IAEE International Association for Energy Economics
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Newsletter

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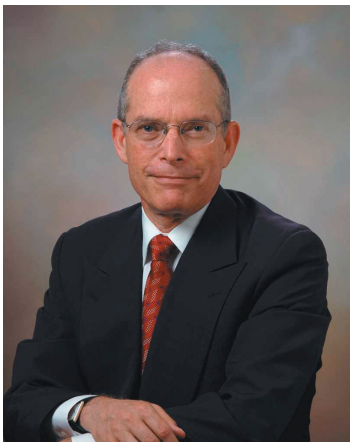
Fourth Quarter 2005

President's Message



Albuquerque, New Mexico: a mid-70s, balloon filled, blue sky October day in the foothills of the Sandia Mountains. 2005 is flying by, and I can't thank you enough for giving me the honor of serving as your President.

Our Association has had a great year—three very successful meetings—our international meeting in Taipei in June, our European meeting in August in Bergen, and our just concluded North American meeting in Denver. I had the pleasure of speaking in the opening plenaries in both the Bergen and Denver conferences, and I'm most grateful to our European and North American Affiliate hosts for that opportunity.

We've had two new Affiliates come into being, one in Turkey and one in Spain, and discussions are continuing with several other prospects as well. Our student membership has grown to 159, with over 42 new students joining IAEE through our three major meetings.

Council developed and approved our first IAEE mission statement (shown on page 5), and we are making excellent progress in our strategic planning discussions. Those of you involved in strategic planning know the value is in the process and implementation, rather than the document itself, and we hope to complete the process and begin implementation by the fourth quarter of 2006.

We've had some unhappiness, as well. It is with great sadness that I must report that Campbell Watkins, a past IAEE President and guiding light for *The Energy Journal* for many years, left us in early September; and that Dennis O'Brien, also a past IAEE President, left us just after the Denver conference. Both will be dearly missed. Andre Plourde and Tony Finizza share their appreciations on Campbell and Dennis elsewhere in this issue of the *IAEE Newsletter*.

In our energy markets, we've had more than our share of surprises. Just when oil markets tightened up with events in Russia, Venezuela and Iraq limiting supply, and strong economic growth in China and the US boosting demand, we thought things couldn't get much tighter--but hurricanes Katrina and Rita showed us otherwise. An unfortunate tragedy for many in the U.S. Gulf Coast, and it will take a long time to rebuild and restore. Oil prices breached $70 a barrel, and recently, natural gas prices breached $14 and MCF. While in the US we saw $3.00+ a gallon of gasoline for the first time, the UK and Western Europe saw their gasoline prices jump as well, with prices in the UK over $1.82 a liter, close to $7.00 a gallon. And with natural gas prices already so high, it will be a very difficult winter heating season in the U.S. And how these oil and natural gas price shocks will affect the U.S. and global economic growth remains to be seen.

We also saw a first hand demonstration on the importance of energy infrastructure protection and the risks of having too much of that infrastructure concentrated on one geographic location. Even though President Bush signed the first U.S. national energy law since 1992 in August, the Congress is already at work on a new energy bill.

Needless to say much remains to be done around the globe to improve the transparency and interconnectedness of our energy, economic and environmental policies, and the

(continued on page 5)

Editor's Notes

Donald Hertzmark examines the restructuring needs of Iraq's oil sector against five different production scenarios over the next five to six years. These output scenarios range from a production decline in 2008 in the 500-750mbd range, up to enhanced production in the 6+ mmbd range. He analyses best practices for NOC management, as well as overall oil sector governance and legal/regulatory developments, as these matters relate to each of the five scenarios. The impacts of recent constitutional issues have been factored into the potential production scenarios.

(continued on page 5)

G. Campbell Watkins, 1939-2005

An Appreciation

It is particularly poignant to note that Campbell Watkins and the environmental economist David Pearce were old school friends and that both succumbed to cancer within days of each other early in September. While not unexpected, Campbell's death has left not only a void in me, but also – as is the case for many of you I'm sure – a deep desire to ensure that we recognize his enormous influence on and importance to energy economics in general and, more specifically, to the IAEE, and *The Energy Journal*.

Campbell completed all of his formal training in economics in the UK. He first obtained a BA and an MPhil at the University of Leeds. His PhD at the University of Aberdeen was completed some years after his move to Canada, where he spent the bulk of his professional career. And what a career it was!

As an association, the IAEE seeks to bring together energy professionals from industry, the public sector, consulting/research organizations, and academia. From that perspective, Campbell was the quintessential IAEE member: different stages of his career took him through all of these various facets of the energy sector. He spent a number of years in industry, working for the Royal Bank of Canada and for Alberta Gas Trunk Line – the intra-Alberta natural gas collection and transmission system now part of the TransCanada PipeLines family.

Campbell also spent many years working for Alberta's Energy Resource Conservation Board (one of the predecessors to the existing Alberta Energy and Utilities Board) – a public organization charged with ensuring that the development and production of the province's non-renewable natural resources were undertaken in the public interest. Then, for more than two decades, Campbell worked as a consultant – first with his own Calgary-based company, DataMetrics, and in later years for Charles River Associates and LECG. This work also led him to act as a high-level advisor on energy policy to governments in Canada and around the world, including – most recently – in his adopted home province of British Columbia. His list of clients from those years is impressive and shows the depth and scope of his knowledge, and testifies to the respect which he commanded in our profession.

Campbell was also a presence in the academic world. A long-standing Adjunct Professor of Economics at the University

of Calgary, he also held an Honorary Professorship at the University of Aberdeen. For a time he was titular of the Saudi Aramco Chair in Energy Economics at King Fahd University of Petroleum and Minerals in Saudi Arabia and a Visiting Scholar with MIT's Energy and Environmental Policy Research Centre. Campbell was also much in demand as an invited speaker, having given more than 175 presentations, guest lectures, and the like in the course of his career. All of which testifies to the respect accorded to his work and his international reputation as a scholar.

Campbell had a deep appreciation for the need to produce and disseminate high-quality research that would shed light on issues of importance to the energy sector. His publication record is outstanding: some 45 papers in refereed journals, ranging from specialized energy-related outlets to top general journals in economics, such as the *Journal of Finance*. He also published some 20 papers in edited volumes and edited three such collections himself. Campbell was also co-editor of two volumes of IAEE/USAEE conference proceedings.

But his role in the production of proceedings volumes is but a tiny indication of Campbell's contribution to our Association. He was an appointed member of IAEE Council from 1982 to 1985, and served two terms as Vice President for Publications between 1986 and 1989. He was then the first – and still the only – Canadian to be elected President of the IAEE – a position he occupied in 1991.

Those of us who have been around that long know of the dire financial situation in which the IAEE found itself in the early 1990s. We should be grateful to Campbell for having had the courage to exercise leadership on such a difficult issue, for he played a critical role in setting our Association on the successful path on which it finds itself today.

Another dimension of Campbell's service to our profession that I suspect many of you might not be aware was his involvement in the American Statistical Association. Campbell was a member of that Association's Energy Statistics Committee beginning in 1992 and culminating with the chairmanship of this committee in 1997. He recognized the critical importance of good data to economic analysis and, in characteristic manner, he did something about it by investing time and effort in ensuring that the methodologies used in the collection of energy-related statistical information were appropriate and that the kinds of information collected were useful to analysts.

The Energy Journal is the flagship publication of the IAEE and is now widely recognized as the highest-quality journal in the field of energy economics. And since 1997, Campbell played a key role in securing and enhancing the *Journal*'s sterling reputation. His co-editor, Adonis Yatchew, recounts how Campbell approached his duties with dedication, integrity, and enthusiasm. Many of us have benefited from the fact that he saw it as part of his duties and responsibilities as editor to provide extensive and useful feedback to authors – whether or not the papers had been deemed suitable for publication in *The Energy Journal*.

As Peter Pearson – who was Vice President for Publications when Campbell was appointed co-editor – relates, Council then believed that he would make a splendid editor. The intervening eight years have certainly proven them right.

From a Canadian perspective, it is difficult to convey to you just how important a role Campbell played in moving Canadian energy policy to the much sounder footing that emerged in the late 1980s. Campbell was a ubiquitous, unavoidable voice for the development of sound economic underpinnings to Canadian energy policy in the decade between the mid-1970s and the mid-1980s, when policy processes and outcomes in Canada went through a series of rather confused and downright silly phases. Through it all, Campbell remained a voice – sometimes a rather strident voice – for energy policy based on sound economic principles and articulated in ways that reflect the operational realities of the sector.

Campbell also had a less serious side: he was, among other things, an avid sports enthusiast. Chances are that if a sport involved a racquet, Campbell played it and played it well. He was also a talented player and passionate fan of football – that's soccer to those of us on this side of the Atlantic. In the early months of 2005, he took great pleasure urging on his beloved Liverpool as they – rather unexpectedly – went on to win Europe's League of Champions.

Given Campbell's impressive record of achievement and his contribution to the IAEE, it is only fitting that we as an Association recognize his work. Campbell once explained to me that one of the things he was particularly proud of was the role he the played in the establishment of *The Energy Journal*'s Best Paper Award. It makes it thus even more fitting that IAEE Council, acting on a recommendation from Georg Erdmann (the current Vice President for Publications) and Adonis Yatchew, has unanimously endorsed the renaming of this award to the *Campbell Watkins Energy Journal Best Paper Award*.

In addition, given Campbell's sustained publication record and his long-standing connection to the University of Aberdeen, it gives me great pleasure to inform you that Professor Alex Kemp has agreed to edit a special issue of the *Journal* designed to commemorate Campbell's contribution to research in energy economics. Heartfelt thanks are extended to Peter Davies and all our friends at BP who, as their own tribute to Campbell's career, will sponsor the production of this special issue.

Campbell brought to all his work a high degree of integrity, clarity of thought, and clarity of expression. And he expected it from those around him. As is the case for many of you, Campbell was an important part of my professional life and a loyal friend. We will all miss him; truth be told, I miss him already. But I also rejoice in having been fortunate enough for our paths to have crossed. He was truly an exceptional man.

