technologies and industrial solutions already developed and available, but to test new processes with a lower "environmental mark".

Energy Companies: Options and Responsibilities

Energy companies cannot choose to endure or, worse, to resist the change, but must play an active and proposal-making role.

Many of the solutions which today are held to be the most promising, starting from the greater utilization of natural gas, were the result of the initiative of energy companies which innovated their behaviors and strategies.

In fact, the increasingly greater presence of natural gas in the European energy balance and its use with innovative technologies in the sector of power generation come from some innovative ideas which date back to the period of the supremacy of oil, when the long-distance transport of gas seemed to present an insurmountable problem from both the technical and the industrial standpoint. These ideas were born and developed also thanks to the capacity and the will of several partners who created the great projects which today make it possible for the European gas system to adapt to growing needs.

Without a precise will to cooperate among countries and companies, many of the most ambitious projects would still be unrealized.

The creation of the first large European gas lines from Holland and Russia required, in fact, the solution of a series of enormous problems of a completely new nature from the contractual, legal and technical standpoint. Thus, there was a transition from a strictly national, or even local (the first fields in France, Italy and UK) dimension to a supranational dimension, but above all to the creation of stable ties among countries and companies. The cooperative approach was also at the basis of the connections between Africa and Europe created with the gas pipelines from Algeria to Italy and Algeria to Spain.

But an energy company cannot just limit itself to thinking about the past; it must look to the future, making the best use of the most significant experiences and investing in innovative technologies.

The Future and the Role of Cooperation with Particular Reference to the OPEC Countries

In the scenario of market globalization which is taking

shape more and more strongly in the energy field, the role of cooperation also appears to be crucial for the success and expansion of any company.

Important changes are also underway from the standpoint of the behavior of the OPEC countries which have progressively abandoned their traditional political positions. After the initial apparent successes and the exceptional growth in revenue stemming from unilateral decisions regarding prices, the producer countries came to perceive the limits of this policy.

Through a process which was not always easy, the State oil companies of those countries developed new strategies, entering the downstream phases of the oil cycle (refining and distribution), in a logic of integration with the economies of the consumer countries and not one of mere confrontation.

The growth in the presence of producer country operators on consumer country markets, including the European ones, coincided with the modernization and restructuring of the oil industry, with the prospect of offering the countries most dependent on oil imports the guarantee of stable relations and a greater security of supplies.

The developments of the Gulf crisis have also demonstrated that the option for downstream integration chosen by countries such as Saudi Arabia, Kuwait, Venezuela, Mexico and Libya is based on solid foundations and their behavior is no longer inspired by the idea of simply controlling their energy resources, but by a more complex and structured strategy of safeguarding the role of oil in general.

A cooperative attitude was shown again recently when OPEC, acting in agreement with other non-OPEC major producers, tried in 1998, and more successfully since April this year, to slow the fall in crude oil prices to relieve the financial pressure that the exporting countries of crude oil have been under since 1997.

The short term strategy of OPEC appears to be:

- To reduce the size of the fluctuation in oil prices in the short term, limiting the fluctuations especially at the lower end of the scale, and to maintain a stable reference value.
- To strengthen the leadership of the major producers whether or not they are members of OPEC.

The attempt to reduce conflict amongst the major producers within OPEC, essentially Saudi Arabia, Venezuela, Iran, Kuwait and Iraq (when U.N. restriction on Iraq will be lifted), with the smaller producers, is consistent with this last objective.

In the medium and long term view the necessity appears for OPEC to consider an even wider strategy that is able to involve also the larger oil companies in the process of stabilizing the markets.

The resources and the production in the Middle East are today controlled by the producing countries and by their companies, while the international petroleum companies have their greater strength in North America, Europe, Africa, various Asian countries and in Latin America.

An asymmetry capable of generating imbalance on the price front, is an obstacle to the ordered development of the energy industry. On the other hand, agreements between international companies and the companies of producing countries with richer resources, in the context of a strategy of reevaluation of the role of oil and its market quota, can guarantee a perspective of stability and development to the market.

Policies favorable to investments, maintaining respect for

the sovereignty of the country that is the holder of the reserves, would allow an easier exploitation of the income from petroleum by the countries with low costs.

Regarding this point, it is necessary to underline the importance of the conditions that influence the investments of the companies and that these depend totally on the government of the country holding the resources.

What, in fact, has the same importance as the level of prices for crude oil, so as to help the development of petroleum resources at low cost, is the margin guaranteed to foreign operators. If the opening of petroleum resources by producer countries takes place with conditions that allow good margins for the international companies and the rules change favorably for foreign operators, the production of crude oil will expand and at the same time the income in foreign currency from the export of petroleum from these countries will increase.

Companies with a strong upstream vocation can work to reciprocal advantage with companies whose strong points lie in their knowledge of markets. Energy source transformation companies can operate jointly with exploration and production operators to ensure a continuous outlet for the production of natural gas.

Cooperation appears even more necessary if one considers that in the medium-long term the distance between the consuming centers and the energy resources to be exploited will tend to increase.

As far as the development of new hydrocarbon resources, the situation today is certainly different from that of the 1970s with much room for new projects, both in exploration and production as well as in transportation.

If, at present the picture of energy reserves appears to be satisfactory, especially due to the revaluation of the resources already acquired, in the medium and long term, when the problem of intensifying exploration efforts in new areas will be clearly felt, the role of joint-efforts will emerge and will require innovative solutions.

There are areas such as South-East Asia and China which will have to be supplied with energy resources which are located very far away, for example in the Middle East and Siberia. Only comprehensive, far-reaching enterprises which combine technology, finance and contract flexibility may guarantee oil and gas supply to both traditional and new areas.

The role of cooperation does not end, however, with the exploitation of new energy resources, their transport, and their supply to final users; it is also necessary to consider the great environmental challenge, to which the energy companies can and must give the most economic and effective answers possible. In many areas of the world there are low-efficiency energy systems which produce enormous quantities of CO₂ and other pollutants.

The reconstruction of these systems offers enormous possibilities for full-range projects between energy companies of industrialized countries and developing countries.

With the prospect of increasingly complex problems, cooperation, one of the main themes of this Conference will become increasingly a necessity in the behavioral models of those companies which are ready to accept the challenge of the new energy markets.

Italy: an Oil & Gas Producing Country?

By Andrea Ketoff*

It is an honour for me to welcome you all in Rome on behalf of the Italian Petroleum and Mining Industry Association (Assomineraria) which represents the corporate world operating in the exploration and production of oil and gas in Italy. It is an industrial sector made of hundreds of companies of all size, and a good number of them are foreign.

While Agip—and more recently the ENI Group—always played the lead role in the research and development of oil and gas fields, foreign companies have traditionally come in great number to Italy to invest in onshore and offshore activity.