André Plourde
University of Alberta

SECURING ENERGY IN INSECURE TIMES

June 7-10, 2006 Kongresshotel am Templiner See Potsdam/Berlin, Germany

29th IAEE International Conference

Conference Chair: Prof. Dr. Georg Erdmann, Berlin Univ of Technology (georg.erdmann@tu-berlin.de)
Program Chair: Prof. Dr. Ulf Hansen, Rostock University (ulf.hansen@uni-rostock.de)
Sponsorship Chair: Dr. Andreas Auerbach, CEO Mitgas GmbH, Halle (andreas.auerbach@mitgas.de)

Conference Objectives and Aims

The management of energy industries has become subject to new insecurities and uncertainties: imbalance between energy supply and demand due to insufficient investment; regulation uncertainties, particularly with regard to grid access and greenhouse gas policy after Kyoto; strategic supply insecurity; market entry of renewables and distributed power generation; integration of power and gas; nuclear resurrection; new and efficient energy technologies and emerging markets for power; new challenges to corporate goernance; and geopolitical rifts and risks.

Plenary Sessions

Energy in an Insecure World Securing Oil and Gas supplies Kyoto and Beyond
Long-term Contracts, Vertical Integration, and Competition in Electricity and Gas Markets
Sustainable Transportation Renewables' Role in Securing Energy
Long-term Technology and Policy Choices

**** CALL FOR PAPERS ****

Abstract Submission Deadline: January 15, 2006

Concurrent sessions will be organized from accepted abstracts. Please submit abstracts of one to two pages in length, comprising (1) overview, (2) methods, (3) results, and (4) conclusions. Please attach a short CV. For a sample abstract please visit http://www.gee.de/2006-IAEE/sample-abstract.doc. Accepted abstracts will be published in the printed abstract volume. At least one author of an accepted paper must pay the registration fee and attend the conference.

Authors will be notified by February 17, 2006 of their paper status. Authors whose abstracts are accepted will have to submit their full-length papers (10 page limit suggested) by April 15, 2006 for publication in the CD-ROM conference proceedings. While multiple submissions by individual or groups of authors are welcome, the abstract selection process will seek to ensure as broad participation as possible: each speaker is to deliver in general only one presentation in the conference. If multiple submissions are accepted, then a different co-author will be required to pay the reduced registration fee and present the paper.

Abstracts should be prepared in MS Word (not PDF) and emailed to Prof. Dr. Georg Erdmann, TU Berlin (TA 8), Einsteinufer 25, D-10587 Berlin, Germany, Email **georg.erdmann@tu-berlin.de**. The lead author submitting the abstract must provide complete contact details: mailing address, phone, fax, e-mail etc.

IAEE Best Student Paper Award ($1,000 cash prize plus waiver of conference registration fees). If interested, please contact http://www.iaee.org/en/students/best_paper.aspx. Student Participants: Please inquire about scholarships for conference attendance at http://www.iaee.org/en/conferences.

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

influence that each of our countries has on global energy markets continues to grow. The externalities each country can create in our increasingly integrated world become more and more important. Our energy policies need to be rational and predictable, and none of us can afford to have energy policies that are too far out of line with our competitors. Energy markets will continue to be tight and quixotic for the foreseeable future, and open communication and cooperation will be needed to help us all muddle through. And despite tightening government budgets in many countries, we'll need to continue to foster cost-effective energy and environmental research and development to help boost longer term energy efficiency, encourage new energy supplies and help preserve our environment.

Each of you has an important role to play—through your professional responsibilities, in your country, and in our Association. I hope your participation in our IAEE will grow, and you will help us accomplish our mission.

I would like to thank our Council (Jean Philippe Cueille, Tony Owen, Michelle Foss, Andre Plourde, Andrea Bollino, Georg Erdmann, Einar Hope, Majid Abbaspour, Marianne Kah, Fritz van Oostvoorn, Fatih Birol, Herman Franssen, Herman-Josef Wagner and Michael Kraus), our student representatives (Hadi Hallouche and Carole Le Henaff), our new *Energy Journal* Editor (Adonis Yatchew) our General Counsel (John Jimison) and both Dave Williams (Junior and Senior) for all of their hard work and dedication during 2005. With Jean-Philippe as our President in January 2006, I know we'll be in excellent hands.

And for you, our valued members, thanks so much for your support and active participation. I hope to see some of you in Prague at the Czech Affiliate conference in early December and in Madrid for our Spanish Affiliate conference in mid January. And of course I hope to see many of you in Potsdam, Germany, in June 2006 for our IAEE International Conference and in Ann Arbor Michigan in September 2006 for our North American Conference.

In the meantime, very best wishes for the upcoming holidays and for a healthy and prosperous 2006.

Arnie Baker

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

Taking into consideration the gas liberalization process and diversification strategy of the European Union, most countries, including Turkey, are developing their projects in line with the European programs. Erdem Catak and Omowumi Iledare investigate the European gas market in terms of reserves, production, consumption, import dependency and Europe's desire to diversify supply needs.

Gerald Westbrook notes that the average reader may ask: why should they accept input on the global warming issue from any "skeptic". His article covers inputs from one type of skeptic, the *Distinguished Veteran*. The education, affiliations and accomplishments of eight such veterans are noted.. They are all skeptics on the global warming issue.

Announcement

8th Annual USAEE/IAEE/ASSA Meeting

Boston, Mass., USA January 6 - 8, 2006

Current Issues in Energy Economics and Energy Modeling

Presiding: Fred Joutz, George Washington University

Session Info:Saturday, January 7–Hilton/Copley–2:30

Speakers:

Youngho Chang, National University of Singapore – *Modeling Pricing Behavior with Vesting Contracts in a Deregulated Electricity Market*

Young Yoo and Bill Meroney, Federal Energy Regulatory Commission – *A Regression Model of Gas/Electricity Price Relationship and Its Application for Detecting Potentially Anomalous Electricity Prices*

Margaret Taylor and Greg Nemet, University of California, Berkeley –*The Interaction Between Policy and Innovation In Renewable Energy Technologies*

Graham A. Davis, Colorado School of Mines – *The Resource Curse: Assessing the Empirical Evidence*

Discussants: Silvia Pariente David - PA Consulting Group
Warren Young - Bar Ilan University
Ian Sue Wing – Boston University
Thorvaldur Gylfason – University of Iceland and CEPR

Abstracts are posted at http://www.iaee.org/documents/2005/assa-abstracts.pdf

The meeting is part of the Allied Social Science Association meetings (ASSA) For program information and pre-registration forms on the larger meeting (usually available in September) go to http://www.vanderbilt.edu/AEA/anmt.htm.

IAEE Mission Statement

In August IAEE Council approved the following Mission Statement to help guide the Association through its strategic planning process. IAEE encourages you to share this Mission Statement with your colleagues and friends:

"The International Association for Energy Economics is an independent, non-profit, global organisation for business, government, academic and other professionals concerned with energy and related issues in the international community. We advance the understanding and application of economics across all aspects of energy and foster communication amongst energy concerned professionals.

We facilitate:

- Worldwide information flow and exchange of ideas on energy issues
- High quality research
- Development and education of students and energy professionals

We accomplish this through:

- Providing leading edge publications and electronic media
- Organizing international and regional conferences
- Building networks of energy concerned professionals"

Hadi Hallouche, one of the student advisors to the IAEE Council, discusses the Barcelona Process Initiative on its 10th anniversary. He reviews its initial intent and regrets that its *spirit* has faded away. He suggests why the Process is needed and should be revitalized.

DLW

Iraq National Oil Company (INOC) Case Study

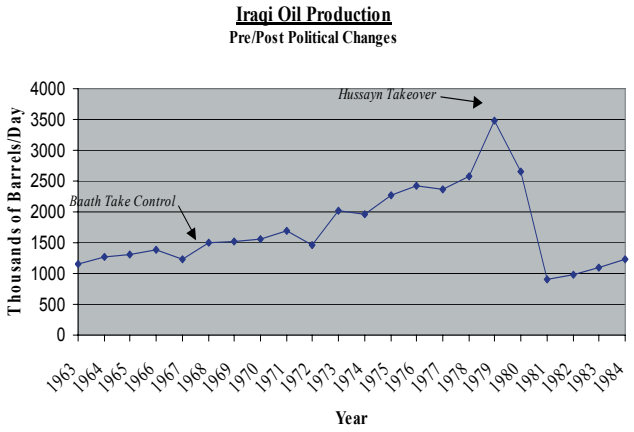
*By Donald Ian Hertzmark and Amy Myers Jaffe**

Introduction

Iraq holds an important place in the political development and economic trend of the international oil market both historically and at the present time. Iraq's proven oil reserves are the second largest in the world, behind only Saudi Arabia's 260 billion barrels, at 120 billion barrels, and its oil export policy has been a critical element in setting international oil supply and pricing for over 30 years. Iraq was a founding member of the cartel of the Organization of Petroleum Exporting Countries (OPEC) and was among the first of the major oil producing countries to nationalize its oil fields in the 1960s. The country's Iraq National Oil Company (INOC) was an early leader in international oil policy and could play a similar role in the future, depending on the inclinations of a new Iraqi government.

Iraq's production today stands at 1.9 million barrels a day or 2% of total world oil supply. In 1979, Iraqi production stood at 4 million b/d, and the country was OPEC's third largest producer after Iran and Saudi Arabia.

Figure 1: Iraq's Oil Production History



In recent years, war, economic sanctions and now civil strife have prevented Iraq from substantially increasing or expanding its oil production capacity. But specialists agree that the oil potential of Iraq is significant and the degree to which the country can realize such potential will be a major factor influencing oil supply and pricing trends in the coming two decades.

Of Iraq's 74 discovered and evaluated oil fields, only 15 have been developed. Iraq's western desert is considered to be highly prolific but has yet to be explored. There are 526 known structures that have been discovered, delineated, mapped and classified as potential prospects in Iraq of which only 125 have been drilled. Six of the 74 known fields are deemed giant, containing more than 5 billion barrels, while some 23 are classified as large (between 500 million-5 billion barrels) and the remaining 45 labeled as medium (50-500 million barrels) to small (less than 50 million barrels). A commitment to a significant investment program could probably allow Iraq to return to its historical production levels of between 4 to 5 million barrels a day in the next decade. Thus, its oil policy and industry structure will have critical influence on the international oil industry in the coming years.

This paper will focus on the prospects for Iraq's oil industry in the future and will argue that Iraq could play a role in the 21st century similar to its past role in OPEC but that it will have to overcome difficult political hurdles to reestablish its oil industry.

Decisions on how to structure its oil industry in the aftermath of the fall of the government of former president Saddam Hussein can potentially have significant bearing on the future of the world oil industry and oil geopolitics. Iraq's new constitution opens many questions about the fate of the country's oil sector and the merits of reorganizing its national oil company or devolving power in the oil sector to local regional authorities. Resolution of this issue could have direct bearing on the competitiveness of international oil markets in the years to come and the relationship between key oil producing states and the private international oil companies. This paper will discuss the implications of current Iraqi politics and stability for the progress of Iraqi oil production policies, investments in Iraq's oil capacity, and security of its oil exports to international markets.

Government Structure And Organizational Policy

Inter-government Relationships

Iraq was an authoritarian government with a bureaucracy chosen for its loyalty to the regime. Inter-governmental relations in Iraq were managed by the Council of Ministers, which in recent years had been composed of the Foreign Minister, the Trade Minister and the Oil Minister. The Oil Ministry was the main organizational body in the oil sector and reported to the Council of Ministers, which in turn reported directly to the President. The Council of Ministers also reported to the committee on energy of the Parliament but the latter was mainly a pro-forma, rubber stamp body with no real oversight function. In addition to reporting to the Council of Ministers, the oil industry divisions had security and intelligence officers whose function was to report to the Ba'ath Party and the National Intelligence/Security service (Mukharabat) about the activities within that company and in competing companies. This structure served to consolidate the power of the President's inner circle and was ultimately used as an instrument of repression.

Regulatory Principles and Practices

There is no oil and gas sector regulator in Iraq. All functions of the oil and gas business are state-controlled. The government sets all prices and operates all infrastructure via a bureaucracy organized by functions and managed under the leadership of the Oil Ministry.

*Donald Ian Hertzmark is an independent oil consultant based in Washington, DC. Amy Myers Jaffe is a Senior Fellow at the James A. Baker III Institute for Public Policy, Rice University. This is an edited version of their paper presented at the 25th Annual IAEE/USAEE North American Conference, September 18 to 21. See footnotes at end of text.

Organizational Structure

A major reorganization of the oil sector took place in February 1987 around the same time that Mr. Issam Abdul Rahim al-Chalabi replaced Qassim Taqi al-Oraibi as Oil Minister. The reorganization initially set up several new organizations including:

a) State Organization of Gas (SOG), which came to oversee the State Enterprise for Gas Distribution
b) State Organization for Oil Refining (SOOR) (covering all refining through three subsidiaries covering south, center and north regions and administering State Enterprise for Manufacturing Oil)
c) State Establishment for Oil Construction/State Company for Oil Projects (SCOP) (implementation of oil projects from design and engineering to construction and start-up)
d) State Organization for Distribution of Oil Products (SODOP) which also took control of the State Establishment for Pipelines

In May 1987, major changes were initiated again, most importantly with INOC becoming part of the Oil Ministry itself. Prior to becoming part of the ministry, INOC reported to an independent board of directors and had a hierarchy similar to a corporate entity with a legal department, its own budget, an accounting, geology, transport and analysis department, among others, and independent hiring and firing practices.

In the second 1987 reorganization, three state agencies SOOR (refining), SOG (gas) and SODOP (products and pipelines) were disbanded and their activities became departments within the Ministry. Key features of this reorganization included:

- Northern Petroleum Organization and Central Petroleum Organization were merged to become the Northern Oil Company. Northern Oil Company, Southern Oil Company and State Company for Oil Projects (SCOP) were given the status of autonomous companies with their own managing directors.
- OPEC relations were consolidated into the newly created State Oil Marketing Organization (SOMO).
- The Oil Exploration Company (OEC) was created and then overtaken by the Iraqi Oil Drilling Company, which would undertake exploration activities on behalf of OEC.
- Two distribution companies were created: Oil Distribution Company and Gas Processing Company.

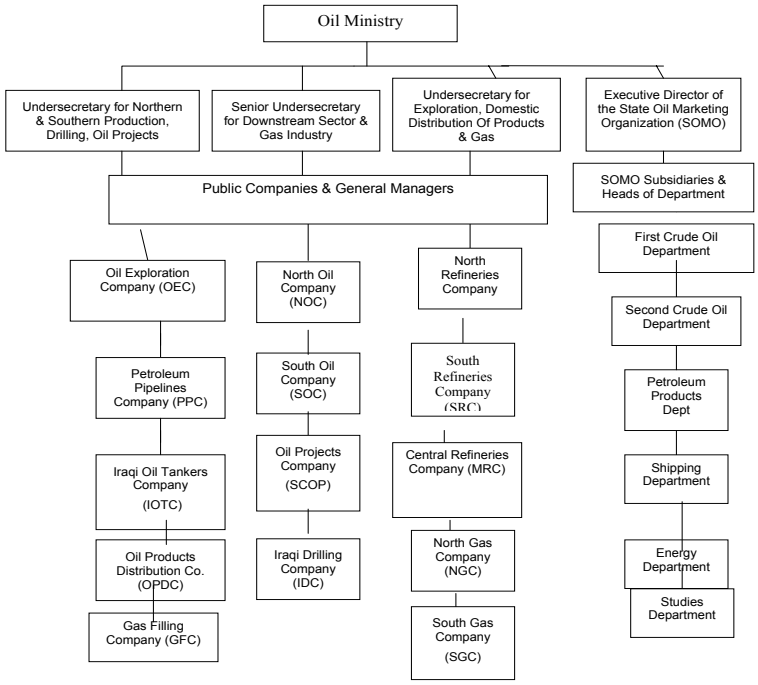
The Iraqi oil industry is currently structured around both regional lines and functional duties. The Oil Minister is the functional head of the industry, with several undersecretaries reporting directly to him. The State Oil Marketing Organization, which is responsible for external sales of all of Iraq's oil, had independent, elevated status and its executive director reported directly to the President of the country for many years. Below this hierarchy are 14 public companies, each led by a Director General and other senior staff.

The 14 companies include 2 upstream companies and 3 drilling service and exploration companies:

1) Oil Exploration Company (OEC)
2) Southern Oil Company (SOC)
3) Northern Oil Company (NOC)
4) State Company for Oil Projects Company (SCOP)
5) Iraqi Drilling Company (IDC)

Downstream activities were divided geographically between the Southern Refineries Co., Central Refineries Co. and the Northern Refineries Co. There were also geographically based gas companies, an oil tanker company, oil product distribution companies and a pipeline company. The overall organization of these companies is shown below.

Organizational Chart for Iraqi Industry as of 2002



Senior Management

Beginning with the Oil Minister Issam Chalabi in 1987, the senior management of the oil industry became politicized and executives were promoted mainly on the basis of loyalty and ties within the Ba'ath party and strength of links to the ruling elite. In comparison, prior to 1980, candidates were fielded for promotion largely on the basis of merit and performance. Candidates were identified by the national oil company based on examinations – vetted by the Palace and the Ba'ath party - and selected for training abroad.

At present, Iraq's oil sector is dominated by its Energy Council, which is chaired by deputy Prime Minister Ahmad Chalabi. An Interim Oil Minister currently serves as the defacto head of the Iraqi industry which remains divided between the South Oil Company, which operates the southern oil fields in and around Basrah and the North Oil Company, which is responsible for the Kirkuk oil field and surrounding production.[1]

External Relations

After nationalization, Iraq permitted no foreign direct investment in its oil industry and did not consider any until the mid-1990s. Since 1996, under United Nations Sanctions, all procurement of international goods and services was conducted either by the United Nations itself or with United Nations oversight. Prior to sanctions, Iraq conducted project based international procurement system, utilizing international tenders and followed a national law for competitive bidding processes, with final short-listing procedures. On occasion, the award of a major international contract would be altered and overruled by geopolitical considerations at the intervention of the Palace or Foreign Ministry.

In the late-1990s, as a part of an attempt to garner support for the lifting of sanctions, the Iraqi regime initiated negotiations for oil field contracts with IOCs that would be implemented after international sanctions were lifted against the country. Talks were conducted by the Oil Ministry at undersecretary level. The ministry appointed three teams, each of which was responsible for negotiations by geographical region or in some cases, by individual foreign company. During this period, Iraq developed its own style of Production Sharing Contracts (PDS) in which the state's participation was guaranteed through a carried 25% interest. The PDS contracts included work and expenditure commitments, cost oil, profit oil (9% contractor/91% Iraq), rate of return and cost recovery (40%) variables as well as production bonuses. There were no royalties attached but an income tax was planned. The Iraq negotiators also conducted talks about service-style contracts known as Development and Production Contracts (DPCs) for already delineated structures. DPCs (essentially buyback contracts) also specified a 25% carried interest for an Iraqi entity and included target production level, duration of contract period, development plan, investment levels, remuneration fee, cost recovery, option to lift oil, and technical assistance. Again, no royalties were assessed. Terms included maximum cost recovery of 50% of produced oil and remuneration fee maximum 10% of production.

Costs of maintaining pipeline and other infrastructure were borne centrally by state. Where oil is produced under PSC or DPC, Iraq had planned to charge a transportation tariff payable to state. Contracts specified that natural gas would be utilized by state.

Signature bonuses ranged around the $50 million level.

Operational Policies Pre-2003

Oil and Gas Depletion

The Oil Ministry was responsible for all policy, planning and national goal setting. Regional public companies (NOC, SOC, COC) implemented policies for preventing oil and gas production decline rates but at great difficulty given sustained low budgets through the war years of the 1980s and into the 1990s and after 1996, given United Nations sanctions.

Oil Revenue Accounting

Oil revenue accounting system was taken over by the United Nations in 1996 under the oil-for-food humanitarian program. Pricing policies were set by SOMO based on market trends and technical analysis, with a United Nations oversight committee auditing and inspecting pricing and contracting terms on a monthly basis to prevent diversion of funds. All monies were paid directly to UN escrow account. Prior to the Gulf War, the SOMO director general determined prices based on technical market factors with direct approval by the President of the country. Revenues reverted directly to the Central Bank by SOMO.

Gas and Products Pricing

Prices for natural gas and petroleum products were set by the state.

Funding Principles

Nationally centrally planned economy and oil sector budget process, with state sector companies owned 100% by the Iraqi government. Auditing handled by the General Auditing Bureau on a ministry by ministry basis. Iraq had extensive international loans from international banking institutions and foreign countries that were trading partners.

Financial Policies

There are no publicly available financial accounts for the Iraqi oil sector. There is no published information on which accounting standards have been adopted or on remuneration. The General Audit Bureau reported to the Council of Ministers on compliance of each ministry with its annual budget. Each public company had its own auditing department.