First was Esso, in the late nineteen twenties, that had an important role in the development of the early oil discoveries of the Northern Apennines. Then, in the fifties, Gulf Oil contributed to the important discovery of the Ragusa oil field in Sicily. And in the late sixties, Shell was a key partner to Agip in the development of the offshore activity in the Adriatic. By the end of the eighties there were over fifteen foreign oil companies concurrently active in upstream operations in Italy.

To give an order of magnitude, overall Italian production up to 1998 has been of around 850 million barrels of oil and 650 billion cubic meters of natural gas. At present, reserves are estimated around 1 billion barrels for oil and 350 billion cubic meters for natural gas.

Domestic oil and gas production is limited but yet strategic to this country, as it reaches 20 billion cu. m. of gas—which represents one third of national consumption (*i.e.*, the demand of the whole residential and commercial sectors for space heating, water heating and cooking)—and 6 million tons of oil—*i.e.*, 7% of oil demand (*or households' oil heating and LPG cooking*), with prospects of reaching 15% within few years.

Over 2000 production wells were drilled onshore and 800 at sea, all along an elongated strip which goes from north of Turin to the southern tip of Sicily, and some key facts have marked this activity in recent years:

- In the Southern Apennines, the oil fields of the Val d'Agri constitute an important discovery—600 M bbl of proven reserves—and provide new indications for research in the whole region. Production activity is starting in the coming months after years of difficult negotiations with local authorities, and hopefully the returns are in view for those companies who believed in the investment (mainly Italian and British).
- In the Northern Adriatic, a consistent discovery of gas fields was made in 1992 thanks to the world largest single geoseismic campaign—12,000 sq. km. Development has been temporarily restrained for the supposed impact that gas production could have on the coast. The controversy is still open, but the use of hi-tech monitoring might soon allow progressive development of those fields starting from the farthest ones.
- In the Southern Adriatic, the Aquila oil field development

(continued on page 17)

* Andrea Ketoff is Director General of Assomineraria, the Italian Petroleum and Mining Industry Association. This is an edited version of his luncheon address at the 22nd Annual International IAEE Conference held in Rome, June 9 to 12, 1999.

The Role of IT in the Energy Markets in the Next Millennium

By Ian Miller*

The subject of my speech today is the role of information technology in the next millennium. Not only is this a broad subject, but it also has a very wide time scale. I'm not going to try and predict where IT will be by the Year 3000, but I will focus on the more practical question of the next five to seven years.

In this period, we will be in a different position in the global economic cycle. Energy competition in Europe will be a fact. There might even be progress on utilities competition in the United States (although a speaker at last year's IAEE conference in San Francisco said that there are only three communist economies surviving in the world today – China, North Korea, and the U.S. utilities industry – so that's not a certainty). Three major producers – Iraq, Iran and even Libya – will probably be substantially changed in their political and economic positions. These changes, and many others in this dynamic market, will undoubtedly make the energy business of the early part of the next century significantly different.

Information technology offers a huge opportunity to benefit from these changes, or to become a loser. This may be controversial, but EDS does not believe that the energy industry is fully exploiting the capability of IT. While the industry leads the way in some other types of technology, there appears to be a very large opportunity being missed in IT. Other industries appear to be doing it better. There are a number of examples, but two that are very obvious are the airline industry and the automotive industry. Both of these have used IT to completely transform their business models, not just their operations.

Airlines moved to computer reservations and passenger check-in years ago. It might now take three minutes to check in instead of 45 seconds with the old manual system, but the benefits to the airline and the passenger are enormous. Route planning and capacity management, aircraft maintenance and utilization, and the tracking of key customers have all made large-scale differences in the way that airlines market their services and manage their business. Airlines have embraced the Internet and electronic commerce in ways that the energy sector has hardly started to consider. They have grown their markets and thrived in an increasingly competitive market, generating profits that would have been impossible under the old model. All these changes have resulted in IT becoming a differentiating competence, and those who failed to adapt are now out of business.

In the automotive industry, computers are everywhere. They have transformed the product (just think about GPS systems for navigation, and engine management systems to optimize performance and economy), and they have radically

changed the way in which vehicles are designed, manufactured and distributed. Lean manufacturing and supply chain integration have increased efficiency in ways that could not have been imagined even 10 years ago. The changes continue – more people are shopping online for cars, and every major manufacturer has a Web site that allows customers to test different combinations of color and features and price their options for a vehicle. While the sophistication of cars has grown beyond belief in the past 20 years, vehicles have remained cost-competitive and affordable, as IT has transformed the entire value chain.

We don't believe that energy companies have seen the same gains in performance through IT. Finding and producing/manufacturing technology development have made a big impact, but has IT really delivered on its promise in our sector? Although there are a few notable exceptions, the answer is probably negative. I'd like to consider several areas that we see as opportunity being missed.

The energy industry has the opportunity to drive further cost out of the E&P, refining and supply chain by identifying and applying best practices. We probably all smile wryly at the old saying "if we only knew what we know," because it is so true. Think of the knowledge

and experience that's locked up in the heads of individuals. Think of the pockets of best practice that exist within your own organization, then consider how much could be gained if the level of the best, in every key process, could be turned into the average across the organization. In this regard, many companies have actually moved backwards in the application of knowledge management. Across the industry, engineering and research and development departments have been downsized or even eliminated. The information and experience that used to reside in these departments has not yet been replaced by computer-based "knowledge networks." Until this is done, companies will sub-optimize by re-solving problems and missing the opportunity to identify, communicate and apply the best techniques for managing these key processes.

In a recent study that EDS performed for a chemical company, we looked at what happens when you are able to share knowledge from the best performing chemical plants in the company with the average chemical plant in the company. The study focused on the potential impact on the overall bottom line. The conclusion was that the company could add 2 percent onto throughput worldwide and could reduce maintenance costs by 15 percent. When you consider the multibillion-dollar scale involved in a global chemical company, these are significant amounts that represent big savings that go directly to the bottom line. If a company can get every site up to the standard of performance of the best, then the profitability of the entire enterprise will be transformed.

At the other end of the value chain we can look at "customer intimacy," which is the latest term for better understanding the enterprise's existing and targeted customer base. In other industries, data-mining techniques are being used to extract from core electronic commerce transaction systems a surprising amount of information on individual customers and



* Ian Miller is President of EDS Energy Industries Group in Plano, Texas. This is an edited version of his address at the 22nd International Meeting of the IAEE, held in Rome, June 9 to 12.

their buying patterns. This is then being used for the development of customer loyalty schemes, for carefully focused marketing of additional services that fit individual preferences, and for identifying possible synergies with other retailers to get access to their customers. Think of the information that you get every time a regular customer buys gasoline. You know where they live, you know where they travel. You know what they buy in addition to gasoline. You know how much gasoline they buy, and from that you can deduce the size of their vehicle. Then think about what you do with all that information, to try and cross sell other products or services, perhaps in conjunction with a retail or service partner. The answer, almost certainly, is nothing. That is missed opportunity.

More opportunity exists through the commercial application of electronic commerce and online trading to improve efficiency and lower cost. One of our chemical customers uses an Internet-based system we developed called COSMOS, a system that integrates customer inquiries and the manufacturing/supply chain. In effect, these systems “outsource the customer.” Customers access inventory records and manufacturing schedules, model different order quantities and qualities, and see immediately the possible prices and delivery dates. Customers place their orders electronically and are invoiced electronically. Not only are the back office savings huge, but customer loyalty is also increased very significantly and the cost of selling is driven down. Just as most of us prefer to use ATM machines to get cash, so most customers enjoy the ability to manage their own orders without human interaction. Electronic commerce is the way of the future. If you’re not getting that message now you’re not listening to your markets.

In utilities, the opportunity of IT might be even greater. Certainly, the threat to the current incumbents in this market is far greater if they don’t adapt to the new digital economy. Utility markets everywhere are facing competition where monopolies previously ruled. Experience in markets that have opened to competition suggests that the utility companies that have operated in a monopoly market find it very difficult to adjust to the new culture of “the customer” instead of “the consumer.” This is becoming a retail business, and utility companies are going to have to become retailers if they are to survive. New entrants are going to come into these markets, and the biggest threat could be from retailers who will capitalize on their skills and experience and their existing customer bases to compete against the traditional players. They will bring with them the latest IT systems to track and analyze their customers, to offer differentiated packages of service based on their individual buying patterns and lifestyles, and to maximize the total value of each customer.

IT systems are going to drive the development of the utilities market. The marketing strategies that we have seen used so far in markets opening to competition have been relatively simple. Those companies who make the first move in using information to produce knowledge about their customers and potential customers and deploy IT to gain and keep market share are going to leave the traditional approaches far behind.

I can summarize by saying that the future will be different. Information technology is leading the way into a new millennium and a new business era. Ignore these facts at your peril. IT is going to transform this industry, and the only question is whether it will be the companies represented here who benefit or suffer from these changes. If the industry doesn’t adapt fast

enough, it will become more and more limited to the commodity end of the market and more vulnerable to low margins and high capital intensity — vulnerable to the economic cycle. We could see the emergence of the “virtual energy company,” where all the capital-intensive operations are outsourced and all of the value of the company is in the collection and application of knowledge.

Enjoy the future, but don’t ignore the opportunity and threat that the digital economy represents. Adapt or die is the rule of business as well as the rule of the jungle.

Italy: an Oil & Gas Producing Country? *(continued from page 15)*

(initiated in 1998) constitute a European record, as it lays at 850 meters below sea level and uses a whole set of innovative technologies.

- In the Po Valley, where exploration has been liberalized this year in hopes of attracting new investors, the excellent production of the deep oil fields (60K bbl/d in Trecate) has recently revealed an interesting area of research.

As a result of this activity, a healthy oil industry has grown in Italy, with technological cross-fertilization between local and foreign companies. Many specialized companies operating here are selling their products and services worldwide.

Just like anywhere else, this industry had to go through the ups and downs of world oil prices and the growing awareness of CO₂ emissions. But other obstacles and difficulties were specific to Italy, principally the fact that most oil and gas fields are situated in environmentally sensitive areas, which is often the reason for long and frustrating negotiations with central and local authorities.

To counteract these barriers, the Industry Association is functioning as an efficient interface with public authorities, first of all by facilitating the authorization processes and easing the companies through the red tape, but also by opening new levels of dialogue and understanding between the oil industry and the environmental constituency.

To this end, we have recently signed an important voluntary agreement with the Ministry of Environment which will foster the commitment of oil companies to developing and applying innovative and environmentally-sound technologies.

We have identified room for technological improvement and further opportunities could lead to technological excellence of this sector in Italy. Given the very particular environmental conditions of the country, we are, therefore, working in the direction of making the *art* of oil drilling totally compatible with the country of the *arts*.

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UK's Competitive Residential Market: A Lot Of Losers And A Few Winners

By Fereidoon P. Sioshansi*

With the last segment of the competitive electricity market now progressively opening to domestic customers in the UK, a crowded and fluid situation is unfolding. Many inside and outside the industry are following these developments with more than a casual interest. The fate of the 23 million remaining customers is a matter of survival for a few of the smaller—and more feeble—of the suppliers. It may also establish a pattern of continued growth and consolidation for a handful of the well-positioned and aggressive players.

A recently completed report by Convector Consulting NA, Inc. (CCNA) and *EEnergy Informer*, provides a comprehensive summary of the evolution of the UK's competitive market since 1990. This multi-client study includes the latest estimates of switchovers, including detailed coverage of what marketing strategies are being pursued among the competing suppliers, and how successful they are.

According to the CCNA report, over 75% of the UK market is able to choose its electricity supplier as of April. The full market is supposed to be open by the end of June. Prices have certainly fallen, though the available savings are somewhat less than were offered in the natural gas market. A saving of 10% on an electricity bill may be the norm in many cases—considerably less than the typical savings of 20% offered on natural gas.

Although information on customer switchovers is being collected by many, it is not publicly available. This is in contrast to California where a visit to the California Public Utilities Commission (CPUC) Web site provides frequently updated access to switchover statistics. However, OFFER has published periodic updates in its press releases. More up-to-date information is collected by various market research polls.

The Table below—from the CCNA report—shows a summary of the information released by OFFER and other sources at various times during the market opening process.

More Customers Are Switching

Date	Total Customers	Number Switched	Percentage
14 September 98	750,000	0	0.00%
30 September 98	1,350,000	15,000	1.10%
23 December 98	6,000,000	165,000	2.75%
25 January 99	15,000,000	300,000	2.00%
3 March 99	20,000,000	600,000	3.00%
26 March 99	21,000,000	800,000	3.81%

Source: Adapted from *Competition in the Domestic Electricity Market in the UK*, published by Convector Consulting NA, Inc., April 1999. Original data is from various OFFER press releases and other sources.

While these switchover percentages are low compared to Pennsylvania, they are substantially better—both in absolute terms as well as in percentage terms—than what has been achieved in California (1.1%, as of February 15, 1999). Furthermore, the figures are on the low side because of the phased market opening and delays in processing switching requests.