Iraq's Upstream Oil Prospects: Overview

There is little doubt among knowledgeable industry professionals that Iraq possesses great potential to oil production and export capacity significantly, albeit with massive investment. Iraq's proven oil reserves of 112 billion barrels, with as much as 220 billion barrels of resources deemed probable, provide an excellent resource base for future production increases. Of Iraq's 74 discovered and evaluated oil fields, only 15 have been developed. Iraq's western desert is considered to be highly prolific but has yet to be explored. There are 526 known structures that have been discovered, delineated, mapped and classified as potential prospects in Iraq of which only 125 have been drilled. Six of the 74 known fields are deemed giant, containing more than 5 billion barrels, while some 23 are classified as large (between 500 million-5 billion barrels) and the remaining 45 labeled as medium (50-500 million barrels) to small (less than 50 million barrels).

It will take Iraq several years to return to its pre-1990 production level of 3.5 million bpd, assuming the security environment can be stabilized. Iraq has previously stated a desire to expand its oil production capacity to 6 million bpd. This is geologically possible but would take a number of years and tens of billions of dollars of investment.

Iraqi oil production is concentrated in two geographic areas in Northern Iraq around Kirkuk and in the south in and around Basra. The Kirkuk oil field accounts for the greatest proportion of Northern oil production, which is currently lim-

ited by repeated attacks on surface facilities by insurgents. The second largest northern field is Bai Hassan. Most northern production is exported via pipeline through Turkey.

At present, the most important producing field in Iraq is the southern field of Rumaila, which accounts for more than half of the Southern oil production. Other large southern fields include Al-Zubair, Missan and West Qurna.

The southern fields depend on water injection systems to maintain pressure and gas treatment facilities. The Rumaila field has been damaged from over-drilling and poor reservoir management. Remediation efforts need to be implemented to reverse coning and restore pressure at the field but are currently difficult to put in place due to the generally poor security situation, bureaucratic delays and problematic transparency and efficiency for allocating budgetary expenditures. Improved metering systems are needed at the fields to allow proper analysis of production conditions but widespread corruption, where theft of output is rampant, has created a pool of vested interests wanting to block such modernization. Production from southern oil fields is currently exported via the Gulf port of Mina al-Bakr. There are pumping stations at North Rumaila and Bin Umar that feed crude to the Mina al-Bakr port. There are two 800,000 b/d pipelines (Zubair-Fao and Rumaila-Fao) that feed the port.

Oil Production Expansion Potential

Since at least the mid-1990s, key upstream officials in the Iraqi oil industry have identified several fields as potential contributors to a production expansion program. The potential increase in output includes both improvements in existing fields and output from either new or significant expansions in currently producing fields.

Stage 1 National Oil Company Investment for Rehabilitation – Target Production 3-3.5 mmbd

Fields	Potential Production Rate Thousand barrels a day	Capital Cost (millions $)
Galabat/Qamar/Qarachoq Kashm al-Ahmar	120	500
Qayara/Najma/Jawan/Qasab	170	500
East Baghdad/ Balad	120	800
South Rumaila/Mishrif+	230	850
North Rumaila/Mishrif+	160	750
Zubair/Mishrif	60	150
Luhais/Suba+	80	200
North Rumaila CG6	60	250
TOTAL	**1 million barrels/day**	**$4 Billion**

+ Foreign oil company sought deal under Hussein Regime.

Stage 2: Rehabilitation of Other Major Fields – Target Production Total 4.5-5 mmbd

Field	Production Rate Thousands barrels a day	Capital Cost millions $
Majnoon+	600	$3 to $8 billion
West Qurna+	600	$3.5 billion
Bin Umar+	440	$3.4 billion
Nasiriyah+	300	$1.9 billion
Halfaya+	225	n.a.
Ratawi+	200	$1.3 billion
Gharaf+	100	n.a.
Al-Ahdab+	100	$1.3 billion
Tuba	180	n.a.
Rafidain+	75	n.a.
TOTAL	**2,820**	**$14.4 billion to $25 billion**

+ Hussein government planned to develop these fields with foreign participation.

Options for Transforming Iraq's Oil Industry

In the summer of 2004, Iraq's interim government set up a Supreme Oil and Gas Council to formulate the public policy for managing the hydrocarbon resources of the country. The Council began to oversee plans for the industry such as crude oil marketing policy, domestic oil products pricing, and the terms of service for members of the ministry of oil and the companies under its purview, but it never addressed key issues related to rebuilding Iraq's productive capacity such as major investments in restoring capacity and how such investments will be financed. The Supreme Oil and Gas Council is designed to be empowered to issue foreign contracts, but the dispensation of foreign participation in Iraq's upstream oil exploration and development of its fields has been deferred until which time a permanent government is in place.[2]

At its first meeting in August 2004, the Supreme Oil and Gas Council (SOGC) proposed the reestablishment of the Iraq National Oil Company (INOC). As proposed, INOC would be a public company owned by the state and responsible for all technical and commercial aspects of exploration, development and production of the country's oil and gas resources. INOC would oversee the operations of four existing operating firms (now under the direction of the Oil Ministry) including South Oil Company, North Oil Company, Iraq Drilling Co. and Oil Exploration Company. Under the proposal, a board of directors would be created for INOC, with the minister of oil serving as the board's chairman. The board would also include the CEO of INOC and oil executives and others recommended by the Ministry of Oil.[3]

While the state oil company model is consistent with cultural and historical preferences in Iraq, catering to nationalistic sentiment among the population and the history of state control of the economy, it remains unclear whether this form of organization will be adopted following ratification of a new national constitution. Senior members of Iraq's existing oil industry hierarchy argue that a national oil company structure would reduce friction over the dispensation of oil receipts by centralizing revenues and permitting oil earnings to go directly to the national treasury and to the federal budget, eliminating regional or local level disputes to a percentage of oil revenue from production located physically in a local area. This option has been supported by Iraq's technocratic elite, including the acting and former oil ministers, and the Allawi national list.

However, during the constitutional process, regional leaders resisted this structure. The politics of this issue is complicating Iraq's ability to forge a permanent government structure with full federal authority. Recent constitutional language has suggested that a more devolved federal approach to oil revenue distribution will prevail, with sizable oil revenues reverting to the provinces, along with additional revenues for producing areas. In particular, key Kurdish and Shi'a leaders asserted the rights of local communities to preserve their direct access to the inflow of oil revenue. Article 109 of the Constitution states that "Oil and gas are the property of the Iraqi people in all provinces and districts." Article 110 asserts significantly "The federal government handles, *in cooperation with the producing province and dis-*

trict cabinets, the management of oil and gas extracted from the present fields, provided the proceeds would be evenly distributed, in keeping with the demographic distribution all around the country. In addition, a share shall be allotted, for a specific period of time, to the afflicted provinces, which were unjustly deprived by the previous regime, and later affected, in a way to secure a balanced development of different areas of the country. This shall be regulated by law." Article 111 specifies "everything stipulated in the exclusive areas of expertise of the federal authorities falls within the provinces' prerogatives. The other mutual prerogative of the federal government and the provinces, in case of conflict, will give priority to the province law."[4]

Regional leaders are pushing to have newly developed fields fall under the jurisdiction of provincial authorities. In particular, local leaders are lobbying for the rights to legitimize all agreements pertaining to exploration and development that have been, or might be, signed by local authorities. As far back as June 2004, Kurdish leaders sent a letter to U.S. President George W. Bush in which it was requested that the United States support their plans to "own and manage Kurdistan's natural resources, and in particular our efforts to develop new petroleum resources in the Kurdistan region…"[5] Kurdish leaders have met separately with foreign oil company representatives about investment deals in Northern Iraq. In the last years of Saddam Hussein's rule, Kurdish groups were cut into northern oil shipments through a 13% tariff. Kurdish candidates gained 20% in recent elections in Iraq, making it hard for other winning groups to form a government without the input of Kurdish leadership. Last February, Canada's Heritage Oil announced that it had formed a joint venture with local Eagle Group to pursue oil investment projects in Kurdish areas.[6] But some oil deals pre-existed the U.S. campaign in Iraq. Jalal Talabani, leader of the Iraqi Patriotic Union of Kurdistan (PUK) signed oil deals with two Turkish companies, General Energy and Pet-Oil, prior to the U.S. campaign in Iraq.[7]

Iraqi politician Ahmed Chalabi has also been reported to be negotiating oil investment contracts with foreign oil company representatives, signaling the possibility that some Shia groups will also look favorably on regional development authority for oil resources.[8] The issue of oil revenue splits is a thorny one with activism evident at the popular local community level. The General Union of Oil Employees, which comprises 15,000 workers of the South Oil Co., went on a 24-hour strike last July, for example, demanding that a larger share of oil revenue be sent back to their local economy. The strike, designed to influence the constitutional process, came after the governor of Basrah, Mohammed Mosbeh Al-Waeli, called for the central government to give a fair share of oil revenues to his region. Statements outlining demands cited Basrah's poverty, high unemployment, damaged sewage system and electricity grid and limited medical services as key grievances to be addressed.[9]

In the past, state-owned entities were responsible for the production and development of virtually all the country's oil and gas. No foreign oil company has operated with equity interest in Iraq since 1975. But Iraq's decision to self-finance its industry in and outside the oil sector over the 1980s and its lengthy war with Iran left the country with high national debts and a commodity-price driven economy. Moving forward, at oil prices of $35 a barrel, financing future capacity expansion out of current cash flow will take about $3 billion annually or about 10% of the government's share of oil proceeds. At $55/bbl a $5 billion annual expansion program would take a similar 10% share of the government's net proceeds from oil sales. A more ambitious expansion program or a similarly sized program under lower oil price scenarios would require a higher proportion of government annual revenue. Refinery rehabilitation and gas system expansion will also need to be funded either from oil proceeds or from outside investment.

Achieving higher levels of output through self-financing, though possible, will present a number of tough and potentially controversial decisions, including the need for rapid corporatization of the national oil company, possible underinvestment in other areas of the country's economy, and potential limitations on oil sector transparency. It is key to remember that the options chosen, and when they are chosen, will have implications for the development of the overall economy and society, for the speed and level of capacity expansion that can be achieved, and for the exposure of investment budgets to changes in oil prices.

There are three major economic impacts of self-financing oil investment. They include 1) Iraq's government will control the equity in its oil industry, making it easy to cooperate with OPEC on production sharing and capacity expansion levels; 2) more of the domestic economy will be dependent on the oil sector than if external financing is tapped; and 3) the country's fiscal policy will be extremely dependent on world oil price levels.