From the beginning, OFFER has maintained that over 1 million customers have registered an intention to switch as soon as they are able to do so. Centrica (formerly, British Gas)—which is among the most active in the market—claims to have

a million electricity customers. These larger figures are a result of counting people who have signed contracts and perhaps been registered, but have not yet actually started with a new supplier.

The same report by Convector Consulting quotes Chris Rix of the Electricity Association, estimating that the current level of switching is around 5%. He “unofficially” predicts that around 20% of domestic customers will have switched by the end of the first twelve months of market operation.

For most of the public electricity suppliers—or PESs—the opening of the domestic market does not look promising. Only four companies have gained customers—at the expense of the losers. More interesting, Centrica, a non-electric company, has been the greatest beneficiary thus far. It has gained more than twice all the other gainers put together, according to the report. The power of its nationwide presence and customer database is clearly showing.

This 200-page report provides the most comprehensive analysis of the UK market to date, including a discussion of the performance and strategies of the key players. Further information is available at <http://members.aol.com/einformer/uktoc.pdf>

* Fereidoon P. Sioshansi is a Partner with Convector Consulting Inc. in Menlo Park, CA. He edits and publishes the *EEnergy Informer*, a monthly newsletter. This is an edited version of an article which appeared in the May 1999 issue and is available on the web at <http://members.aol.com/einformer>.

Award Recommendations Solicited

The IAEE Awards Committee, chaired by Immediate Past President Charles Spierer, seeks recommendations from the membership for the Association's 1999 Awards.

Annually, the Association makes two awards: The *Outstanding Contributions to the Profession* Award and the *Journalism* Award. Occasionally, it also makes an award for *Outstanding Contributions to the Association*.

The *Outstanding Contributions to the Profession* award is made to an individual judged to have made singular contributions to the field of energy economics and its literature. The award was won in 1996 by Michael Hoel, in 1997 by Robert Pindyck and in 1998 by Colin Robinson

The *Journalism* award is made for excellence in written journalism on topics relating to international energy economics. It was won in 1996 by Isabel Gorst, in 1997 by Anne-Marie Johnson and in 1998 was shared by John Jennrich and Toni Mack.

The *Outstanding Contributions to the Association* award is made to an individual judged to have made a distinguished and significant contribution to the IAEE and its well-being. It was given in 1993 to Toyoaki Ikuta, in 1994 to Melvin Conant and in 1998 to Subroto.

Recommendations should include a letter citing reasons why the committee should consider the individual being nominated along with samples of the individual's work that would be relevant to consideration.

Recommendations should be sent to:

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The Costs of the Kyoto Protocol: A Multi-Model Evaluation

Edited by John P. Weyant
(Energy Modeling Forum, Stanford University)

This Special Issues represents the first comprehensive report on a comparative set of modeling analyses of the economic and energy sector impacts of the Kyoto Protocol on climate change. Organized by the Stanford Energy Modeling Forum (EMF), the study identifies policy-relevant insights and analyses that are robust across a wide range of models, and provides explanations for differences in results from different models. In addition, high priority areas for future research are identified. The study produced a rich set of results. The 448-page volume consists of an introduction by John Weyant and a paper by each off the thirteen international modeling teams. More than forty authors provide richly illustrated descriptions and of what was done and concluded from the model runs that were undertaken.

Contents

- Introduction and Overview by *John Weyant and Jennifer Hill*
- The Kyoto Protocol: A Cost-Effective Strategy for Meeting Environmental Objectives? By *Alan Manne and R. Richels*
- The Economics of the Kyoto Protocol by *Christopher MacCracken, Jae Edmonds, S. Kim and R. Sands*
- Adjustment Time, Capital Malleability and Policy Cost by *Henry Jacoby and Ian Sue Wing*
- Requiem for Kyoto: An Economic Analysis of the Kyoto Protocol by *William Nordhaus and Joseph Boyer*
- Kyoto, Efficiency, and Cost-Effectiveness: Applications of FUND by *Richard Tol*
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- CO₂ Emissions Control Agreements: Incentives for Regional Participation by *Stephen Peck and Thomas Teisberg*

ABOUT THE EDITOR: John P. Weyant is a professor of engineering-economic systems and Director of the Energy Modeling Forum (EMF) at Stanford University. His current research focuses on analysis of global climate change policy options and models for strategic planning.



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Major Authors include: Alan Manne, Chris MacCracken, Jae Edmonds, Henry Jacoby, William Nordhaus, Richard Tol, Atsushi Kurosawa, Arjen Gielen, Mikiko Kainuma, Tsuneyuki Morita, David Montgomery, Thomas Rutherford, Vivek Tulpule, Brian Fisher, Warwick McKibbin, Peter Wilcoxon, Adrian Cooper and Stephen Peck.

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The Mediterranean Oil Markets: Issues and Implications

By Mohamed T. Yousef*

Good morning, ladies and gentlemen. I am honored to have been invited to speak today on a subject of great interest to all of us – the Mediterranean energy market.

The Mediterranean is at a cross-roads between the Atlantic Basin on the one hand and the previously expanding oil economies of the Far East on the other. Although this provides excellent oil trading opportunities, it also means that the region is vulnerable to international changes in both the quantity and quality of crude oil and products supply and demand.

This is, of course, in addition to the “internal” market of the region itself. Although there are clear links between the individual countries bordering the Mediterranean Sea, the market is better understood if looked at as three distinct parts:

- Southern OECD Europe, including southern France and southern Germany, as well as Austria and Switzerland but excluding Portugal;
- The north African countries and the eastern Mediterranean – from Morocco to Lebanon;
- Countries of the former east bloc which border on the Adriatic and the Black Sea.

These three subdivisions of the Mediterranean have different characteristics in terms of market structures and growth potential as shown by:

- The rate of population growth;
- Gross Domestic Product per capita;
- Energy intensity – measured in barrels of oil equivalent per \$1,000 of GDP.

This emphasizes the extent of the differences between the sub-regions and provides a pointer towards the potential variations in future energy and oil demand growth.

In economic and energy terms, the Mediterranean is dominated by southern Europe. Although these countries represent less than half the area’s total population, they account for around three-quarters of the Mediterranean’s energy and oil consumption and economic wealth.

Although much smaller in size, the countries of the former eastern Europe play a disproportionately large role in terms of oil and energy use. Despite major structural changes since the end of the Soviet era, the legacy of inefficient, heavy industries remains. This is reflected in the fact that these are the least energy-efficient economies in the area. An energy input of over 4 bbls oil equivalent is required to generate each \$1,000 of Gross Domestic Product – compared with around 2 bbls oil equivalent in other parts of the Mediterranean.

North Africa and the countries of the eastern Mediterranean have greatest potential, in terms of future energy supply and demand growth. Recent strength in population growth and economic activity is likely to continue and there is scope for modest increases in per capita and per unit GDP and energy use as disposable incomes rise, access to personal transportation grows and industrialization continues.

Having established a regional framework for analyzing the

* Mohamed T. Yousef is Vice Chairman, Tamoil Italia SpA. This is an edited version of his talk at the 22nd annual IAEE international meeting, June 9-12, Rome Italy.

Mediterranean, I would like to examine the following areas:

- Primary energy demand and oil demand
- Products qualities and the impact on the refining industry
- The crude oil market background
- The refining position
- Products trade implications
- Conclusions

Primary Energy Demand

Let us now look at primary energy use for the Mediterranean as a whole.

The past 12 years have seen an increase of some 3 million b/d oil equivalent, concentrated in oil and natural gas. In fact, consumption of solid fuels has actually declined by over 1 million b/d – with almost half of the decline in the former eastern Europe.

Looking ahead over the next 10 years (Chart 4), we can see that energy demand could expand by around 2% each year – or about 6 million b/d oil equivalent over the whole period – assuming economic growth of about 3% a year.

This assumes that environmental concerns lead to a gradual reduction in energy and oil intensity. In addition, there will be an increasing impact on energy use from emission reduction targets from 2005 onwards.

The growth is likely to be concentrated in natural gas use and, to a lesser extent, oil.

The most significant change in energy market structure is the increase in natural gas demand, accounting for around 60% of the total increase in primary energy. As a result, gas’s share of the energy market will rise from 20% currently to about 30% by 2010.

There are a number of reasons for this.

- Gas has lower emissions of both sulphur and CO₂ than coal or oil and this is important for the power generation sector.
- Deregulation of the natural gas and electricity markets in Europe will increase demand for natural gas. In the gas industry, the removal of transmission and distribution monopolies will create more open market access, increased competition and hence lower prices. There will be also new entrants into the liberalized electricity sector, and with the removal of coal’s previously protected role, power generators are expected to switch to gas. Combined cycle gas turbine technology, in particular, has become a popular option, having a short construction phase, fuel efficiency and relatively lower capital cost.

In addition, natural gas will benefit from competition emerging between the larger suppliers – such as Russia, Algeria and potentially also Central Asia, in Turkmenistan and Iran.

Oil Demand

The growing role of gas has had a significant impact on oil demand in recent years.

Against a background of some 2 million b/d growth in total oil use, residual fuel oil consumption actually declined slightly. If use had not been rising in north Africa and the eastern Mediterranean, the drop would have been even sharper.

In short, although oil has maintained its share of around 47% of primary energy requirements, this hides a trend towards declining power sector use and increasing concentration in the transportation and petrochemical sectors.

Looking to the future, we would conclude that average

economic growth of around 3% per annum would generate an incremental 2 million b/d of oil demand for the Mediterranean region as a whole through 2010.

Two further key assumptions underlie the outlook for oil demand:

- Oil intensity could actually rise over the medium term in the southern and eastern Mediterranean, due to rapid economic and population growth, with this area accounting for 50% of the total increase in oil use. In contrast, oil intensity should continue to decline in southern Europe and the former eastern Europe.
- Oil use is expected to become increasingly concentrated in the transportation and petrochemical sectors, with fuel oil use declining by a further 300,000 b/d. Fuel oil demand is only likely to grow in the developing power generation and industrial sectors of the southern and eastern Mediterranean, where energy demand is expected to out-pace the development of a non-oil infrastructure.

Within the transportation sector, diesel will continue to gain market share from gasoline. This is already evident in Europe, where diesel use is currently similar to gasoline, up from only 35% of the road fuels market in the mid-1980s. And European governments on the whole show no sign of removing the fiscal advantage to the consumer that has supported this increase in diesel's share. As automotive diesel engines are more energy efficient than gasoline, diesel's market share stand to rise further in the future, with gasoil and diesel oil accounting for 50% of increased oil requirements.

Products Qualities

Changes in products quality, however, are becoming as important as developments in volume. The European Union has already agreed on tighter gasoline and diesel specifications for the year 2000 under the "Auto-Oil" program, with further progress on year 2005 specifications expected in 1999.

The main features are:

- A reduction in sulphur content of gasoline and diesel, with diesel cetane and density requirements and gasoline olefin content also being tightened;
- A complete phasing out of leaded gasoline. However, some slippage may be available from the 2000 deadline for refiners in southern Europe, where leaded fuel still has a larger market share than in North West Europe;
- Regulations to reduce heating gasoil and fuel oil sulphur contents are also being drawn up under the European Union Liquid Fuels Directive.

Although the limits we have discussed may apply only to the European or United States markets for now, Asia and Latin America are also progressively tightening fuel qualities. If the Mediterranean is to retain its position as a key swing trade center for global products, refiners in the region will have to respond to the challenge.

Impact on the Refining Industry

The refining industry will be affected in a number of different ways by these quality changes:

- Demand for low sulphur crude feedstock is likely to be boosted, although if low sulphur feedstocks are not available, refiners will need to invest in hydro-processing capacity to remove sulphur and match diesel cetane requirements;
- Rising hydrogen needs, resulting from additional hydro-

treating capacity, could force refiners to increase reforming, worsening Europe's existing imbalance between surplus gasoline and middle distillate tightness;

- Light straight run kerosene supplies will tighten, as their value as diesel blend-stock increases.

In addition, as products markets become more segmented, it will be less easy to switch production between products cuts, and production units, storage and shipment facilities will become increasingly product-specific. This will reduce supply-side flexibility and lead to increased price volatility.

Of course, not all refiners will make the significant investments needed to meet new fuel specifications. Some may already have the flexibility to alter their operating regime at low cost and others may become marketers of "off-spec" product. The remainder will face a stark choice between high investment or closure.

On the whole, the refining sector in the Mediterranean is less advanced than in North West Europe in terms of octane and hydro-processing capability, so refiners in the Mediterranean face greater problems in adapting to changing product specifications. Substantial investment will obviously be made, but there will also be restructuring and closures.

The Crude Oil Market Background

Crude oil prices are expected to remain relatively low over the medium term, with little scope for a sustained recovery above \$15/bbl for Brent. And this is likely to encourage further rationalization in the European downstream. Further ahead, however, the low oil price will cut into non-OPEC supplies, boosting the call on OPEC and providing scope for higher prices by the second half of the next decade.

An examination of marginal crude oil supply and demand indicates a continued tightness in the heavy crude market over the next 3-4 years. This implies a relative strength in Urals prices until 2003, when increased supplies of Arab Gulf crude start to force a global widening in light versus heavy crude differentials.

Urals prices will be further weakened as the Mediterranean becomes broadly crude self-sufficient by 2005.