Given the likely investment needs of Iraq's oil sector - more than $20 to $30 billion to raise output to the 5 mmbd range - the question of how to raise such sums has to be addressed.

At the level of overall policy, significant sums of debt and equity are difficult to organize or attract without a well-organized sector legally defined and sanctioned. Thus, the outcome of the drafting of Iraq's constitution and the development of its political and court systems will have tremendous implications for the health of the oil sector. It is important to note that, even if Iraq decides to rely on its own sources of funding, a substantial degree of corporatization for its newly-constituted INOC will still be required to organize and make good use of capital volumes that will necessarily run to the billions of dollars annually. Many countries that have chosen to self-finance and keep upstream sectors closed to foreign participation have found that this strategy has generally led to both production and fiscal difficulties; if not often in the immediate term, then more frequently in the longer run.

Over the next several years, the newly constituted Government of Iraq will need to make a large number of critical decisions on the future of the oil industry, the role of oil revenues in funding other national reconstruction efforts, and defining the role of the national oil company entity itself in

the oil industry's restructuring.

Improved management in the oil sector will have to serve as a basis for any program to expand production. Issues related to the role of an Iraqi national oil company or a devolved structure of regional oil companies will have to be tackled head on. Some governments have opted to use their NOCs as a tool to achieve wider policy objectives such as employment, community services, revenue generation, or economic diversification. In some cases, decisions regarding the utilization of the NOC's resources have been made on political rather than economic grounds. Although this may be judged to be beneficial to the nation or the regions as a whole, additional costs and non-core responsibilities that might be imposed on the emerging new Iraqi national oil company or regional entities would affect profitability and the ability to build core functions of oil production capacity management and expansion.[10]

The ability of Iraq to attract outside funds for capacity expansion and oil field development will be dependent on the policy steps taken by the government, including the attractiveness of fiscal terms offered to potential IOC investors; the legal and regulatory environment; and the establishment of appropriate roles for various federal, provincial, and local oil sector institutions.

In studying the possible involvement of international oil industry investment, Iraq will have to consider the experiences of other oil producing countries:

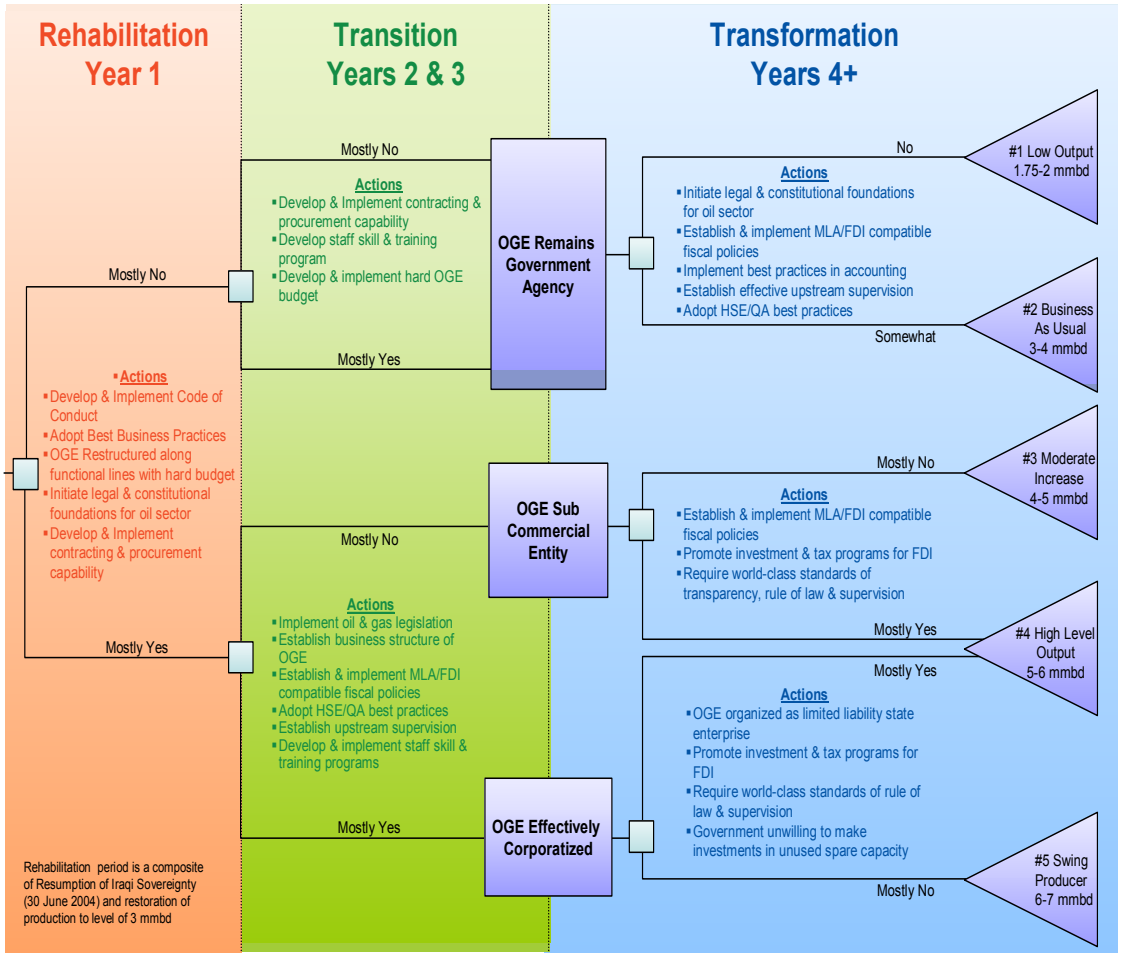
- Upstream contractual arrangements vary widely according to the history, domestic political circumstances, and goals of the host country.
- Inadequate regard for the risks borne by IOC contractors has led to less-than-successful investment programs and an inability to tender fully offered exploration acreage in a timely manner.
- Countries with less attractive geology and governance such as Azerbaijan have been able to overcome their risk profile and pull in billions of dollars of investment by offering very competitive terms.

Contracting terms remain the major means of allocating risks and rewards from exploration. Should external financing be sought, it is worth remembering that in the past countries that did not offer risk-adjusted rates of return equal to or above other nations were unable to achieve significant levels of investment, regardless of the richness of their geology (e.g., Iran, July 2003 round; Venezuela, post 2001 tenders; Saudi gas initiative; Pertamina, 1990s).

Figure 2, below, is multi-dimensional timeline / scenario analysis that illustrates graphically the causal and temporal relationships between investment, governance and organizational actions taken by the Government of Iraq and corresponding levels of production. This chart illustrates the difficulties Iraq will have in achieving high levels of production—should that be considered a national aim—without a sequential series of management and governance actions within specified timeframes. While no initial set of actions is irreversible, certain governance and production outcomes could become impossible in the period in question without appropriate initial steps.

In particular, during the rehabilitation phase there are

Figure 2: Key Milestones of Iraq's Oil Sector Rehabilitation and Transformation



specific activities that will promote and enable a rapid return to former production levels, whilst being necessary preconditions to achieving even higher levels of production within a medium to long timeframe. The activities that must be completed successfully in the rehabilitation phase include (i) improved human resources, replacing many of the older technical staff; (ii) new and improved contracting and procurement mechanisms.

How such initiatives would be implemented under the new constitution remains unclear. To ensure success, new entities, whether they be federal or local must complete most or all of the following steps: (i) new oil and gas legislation; (ii) hard budgets for the INOC; (iii) improved human resource and training programs. Success in this transition phase will be necessary, but not sufficient, to achieve any significant rise in oil output. Indeed, even returning to 3-3.5 mmbd of oil output will require most of these activities to be successfully initiated within 1-2 years.

During the transformation phase, path dependence becomes critical. In particular, there are important ways in which the potential for significant increases in output will depend significantly on decisions taken in the very near future on staffing, contracting, investment and transparency/rule of law. These path dependencies include the following ones:

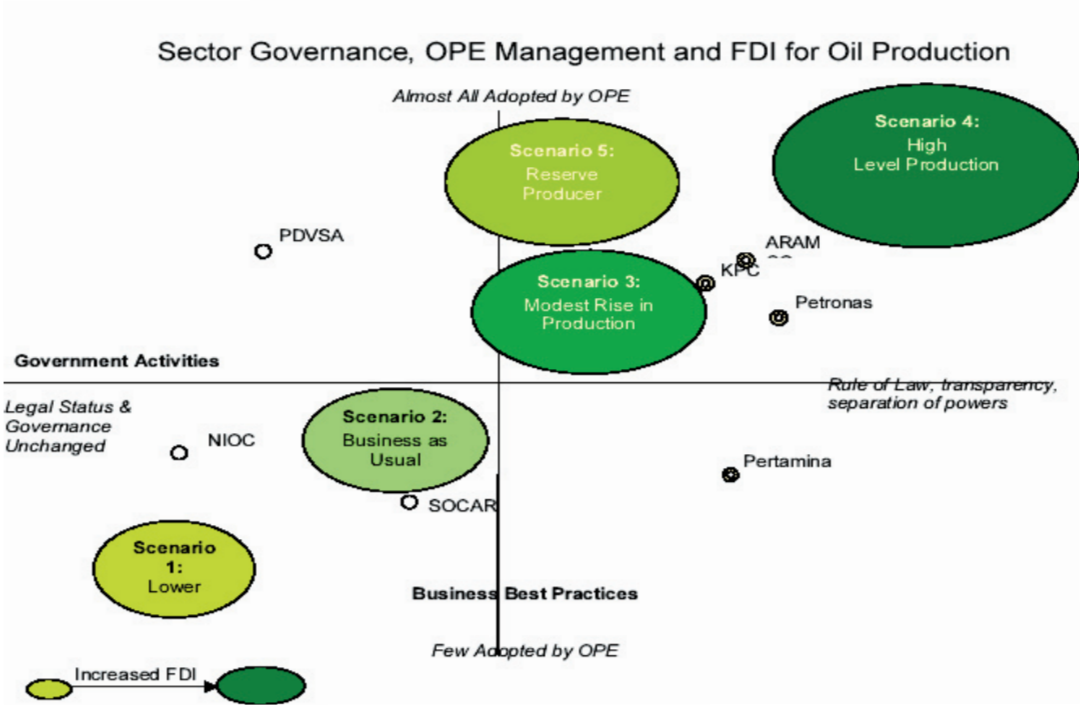
Decisions during Transition Phases establish limits of what can be accomplished - *Path dependence takes over:*

1) An aggressive program of legal and management reform is necessary to achieve one of the higher output scenarios (Scenarios 3, 4, 5),
2) The momentum established by the early efforts should permit substantial gains in production even if a full set of Transformation phase reforms is not adopted.
3) Key decisions to ramp up production involve management and legal matters as prerequisites for a high tempo of investment and production activity;
4) Difficulties in these regards (Scenarios 1 and 2) will limit the potential of the Transformation stage to - at best - a small increase over pre-war levels of output.