The key to this self-sufficiency lies in the outlook for production from Algeria and Libya, together with the likely volume of Iraqi and FSU exports passing through the Mediterranean. Total liquids production from Algeria and Libya currently amounts to some 3 million b/d. This could rise by at least a third by 2010.

The Refining Position

The Mediterranean region has installed a crude distillation capacity of 10.4 million b/d, with the majority of both simple and complex capacity concentrated in southern Europe.

Current utilization rates are relatively high in southern Europe and the southern and eastern Mediterranean, with any significant spare capacity concentrated in eastern Europe.

However, it is not clear whether substantially higher utilization rates can be achieved in practice without further investment. Investment is also needed to produce products in line with existing, let alone future, European specifications.

We can expect fuel oil conversion and product quality-based additions to remain the focus of refinery investment in the next few years.

On the basis of firm plans – that is, projects already

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The Mediterranean Oil Markets *(continued from page 21)*

underway – regional distillation capacity will increase by 230,000 b/d, heavily concentrated on projects in Egypt and Morocco, with only Turkey adding primary capacity within Europe. In contrast, cracking, octane-boosting and hydro-treating additions will be substantial and widespread throughout the region. Despite a period of relatively poor margins since the mid-1990s, the investments so far made in terms of firm capacity additions reflect an awareness of fuel oil's declining market share and the measures needed to meet new fuel specifications in Europe.

The story is rather different for projects currently at the planning stage, which represent the next generation of refinery investments. There are numerous proposals for expansions and new refineries, amounting to some 900,000 b/d and distributed throughout the Maghreb region to Lebanon, Syria and neighboring countries.

So far, however, the amount of upgrading capacity associated with these projects is either uncertain or limited. Clearly, given the lightening of the demand barrel, and a growing need for ever-cleaner products, substantial further cracking, octane and hydro-treating investment will be needed. The extent to which this investment takes place may depend upon a fundamental re-orientation in the structure of the downstream sector in the Mediterranean.

Products Trade Implications

So just what does the future hold for the Mediterranean in terms of its traditional role at the cross-roads of global products trade? Note the following:

- The region is a significant net importer of gasoline, gas/diesel oil and fuel oil, much more so than when east Europe's refineries were operating closer to capacity levels;
- Significant volumes of gasoline can be sourced from the North West European refining region, which has a substantial structural gasoline surplus;
- Gasoil and fuel oil enter the region in significant volumes through the Russian Black Sea ports, while Algeria's refineries provide low sulphur diesel supplies for southern Europe;
- The region is long in straight-run products such as jet/kerosene and naphtha, with north African refineries again the main source of export cargoes.

Purely on the basis of firmly planned capacity additions, how is this position likely to change?

Despite the apparently high levels of new upgrading capacity already under construction, the combination of higher runs and static fuel oil demand could lead to a substantial fuel oil surplus by 2005, with the main distillate products in deficit.

This suggests that, although total oil demand growth through 2005 can be met by raising utilization to 95%, currently planned cracking additions are insufficient. Indeed, we would estimate that the system needs an average of around 115,000 b/d of new upgrading capacity every year to minimize the potential fuel oil surplus. Comparing this with capacity under construction suggests a potential annual average shortfall of some 80,000 b/d. To put this into context, since 1990 annual upgrading capacity additions have averaged only around 50-60,000 b/d.

Conclusions

The international oil industry is currently undergoing a

major restructuring, which is already having an impact on the Mediterranean downstream. As long as oil prices remain low this global trend is likely to continue and, combined with specific regional factors, could lead to significant changes in the structure of the Mediterranean downstream. The key factors involved here are:

- The anticipation that crude prices and oil company profitability will remain weak over the medium term. This will maintain pressure on European integrated operators to seek further cost reductions and efficiency gains through consolidation, capacity closures, alliances and mergers;
- The privatization of the eastern European refining systems finally appears to be getting underway. This will lead to much-needed investment in outdated facilities, allowing higher throughputs and products exports;
- Liberalization moves in north Africa and the eastern Mediterranean look set to gather momentum and will allow greater involvement in the downstream by foreign operators;
- Growing opportunities to link downstream oil activities with natural gas distribution and marketing and power generation will also alter the nature of the Mediterranean downstream.

Even before last year's price collapse, international oil companies were under pressure to restructure their European downstream operations to reduce costs and increase financial returns. The problems in Europe were brought into focus by the relative success already achieved in the USA. There, however, the market structure lent itself more easily to the disposal of refining capacity to third party independents and to the merging of downstream operators of similar size and complementary geographic structures.

Although this had minimal impact on overall refining margins, since there has been little or no capacity closure, it has improved individual company profitability through cost reductions, as well as enhancing overall financial performance.

Privatization in the former east bloc countries of the Mediterranean, especially in Bulgaria and Romania, is leading to the re-activation of under-utilized capacity. The need for additional investment, not just to meet tighter product specifications, but even to meet current specifications, has already been discussed.

Although there has been little downstream liberalization or privatization to date in the southern Mediterranean region, except for Morocco, there are clear signs that this is now starting to happen, especially in Algeria and Egypt. This is expected to become more apparent in the next few years, especially in a climate of low oil prices.

Whether this will lead to an increase in investments in new refining capacity remains to be seen. However, state funding is bound to diminish, whilst private capital is more likely to be directed towards improving distribution and retailing facilities than adding refining capacity – unless this is needed for domestic demand growth and/or products quality improvements.

Turning to the non-oil sector, the changing nature of the natural gas and electricity markets will make it possible for newcomers to enter, not only the natural gas "midstream" business, but also electricity generating and distribution. Some oil companies will view this as an opportunity to establish a fully integrated and diversified new energy business, with

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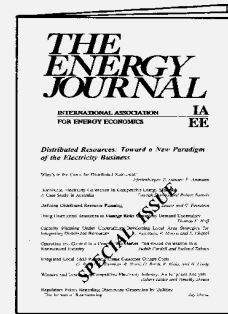
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Theme

Energy Markets and the New Millennium: Economics, Environment, Security of Supply

The year 2000 is an ideal time to reflect on the dominant role of fossil fuels over the past century and assess how this pattern of reliance will change in the context of the liberalisation of energy markets and environmental pressures and concerns. This conference will consider: electricity market liberalisation: international experiences and expectations; the economics of renewable energy technologies; Asian energy markets and macro-financial management; liberalisation of international trade in energy resources; the geopolitics of energy supply: social, cultural, political and philosophical dimensions of energy sector restructuring; transport policy in the new millennium; and carbon sequestration and recycling.

Sydney (the Olympic City in the year 2000) has many attractions for both participants and accompanying persons, in addition to the world famous Harbour Bridge and Opera House. City and harbour tours are readily available, while longer trips into the Australian “bush” can be made with a hire car. World class vineyards are just two hours drive to the north of Sydney, sharing the area with some of Australia’s largest open cast coal mines. The nation’s capital, Canberra, is a 40-minute flight to the south of Sydney.

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President Hoesung Lee Addresses the Gala
Dinner

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the 2000 International Meeting

Georg Erdman and Hans Larsen listen to Lee Shipper

Tony and Carol Finizza with Kevin Leydon

John Ferriter accepts a coin of appreciation from Edgardo Curcio

Guy and Donna Causo with John Ferriter and friend

The Mediterranean Oil Markets (continued from page 23)

long term prospects of high growth. Some, such as ENI and Repsol, have already taken steps along this route, whilst others (Shell and BP, for example) appear to be preparing the ground for such moves.

It is clear that the nature of the Mediterranean oil market will change significantly in the coming decade. If this change is to be managed smoothly and effectively, it needs to be carried out in an environment of co-operation and dialogue, recognizing the synergies between the countries that form the Mediterranean region. Such steps in this direction as have already been taken have largely been at a government level, with the European Commission playing an active role. However, to be truly effective, it will be necessary to extend this approach to the private sector.

In closing, I would like to emphasize the ever increasing importance of active dialogue between key players in the Mediterranean, with a view to approaching the way forward in a spirit of co-ordination and co-operation.

Energy Job Openings

At the IAEE International Conference in Rome there was discussion on offering an opportunity of listing energy related employment opportunities on the Association's website. Interested employers may submit their employment listings electronically to IAEE Headquarters (e-mail: iaee@iaee.org).

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For President-elect	Arild Nystad
For VP for Conferences	Michelle Michot Foss
For VP for Publications	Hossein Razavi
For VP and Secretary	Jean-Philippe Cueille

Members of this year's Nominating Committee, in addition to O'Brien, were Past President's Denny Ellerman, Ulf Hansen, Jean Masseron, and Kenichi Matsui.

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7/99 News

Publications

Electric Utility Planning and Regulation, Edgard Kahn (1991). 339pp. Price \$27.00. Contact: American Council for an Energy-Efficient Economy, 1001 Connecticut Avenue, NW, Suite 801, Washington, DC 20036.

Turning Off the Heat: Why America Must Double Energy Efficiency to Save Money and Reduce Global Warming, Thomas Casten (1998). 269pp. Price \$26.95. Contact: American Council for an Energy-Efficient Economy, 1001 Connecticut Avenue, NW, Suite 801, Washington, DC 20036.

European Power Daily. Subscription. Price \$1200/year. Contact: Standard & Poor's Platt's, Wimbledon Bridge House, 1 Hartfield Road, London SW19 3RU, United Kingdom. Phone: 44-181-543-1234. Fax: 44-181-545-6269.

World Energy Outlook. 1998 Edition. Price \$120.00. Contact: IEA Publications, PO Box 2722, London W1A 5BL, United Kingdom. Phone: 44-171-896-2245. Fax: 44-171-896-2244.

China's Oil Industry and Market, H.H. Wang (1999). 428 pp. Price: \$100.00. Contact: Elsevier Science, PO Box 211, 1000 AE Amsterdam, The Netherlands. Phone: 31-20-485-2603. Fax: 31-20-485-2425.

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Calendar

August 29 - September 1, 1999, 20th USAEE/IAEE Annual North American Conference - "The Structure of the Energy Industry: The Only Constant is Change." Orlando, Florida, USA. Contact: USAEE/IAEE Headquarters, 28790 Chagrin Blvd., Ste. 350, Cleveland, OH 44122. Phone: 216-464-5365. Fax: 216-464-2737. E-Mail: iaee@iaee.org URL: www.iaee.org

6-10 September 1999, Contracts in the Oil and Gas Industries: Negotiating and Drafting. University of Dundee, Scotland, UK. Contact: Mrs. Moira McKinlay, CEPMLP/University of Dundee, Dundee DD1 4HN, Scotland, UK. Phone: 44-1382-344303. Fax: 44-1382-345854. E-mail: m.r.mckinlay@dundee.ac.uk URL: www.cepmlp.org

9-10 September 1999, Oil Price Challenges into the Next Century. Houston, Texas. Contact: Samantha Holloman, Pennwell, 1700 W. Loop South, Suite 1000, Houston, TX 77027. Phone: 713-963-6251. Fax: 713-963-6212. E-mail: samantha@pennwell.com

13 September 1999, Sixth Grove Fuel Cell Symposium. London, UK. Contact: Phillipa Orme, Sixth Grove Fuel Cell Symposium Secretariat, 12 Church Street, West Hanney, Wantage, Oxon OX12 0LN, UK. Fax: 44-1235-868811. URL: www.elsevier.nl/locate/fuelcell99

13-14 September 1999, Oil and Gas in Brazil. Craine Plaza, New York. Contact: Jon Neale, Business Development, CWC Associates, Business Design Centre, 52 Upper Street, London N1 0QH. Phone: 44-171-704-6742. Fax: 44-171-704-8440.

13-17 September 1999, UK Oil and Gas Law. St Andrews, Fife, Scotland, UK. Contact: Mrs. Moira McKinlay, CEPMLP/University of Dundee, Dundee DD1 4HN, Scotland, UK. Phone: 44-1382-344303. Fax: 44-1382-345854. E-mail: m.r.mckinlay@dundee.ac.uk URL: www.cepmlp.org

15-17 September 1999, PowerTrends. Philippines. Contact: Alice Goh Project Manager, Interfama International Pte Ltd., 1 Maritime Square #09-36 World Trade Centre Singapore 099253. Phone: 65-2766933. Fax: 65-2766811. E-mail: w2608@singnet.com.sg

16-17 September 1999, World Oil Prices. Hyatt Carlton Tower, Cadogan Place, London. Contact: Jon Neale, Business Development, CWC Associates, Business Design Centre, 52 Upper Street, London N1 0QH. Phone: 44-171-704-6742. Fax: 44-171-704-8440.

20-21 September 1999, A New Era for Energy? Price Signals, Industry Structure and Environment. St. John's College, Oxford. Contact: Mrs. Mary Scanlan, Administrative Secretary, BIEE, 37 Woodville Gardens, London W5 2LL, UK. Phone: 44-181-997-3707. Fax: 44-181-566-7674.

20-21 September 1999, Oil and Gas in Angola. One Whitehall Place, London, UK. Contact: Jon Neale, Business Development, CWC Associates, Business Design Centre, 52 Upper Street, London N1 0QH. Phone: 44-171-704-6742. Fax: 44-171-704-8440.