As can be seen from Figure 2, a history of success in health, safety and environment contracting and law can set the stage for significantly increased investments by outside parties. Given the experiences of the recent past with changes in legal regimes, it is unlikely that the IOCs will be willing to put up the $20-30 billion required to qualitatively transform the country's oil sector without "yes" answers to most of the questions posed in Figure 2 on staffing, contracting, rule of law and transparency. As Iran has found, it is extremely difficult to overcome many years of non-standard practices in external relations and investment.

Strategic Issues

There will continue to be much debate about the strategies Iraq should undertake in its oil sector and in its restructuring of its national industry. The consequences of its decisions will have major implications for future oil market trends and global oil pricing and security, just as Iraq's decisions to nationalize its oil industry in the 1960s played a pivotal role in formulating OPEC strategies and raising the price of oil worldwide. Because of the extensive size of its resource base, the manner of Iraq's participation in oil markets will be a major feature of the next decade and beyond. If Iraq chooses to reconstitute its national oil company under strategies similar to the manner in which it participated in international oil trade in the 1960s and 1970s, it could become a leader in working together with other OPEC countries to restrain future investment in oil resources and to limit output to achieve sustainably high oil prices for a significant period of time until backstop



technologies and energy efficient technologies could be brought to bear in the market by consuming countries.

If on the other hand, Iraq were to restructure its industry to devolve investment authority to the regions, this is likely to increase the chances that these smaller, more regionally focused entities will allow foreign direct investment as leaders in these local communities have already signed foreign

investment deals or at least held meetings for this purpose. The consequences of increased foreign participation in local investment in Iraq is likely to lead to more competitive structures for global oil markets in general and thereby lower energy prices. It is also possible that local leaders will consider privatizing key entities or aspects of their oil sectors.

The figure on the previous page indicates the types of operating conditions that accompany varying levels of transparency and rule of law, as preconditions for increased FDI in Iraq's oil industry.

If international oil companies can undertake significant investments in Iraq, then it becomes *possible* that the total increase in expanded Middle East capacity could become larger than the increase in Asia demand.[11] Privatized ownership of oil assets would make it harder for Iraq to adhere to production expansion restraint coordination and production sharing agreements proposed by OPEC.[12] If Iraqi production were to expand to such a large extent that Asian markets could be supplied totally by Middle East producers with no imports required from more distant supplies in Africa or the Atlantic Basin, then the Asian crude oil price premium might disappear. However, Iraq faces many hurdles before it can attract direct foreign investment and it is unlikely that this process will progress quickly in the near future.

Footnotes

[1] "Plans for Iraq Spell Trouble for Oil Sector" Petroleum Intelligence Weekly, September 5, 2005

[2] "Iraq Establishes Supreme Oil and Gas Council" Middle East Economic Survey (MEES) 47:29 A3 July 19 2004

[3] "Iraq to Establish National Oil Company" MEES 47:35 August 30, 2004 A4

[4] Oil and Gas Journal

[5] "Iraqi Kurds Demand Right to Own and Manage Northern Oil Reserves" MEES 47:24 June 14 2004 A4

[6] News In Brief, Petroleum Economist, Feb. 8, 2005, p. 41

[7] "Turkey to develop oil fields in Northern Iraq" Xinhua News Agency, May 20, 2003; "Kurds Go It alone with International Oil Deals" Independent, (London) May 18, 2003,

[8] New York Times

[9] "Oil Workers in Southern Iraq Demand Bigger Share of Income from Exports" International Oil Daily, Tuesday, July 19, 2005

[10] An example of increased exposure to non-core businesses is found in Venezuela, where PDVSA has taken ever-more responsibility for certain downstream businesses that would not normally concern a national oil company.

[11] Venezuela once again provides the counter example. High oil prices have more than offset what would otherwise be a disastrous fall in oil output for the country.

[12] Note that if Iraq chooses to become a reserve capacity OPEC member, then it will result in less FDI than would a similar increase aimed at export maximization, simply because investors will be loath to invest billions that can potentially sit idle.

Appendices

1 Gas Upstream Requirements

Iraq holds a minimum of 110 trillion cubic feet (Tcf) of proven natural gas reserves, as well as approximately 160 Tcf in probable reserves. Much of this gas has remained untapped. We expect that gas development will take a backseat to oil development where markets and profits are more immediately tangible. Iraq has already discussed gas exports to Turkey in competition with Russia, Iran and other key gas producers.

In 1997, Baghdad reached an agreement with Ankara to build a $2.5 billion 1,380-km gas pipeline from northern Iraq to southwestern Turkey, which could possibly be linked to Europe. The proposal would involve the transport of 10 Bcm of Iraqi gas annually to Turkey from five fields in the north -- Al-Anfal, Al-Mansuriya, Jaryat Pika, Al-Khasham al-Ahmar and ChemChemal. Development of these fields and related infrastructure is projected to cost $1.7 billion. There has also been speculation that a new Iraqi government would consider building a natural gas export system to Jordan.

Associated gas primarily comes from the Kirkuk, Ain Zalah, Butma and Bai Hassan oil fields in northern Iraq, as well as the North and South Rumaila and Zubair fields in the south. The Southern Area Gas Project, brought online in early 1995, consists of nine gathering stations and has a processing capacity of 1.5 Bcf/d. Gas gathered from the North and South Rumaila and Zubair fields is transported by pipeline to a 575-Mmcf/d natural gas liquids (NGL) fractionation plant in Zubair and a 100-Mmcf/d processing plant in Basra. At Khor Al-Zubair, a 17.5-MMcf LPG storage tank farm and loading terminals were added to the southern gas system in 1990. The Al-Anfal field in northern Iraq produces the only non-associated gas in the country at about 200 Mmcfd. Al-Anfal production is piped to the nearby Jambur gas processing station. Al-Anfal has estimated reserves of 4.5 Tcf, of which 1.8 Tcf is proven. In November 2001, there were reports that Iraq had discovered a large non-associated natural gas field in the Akas region of western Iraq, near the border with Syria, and that it held an estimated 2.1 Tcf of reserves.

2 Downstream Investment Requirements

Massive repairs are also needed to Iraq's 4 major oil refineries and other smaller plants. Estimates are that Iraq's current refining capacity is below its 400,000 b/d of domestic demand. The country has 10 refineries and topping units, most of which are considered "environmental nightmares" as they have not had any spare parts to guarantee their clean operations.

Iraqi Refining Capacity --Post-Gulf War repairs (1,000 b/d)	
Refinery	**Post-repair Capacity**
Basra	**126**
Daura	**100**
Kirkuk	**27**
Salaheddin (Baiji)	**140**
North (Baiji)	**150**
Khanaqin/Alwand	**10**
Nasiriyah	**27**
Haditha	**14**
Muftiah	**4**
Qayarah	**4**
Total	**602**

The Skeptics on the Global Warming Issue: The Distinguished Veterans

By Gerald T. Westbrook*

The objective of this essay is to put some faces on the skeptics on this issue. One way to do this is to categorize the skeptics and review these categories, one at a time. In this essay, the category is what I call the *Distinguished Veterans*. These are those scientists, perhaps retired, with incredible credentials and accomplishments to their credit. More on these scientists shortly.

Today, several energy companies have stopped fighting on the global warming issue, and essentially joined the *warmers*. Such companies accept the verdict of news releases from the UN agency—the Intergovernmental Panel on Climate Change (IPCC)—as the final word. There are still some key companies that are skeptical on this issue, and are convinced that the Kyoto Protocol (KP), for example, is at best premature and at worst a fraud. Indeed, there are many skeptics on this issue, but they get very little press coverage, and even less respect. Michael Crichton has been one exception. Because of his reputation as an entertaining and provocative writer he has received the press coverage. His latest book[1], *State of Fear*, is a James Bond type of novel. The warmers scream that this is a ridiculous book, with even more ridiculous characters, and hence is not worth reading. George Will[2], in contrast, called this book a political broadside woven into an entertaining story.

What has infuriated the warmers is not really his plot, nor his characters, but the fact he repeatedly brings in current inputs on the global warming issue. These take the form of *discussions* between his characters. He adds tables and graphs to this dialogue. He uses extensive footnotes, and postscripts that includes *The Author's Message*, where Crichton states his convictions, conclusions and positions and *Appendix I, on why Politicalized Science is Dangerous*.

In *State of Fear* there is little question that Crichton comes out on the skeptics side of this issue, both in the novel part and in his incorporation of much global warming science in his book. Crichton has been attacked viciously by this group. However, Crichton's effort will show to his many readers that an actual debate exists. As such it may well change the nature of this debate.

George Will noted two major themes in this book.

- Theme 1: "Crichton's subject is today's fear that global warming will cause catastrophic climate change (CCC)." This book is about CCC, but it takes some reading before one realizes that these CCC events will be *manufactured* by the radical environmental groups described in this novel. The events—ice shelf calving, flash floods, and tsunami generation—are all scheduled to occur at or near the time that a major conference on CCC is underway. In this way these groups expect to generate huge publicity, a multiplicity of new members and mega-bucks in donations.
- Theme 2: This theme was: "Crichton's subject is also how conventional wisdom is manufactured, in a credulous and media-drenched society."

Theme 2 is similar to that in a recent book[3] by this writer entitled *'Acid Rains' on Liberal Propaganda* {'AR'}. The key point in '*AR*' is that a *war* is going on: warmers versus skeptics; and as a result we live in a tidal wave of never ending propaganda.

Today the global warming issue has become conventional wisdom — it is happening, it is caused by society, it will be terrible, but we, the *warmers*, know what needs to be done to stop it.

A very major contribution of Crichton's book is that it publicizes the fact that a broad and deep debate on this issue is underway. Most *warmers* refuse to admit that such a debate exists. And one will never learn about such a debate in the *mass media*. Instead, the *mass media* presses ahead *manufacturing conventional wisdom* about global warming.

Crichton notes that the PLM (the Politico–Legal–Media) complex, has a vested interest in keeping society in a continuous *State of Fear*, hence the title for his book. The PLM has to resort to endless fear–mongering in order to keep the populace in a constant state of fear. And climate change is a perfect subject to scare the devil out of the average citizen.

In turn 'AR' argues that the *Ultra Liberals, Far Lefters and Global Warmers* must use a tidal- wave of propaganda to gain and hold power.

The average reader may still ask: why should they accept any of the inputs from Crichton, or from this writer. After all, neither are a climatologist or meteorologist or glaciologist etc, etc, etc. (Crichton does have a degree in medicine, and has conducted some biochemical research early in his career). One answer to this question is to shift from Crichton, to review the inputs of other skeptics. This essay will be on inputs from one type of skeptic, what I consider as perhaps the most interesting and compelling set. These skeptics are what I call the *Distinguished Veterans*. These are scientists with incredible credentials and accomplishments. Many of them are retired, some with the word *emeritus* in their title. These individuals do not have to play the game of chasing after grant money. These are scientists that do not have to curry favor with the department chair-person, or other university *brass*. They are free to state their convictions, and to speak their mind. And they are all highly skeptical on the global warming issue.

A quick word of caution is in order here. Note that at times some of the quotes from one veteran may seem to counter the quotes or be inconsistent with the quotes from another veteran. This is due to the individual context or timing where each quote occurred. Readers can rest assured that these veterans are all agreed that the big picture on global warming, as painted by the alarmists, is seriously flawed.

Hurricane Specialists

Dr. Neil Frank

This review will start with Dr. Frank, Chief Meteorolo-

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* Gerald Westbrook is President of TSBV Consultants, Houston TX.

Footnotes refer to references noted at end of text.

gist for Channel 11 in Houston, since 1987. Frank made this list of Distinguished Veterans because this writer lives in Houston and has had the opportunity to see him deliver the weather news many times, has seen him interviewed on global warming by Dan Rather and others at CBS, and has heard him speak on this issue several times at various professional and service meetings. Before Dr. Frank took this role at Channel 11, he served as head of the National Hurricane Center for 13 years, with a total of 26 years spent at that Center. He started his professional career as a weather officer in the Air Force.

Dr. Frank is highly skeptical about the global warming issue. He comes across loud and clear with his conviction that there is something very wrong with the proponents case. A major part of this concern is in the reliance by the proponents on results from computer models.

- He notes[4,5] that the models, used in weather forecasting can't be relied on for a three day forecast. He also notes, that for global warming predictions, we are being asked to rely on similar, but simpler models than those used in weather forecasting. Yet these climate models are applied in a far more complex arena to prepare climate forecasts for the next two centuries.
- He has also noted[5]: "Scaling back U.S. carbon dioxide emissions will require a considerable reduction in energy use, [but] climate change has nothing to do with carbon dioxide[4]". – – – "Nothing in the data – – – not the numerical models – – – would force us into a rapid decision [to cut] back on emissions and [to] impose an economic disaster on this nation."

Dr. William Gray

Gray obtained his BSc degree in 1952, then worked for the Air Force forecasting weather. He attended the University of Chicago from 1957 to 1961, obtaining an MSc degree in Meteorology in 1959, and a PhD in Geophysical Sciences in 1964. He joined Colorado State University, Department of Atmospheric Sciences, in 1961.

Gray has been forecasting the number of hurricanes for many years. He has become the nations preeminent hurricane authority, and is a Fellow of the American Meteorological Society. He is the recipient of many awards including the *Neil Frank* award in 1995, from the National Hurricane Conference, for his work in long range hurricane forecasts.

His statements on global warming are aimed at putting computer models into perspective.

- In a speech in Houston[6] he noted that *climate models, while surely useful, are far from perfect*. *"The models have been superb when used for the next 5-10 days, but when modelers move out onto the climate area the complexity becomes too damm much."*
- Some have tried to couple the upswing in hurricane activity as evidence of global warming. Gray's reaction[7] to such claims: there is no way such an interpretation can be accepted. Anthropogenic greenhouse gas warming, if a physical valid hypothesis, is a very slow and gradual process that, at best, could only be expected to bring about small changes in global circulation over periods of 50 - 100 years. This would not result in abrupt and dramatic upturn in hurricane activity.
- Gray has noted that hurricane frequency is somewhat cyclical and somewhat random. The last major storm to come through Florida, before Hurricane Andrew hit in 1992, was Hurricane Betsy in 1965." - - - "Eight of the last 10 years have been very active - - -." " - - -and yet we went from 1992 until last year with no hurricanes coming through Florida." During this period Gray commented that Florida had "just been lucky and that it was going to end." - - - "Although last year was a terrible year for them, it could have been worse because none of the four storms that affected the Florida region went into a highly populated area."
- Gray recently reinforced his views on this subject[8]. "While there has been warming since the middle '70s, especially in the last 10 years. But this is natural, due to ocean circulation and other factors. It is not human induced." - - - "Nearly all my colleagues who have been around for 40 or 50 years are skeptical as hell about this whole global warming thing."
- While Gray is in *retirement* he still works every day. "For years I haven't had any NOAA, NASA or Navy money. But I'm having more fun." - - - "Right now I'm trying to work on this human-induced global-warming thing that I think is grossly exaggerated." He admits he has cut his forecasting project way back, partly do to lack of funding. He noted he had "NOAA money for 30 some years, and then when the Clinton administration came in, and Gore started directing some of the environmental stuff, I was cut off. I couldn't get any NOAA money. They turned down 13 straight proposals from me."

Agriculture/Botany/Food Production Experts

Dr. Timothy Ball

Ball was the first Canadian PhD in climatology. His doctoral thesis the University of London, England, was the reconstruction of climate from 1714 to 1952 using the extensive records of the Hudson Bay Company (HBC). Ball worked for the Canadian Air Force for eight years, then for the University of Winnipeg for 28 years, retiring as full professor in 1996.

Ball has given over 600 talks on science and the environment. He has written hundreds of columns for the top Canadian farm magazine—*Country Guide*—under the heading *Weather Talk*. He has written many papers on climate, long range weather patterns, ecosystems, air quality, silting and flooding problems, and impact of climate change on sustainable agriculture. He is the co-author of the book[9]: *Eighteenth Century Naturalists of Hudson Bay*.

Ball has served on environmental, water resources, and climate committees at all levels of government and chaired many provincial boards on environmental issues and water management.

Some key comments [10]

- Is the world getting warmer? "Yes, it warmed from1680

up to 1940, but since 1940 it's been cooling . The evidence for warming is because of distorted records. The satellite data, for example, show cooling."

- Could you summarize the evidence that suggests the world is cooling slightly, not warming up? "Yes, from 1940 until 1980, even the surface record shows cooling. The argument is that there has been warming since then, but in fact almost all of that is due to what is called the 'urban heat island effect', that is, that the weather stations are around the edge of cities and the cities expanded out and distorted the record. When you look at rural stations - if you look at Antarctica, for example - the South Pole shows cooling since 1957. And the satellite data which has been operating since 1978 shows a slight cooling trend as well."
- Do we have the tools to model the climate? "We don't have the tools." - - - "The fact is the big models don't work. The fact is we don't even understand a fraction of the mechanisms of climate."
- What is the scientific basis for the Kyoto Protocol (KP)? "There is none." - - - "So it is a policy based on ideology and economics and politics and has nothing to do with science."
- Why did Russia sign the KP? Putin signed because Europe essentially blackmailed him in to signing.

Dr. Sylvan Wittwer

Dr. Wittwer received his undergraduate education in Horticulture at Utah State and his PhD from Missouri.

Wittwer, a distinguished professor of horticulture at Michigan State University, retired in 1996. He is Director Emeritus of the Michigan State University Agricultural Experiment Station. He was Chairman of the Board on Agriculture, for the National Research Council, from 1973-77 and a member of the Climate Research Board, 1978-81. He has served as a consultant for all International Agricultural Research Centers, all U.S. Federal agencies relating to agriculture and environment, the United Nations Development Program, and the World Bank

He is the author of over 750 papers and five books, ranging from *Feeding a Billion - Frontiers in Chinese Agriculture*, down to a best selling gardening book: *Greenhouse Tomatoes, Lettuce and Cucumbers*. The book[11] *Feeding a Billion* was co-authored with three Chinese agriculture scientists. It is now out of print and considered a collector's item.

Wittwer is the scientific pioneer who conducted the original studies on CO_2 enhancement of the production of food crops, starting in 1964[12]. He notes he has "now lived through 8 decades of 'global warming'. - - - "The 'greenhouse effect' warming is non-existent - - -." He has also noted that "the evidence is that the rising levels of atmospheric carbon dioxide are very favorable for the most essential of human activities - - - namely the production of food." He is the author of *Food, Climate, and Carbon Dioxide*. He writes that the effects of an enriched CO_2 on crop productivity, are positive as to the benefits for global food security. He argues that the rising level of atmospheric CO_2 is a universally free premium, gaining in magnitude with time.

He has also noted[13] that the "benefits of carbon dioxide are not just limited to photosynthetic efficiency and water use efficiency. When plants are exposed to elevated levels of atmospheric carbon dioxide, every kind of stress is alleviated to some extent that we've been able to examine." Whether it is water stress, temperature stress, air pollution stress, deficiency of nutrients stress, even a deficiency of light stress, that stress is alleviated to some extent.

Dr. Sherwood Idso

Idso obtained his BSc, MSc and PhD, in physics, all from the University of Minnesota. On graduation in 1967, he joined the U. S. Water Conservation Lab in Phoenix as a research physicist. Idso has also served as adjunct professor of Geology, Geography and Botany at Arizona State University. In 2001 he retired from the Water Conservation Lab to become president of his own web site. See below. His efforts in Phoenix would seem to be those of one who has picked up the ball from Wittwer and is carrying it forward. Idso has published over 500 papers, plus the books *Carbon Dioxide: Friend or Foe*? and *Global Change: Earth in Transition*.

Several writings by Idso have been highly influential in my education. The first references[14,15] were on a critique, in the New York Times in 1990, of Al Gore's infamous chart, that compared temperature and atmospheric carbon dioxide content over the past 160,000 years. The former VP was trying to make the case that the skeptics were wrong on global warming issue. Idso refuted these claims and showed that Gore was the one who was wrong on the facts and the reasoning.

The second reference, was his contribution[16], in a 1996 book on the global warming debate. His conclusion—on the impact of elevated atmospheric carbon dioxide levels—tends to shatter the Armageddon view about global warming: "*Rising levels of CO_2 in the atmosphere promote plant growth and at the same time reduce their demand for water. These effects should lead to a greening of the Earth and signs are that this has already happened*." Many of the studies show positive results based on a change from 350 to 650 parts per million of CO_2. Thousands of publications have verified these effects.