20-21 September 1999, Energy Utilities Advanced Valuation. NM Rothschild Ltd., London, UK. Contact: Mrs. Moira McKinlay, CEPMLP/University of Dundee, Dundee DD1 4HN, Scotland, UK. Phone: 44-1382-344303. Fax: 44-1382-345854. E-mail: m.r.mckinlay@dundee.ac.uk URL: www.cepmlp.org

21-22 September 1999, Gas and Power in India. Hyatt Carlton Tower, Cadogan Place, London, UK. Contact: Jon Neale, Business Development, CWC Associates, Business Design Centre, 52 Upper Street, London N1 0QH. Phone: 44-171-704-6742. Fax: 44-171-704-8440.

22-24 September 1999, 2nd International Energy Symposium - New Worlds. Stift Ossiach, Carinthia - Austria. Contact: Dr. A. Reuter, Verbundplan GmbH, Kohldorfer Strasse 98, A-9020 Klagenfurt, Austria. Phone: 43-1-536 05-32560. Fax: 43-463-23 97 29. E-mail: reutera@verbundplan.at

23-24 September 1999, Re-identifying and Meeting China's Oil and Gas Demand: Opportunities for Co-operation. Waldorf Hotel, London, UK. Contact: Jon Neale, Business Development, CWC Associates, Business Design Centre, 52 Upper Street, London N1 0QH. Phone: 44-171-704-6742. Fax: 44-171-704-8440.

23-24 September 1999, Co-operation for Competition: The Emerging European Regulatory System in Implementing the
(continued on page 32)

Conference Proceedings 21st IAEE International Conference Quebec, Canada May 13-16, 1998

The Proceedings from the 21st International Conference of the IAEE held in Quebec, Canada, are now available from IAEE Headquarters. Entitled *Experimenting with Freer Markets: Lessons from the Last 20 Years and Prospects for the Future*, the proceedings are available to members for \$89.95 and to nonmembers for \$99.95 (includes postage). Payment must be made in U.S. dollars with checks drawn on U.S. banks. To order copies, please complete the form below and mail together with your check to: Order Department, IAEE Headquarters, 28790 Chagrin Blvd., Suite 350 Cleveland, OH 44122, USA

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Calendar (continued from page 31)

EU Energy Directives. Crowne Plaza Hotel, Brussels. Contact: Mrs. Moira McKinlay, CEPMLP/University of Dundee, Dundee DD1 4HN, Scotland, UK. Phone: 44-1382-344303. Fax: 44-1382-345854. E-mail: m.r.mckinlay@dundee.ac.uk URL: www.cepmlp.org

26 September – 1 October, Natural Gas: The Commercial and Political Challenges (Alphatania Training Course). Cricklade, Wiltshire, England. Contact: Esther Musoke, Course Administrator, The Alphatania Partnership, Rodwell House, 100 Middlesex Street, London E1 7HD, United Kingdom. Fax: 44-171-650-1401. E-mail: training@alphatania.com

27-28 September 1999, Corporate Transformation in the Gas Industry. Dorchester Hotel, London, UK. Contact: Jon Neale, Business Development, CWC Associates, Business Design Centre, 52 Upper Street, London N1 0QH. Phone: 44-171-704-6742. Fax: 44-171-704-8440.

27-28 September 1999, 1999 Market Forecasting Conference. Washington, DC. Contact: EPIS, Inc., 18813 Willamette Drive, West Linn, OR 97068. Phone: 503-675-0387. E-mail: ron@epis.com URL: www.epis.com

28-29 September 1999, 1999 Natural Gas Conference. Montreal, Quebec, Canada. Contact: Industrial Gas Users Association. Phone: 613-236-8021. Fax: 613-230-9531. E-mail: igua@igua.ca

4-6 October 1999, Middle East Strategy: To the Year 2012. Contact: APS House, PO Box 23896, Nicosia, Cyprus. Fax: 357-2-350265 E-mail: apsnews@spidernet.com.cy

13-15 October 1999, 6th Annual Indaba Africa Upstream '99. Cape Town, South Africa. Contact: Global Pacific & Partners Pty Ltd., 8 Victory Road, Greenside, 2193, Johannesburg, South Africa. Phone: 27-11-782-3189. Fax: 27-11-782-3188. E-mail: global.pacific@pixie.co.za

18 October 1999, SNS Energy Day 1999: Corporate Restructuring of the Global Energy Industry: Driving Forces and

Implications. Stockholm, Sweden. Contact Judit Weibull, Phone: 46-8-507-025-74. Fax: 46-8-507-025-45.

18-20 October 1999, Hydropower into the Next Century. Gmunden, Austria. Contact: Aqua-Media International Ltd., Westmead House, 123 Westmead Road, Sutton, Surrey, SM1 4JH, United Kingdom. Phone: 44-181-643-4727. Fax: 44-181-643-8200. E-mail: conf@hydropower.cix.co.uk

19-20 October 1999, European Electricity Summit. Europa Inter-Continental, Brussels. Contact: Global Business Conferences, Sycamore House, 5 Sycamore Street, London, EC1Y 0SG. Fax: 44-171-253-2798. Phone: 44-171-608-0541.

19-20 October 1999, Managing Mergers and Acquisitions in the International Petroleum Industry. Ashurst Morris Crisp, London. Contact: Mrs. Moira McKinlay, CEPMLP/University of Dundee, Dundee DD1 4HN, Scotland, UK. Phone: 44-1382-344303. Fax: 44-1382-345854. E-mail: m.r.mckinlay@dundee.ac.uk URL: www.cepmlp.org

21-22 October 1999, Kyoto Mechanisms Business Opportunities: The Value of Projects Selection, Verification and Certification. Basle, Switzerland. Contact: Wolfram Kaegi, Institute for Economy and the Environment, University of St. Gallen, Tigerbergstrasse 2, CH – 9000 St. Gallen, Switzerland. Phone: 41-71-224-25-83. Fax: 41-71-224-27-22. E-mail: Wolfram.Kaegi@unisg.ch URL: www.iwoe.unisg.ch/kyoto

21-22 October 1999, Kyoto Mechanisms Business Opportunities: Financial Aspects. Basle, Switzerland. Contact: Josef Janssen, Institute for Economy and the Environment, University of St. Gallen, Tigerbergstrasse 2, CH – 9000 St. Gallen, Switzerland. Phone: 41-71-224-25-89. Fax: 41-71-224-27-22. E-mail: Josef.Janssen@unisg.ch URL: www.iwoe.unisg.ch/kyoto

26-28 October 1999, PowerMart '99. AstroArena, Houston, Texas. Contact: FT Energy, 13111 Northwest Fwy, Suite 520, Houston, TX 77040. Phone: 713-460-9200. Fax: 713-460-9150. URL: www.powermart.com

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