The third references are all output from his web site[17]: *The Center for the Study of Carbon Dioxide and Global Change*. This site has been extremely useful to this writer, but it has struck a sore point with the warmers. They have attacked it vigorously accusing Idso and his sons, Craig and Keith, all of being puppets of the energy industry. This charge seems to me to be one of desperation. It surely is a great exaggeration. And it is one of ultimate simplicity. The proof of such a charge would be in the nature and the quality of their postings, which both seem more than adequate to this writer. Further, I have personally not seen any critiques of this web site based on the lack of quality of its work, or on the weakness of its arguments.

Experts in Physics

Drs. Robert Jastrow, William Nierenberg and Frederick Seitz are authors of the book[18] *Scientific Perspectives on the Greenhouse Problem*. This book, now 15 years old, was one

of the first robust critiques of the greenhouse issue. A quick review of their credentials continues the rather incredible set of capabilities and accomplishments set by the first five distinguished veterans.

Dr. William Nierenberg

Dr. Nierenberg, (1919 - 2000) was Director of the Scripps Institute of Oceanography from 1965 to 1986. He was an expert in several areas of underwater research. Nierenberg was known for his long record of national and international service. Specifically he was a former member of EPA's Global Climate committee, the National Academy of Science Climate Research Board and a former chairman of the National Academy of Science CO_2 Assessment Committee. He served on several panels of the President's Science Advisory Committee.

Dr. Frederick Seitz

Dr. Seitz was born in 1911, and earned his PhD from Princeton in 1934. Work at Princeton continued in the field of solid state physics. Seitz moved to the U. of Illinois in 1949, rising to the Dean of the Graduate College by 1965. From 1965 to 1968 he became the first full-time president of the National Academy of Sciences. He was president of Rockefeller University—a biomedical research and teaching center—from 1968 to 1978, and is now President Emeritus. He is the former Chairman of the Defense Science Board and a former NATO science advisor.

Dr. Robert Jastrow

Dr. Jastrow was born in 1925. He also received his degrees in physics from Columbia University. He joined NASA in 1958 and formed the Goddard Institute for Space Studies in 1961, which he directed until his retirement in 1981. Following 11 years as a Professor of Earth Sciences at Dartmouth College, he became Chairman of the Board of Trustees at Mt. Wilson Institute, which manages Mt. Wilson Observatory. Dr. Jastrow has had a long interest in astronomy, science fiction and religion. He is the author of *The Enchanted Loom: Mind in the Universe*, and *God and the Astronomers*.

These three scientists challenged the IPCC in 1990 and their computer based, global warming range, for the next century, of 1.5 to 4.5ºC. They felt this range was far too pessimistic. Their analysis, based on reasonably hard observational data, but no computer models, included:

1. assuming the temperature increase over the 20th century was 0.3 to 0.6ºC;
2. assuming this rise was all due to a 50% increase in greenhouse gases from pre-industrial levels;
3. assuming a 100% increase in greenhouse gases, from pre-industrial levels, for the current century;
4. as openers then, could see twice the warming, from pre-industrial levels, at the end of this century, or 0.6 to 1.2ºC;
5. assuming a correction of 0.2ºC for ocean thermal lag, giving a revised range of 0.8 to 1.4ºC;
6. finally assuming an allowance, of ± 0.4ºC for natural climate variability, giving a range of 0.4 to 1.8ºC.

Again, based on this simple analysis, they felt the 1.5 to 4.5ºC was far too pessimistic, and represented a major exaggeration of the actual physical situation. Clearly the IPCC paid zero attention to this criticism, as the 2001 IPCC range is 1.8 to 5.8ºC.

Separate from the above book, the upper range value deserves additional comment. This increase in value from 4.5 to 5.8ºC was not due to any new science, but simply a change in the scenario definition. Unfortunately the high end value gets most of the publicity. The 5.8 ºC gets translated to 10.4 ºF, then rounded up to 11 ºF. The use of this value is outrageous as it is based on a hyped up scenario definition, that includes a ridiculously unrealistic global CO_2 per capita emissions growth. In 1979 this value peaked at 1.23 tons/year per person. This ratio dropped to 1.11 by 1999. But in spite of all the attention paid to energy conservation, in spite of all the pressure to use better fuels and alternative energy, the IPCC ended up with a value of 4.0 tons/year per person by 2100, almost four times current level.

This analysis reinforces the conclusion that the IPCC deals in major exaggeration.

Conclusions

Eight key veterans of the climate change battle have been cited. Three of these scientists were experts in the agriculture/botany/food production fields; three were experts in various branches of physics; and two were experts in hurricanes. The individuals cited all have had incredible careers:

- very advanced degrees in many of the most complex fields imaginable;
- broad national and international accomplishments;
- dozens of government committees and
- many awards.

These Distinguished Veterans are all skeptics. Their lifetime publications, speeches and comments gives a sample of the nature of this groups views on the global warming issue.

When considering whether to accept the views from a Michael Crichton or from this writer—where clearly neither of us are research scientists in this field—look at us in the role as news reporters, or better, as science reporters. Such key outlets as the New York Times or Nature magazine or Science magazine have general science reporters. Further all the Non Government Organizations (NGOs) also report such news. And these are the people, and these are the organizations that we are competing with as to who can best tell the public the latest scientific news. And the key news about the global warming issue is that there is a serious, valid and vigorous debate going on and the skeptics may very well have the best of the arguments.

And the very best proof that such a debate exists—that it is relevant and valid, and that the skeptics may be winning—is in the speeches and papers and words of the Distinguished Veterans. To claim that these scientists don't understand the sciences involved is silly. To argue that these veterans are being conned into their positions is spurious. And to accuse them of being puppets of the energy industry is specious at best.

References and Notes

(1) Crichton, Michael, *State of Fear*, Harper Collins, December 7, 2004

(2) Will, George, *Newsweek*, December 23, 2004.

(3) Westbrook, Gerald T., '*Acid Rains' on Liberal Propaganda*, iUniverse, Lincoln NB, December 9, 2004. Note that this book has nothing to say on the acid rain issue. The acid refers to the acid satire used throughout this book.

(4) See *Houston Chronicle*, April 11, 1998 as reported by the South Florida Sun Sentinal.

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(6) Gray, W., Colorado State University, *Predicted Hurricane Activity for 1997: Is Global Warming Causing More and Bigger Hurricanes?,* Speech at the National Hurricane Association meeting, Houston, TX, April 25, 1997.

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(8) Svitil, Kathy A., Weather Seer: 'We're Lucky', *Discover*, September, 2005.

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(10) Houston, Stuart, Ball, Tim, and Houston, Mary, *Eighteenth Century Naturalists of Hudson Bay*, McGill-Queens University Press, Montreal, 2003.

I first became aware of the HBC as a child in Canada, through their fine department store. The HBC was, of course, far more than a department store chain. It was in turn a trading company; an exploration activity; a map maker; a student of, and keeper of weather data; a recorder of, and guardian of the natural resources of their region; and finally a pseudo government. No organization could have been more interested in the weather, as they had the challenge of getting their boats out of Hudson Bay *in time*. Hence they kept detailed records of weather, animal and bird information, vegetation and celestial inputs. As noted above, Ball did his PhD thesis based on these records, and has done much to preserve them.

(11) Wittwer, Sylvan, Yu Youtai, Sun Han, Wang Lianzheng, *Feeding a Billion: Frontiers in Chinese Agriculture*, Michigan State University Press, September 1, 1987.

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(13) *Greening of Planet Earth Continues*, a panel discussion, Bismark, ND, November 13, 1998. See: www.co2andclimate.net/premier.htm.

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(16) Idso, Sherwood B., *Plant Responses to Rising Levels of Atmospheric Carbon Dioxide*, The Report of the European Science and Environment Forum, editor J. Emsley, Bourne Press Ltd, Dorset, March, 1996.

(17) See: www.co2science.com.

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Natural Gas Supply Diversification in Europe – Role of Turkey as a Transit Country

*By Erdem Catak and Omowumi O. Iledare**

Introduction

Natural gas consumption in Europe has been growing at a steady pace of 5.2%/year on average. Demand reached 498.1 Bcm at the end of 2003. High oil prices, environmental policies, and developments in gas fired power generation are expected to increase gas demand in Europe. Natural gas production in Europe has been pretty constant since 1987. Although the demand for gas has increased 66.8%, there is almost no improvement in gas production capacity. Annual gas production was 194 Bcm in 1986 and is now 204.1 Bcm. Norwegian production is expected to climb to 85 Bcm/year by 2010; on the other hand, this will barely offset the substantial decline in British production starting from 2005[1].

Lack of reserves and production capacities are driving Europe to be a net importer. The tremendous increase in gas demand since 1987, and almost no increase in production capacity is increasing reliance on outside suppliers to supplement European gas. Current gas supplies are pipeline supplies from Russia, and LNG supplies, mostly from Algeria. On the other hand, giant gas reserves with lower production costs and competitive prices in Iran, Middle East and Central Asia may be very attractive for the energy-hungry European countries.

Thinking that competition among the players in the market will reduce prices, Europe decided to diversify the supply paths of its energy needs. A stable, continuous and secure access to energy is one of the primary goals of European industry. As many other countries, Turkey, as a transit country is looking forward to being the energy bridge[2] between the hydrocarbon rich Middle East and Central Asia, and highly developed energy hungry European countries.

Natural Gas Demand in Europe

Figure 1 shows the gas demand history in Europe since 1965. High oil prices, and environmental policies force European companies and communities to spend more on gas than any other fuel. The three major sectors, which consume 94.8% of the gas in Europe, are residential users, industrial users, and, of course, gas fired power generation. The distribution of consumption among the sectors is given in Figure 2.

Residential consumption accounts for 41.6% of gas demand in Europe. The natural gas distribution networks connecting increasing numbers of customers are the primary reason for this high level of gas demand. Industrial consumption accounts for 28.6% of total consumption. It is highly dependant on price of competitive products, economic activities, and energy saving policies. Developments in gas fired power generation and restrictions on nuclear power plants are expected to increase gas demand in Europe during the next decade. Gas fired power generation has been substituting[3] for nuclear energy, especially after the accident in Chernobyl. Gas fired power generation accounts for 24.6% of the gas consumed in Europe.

Figure 1. Natural Gas Consumption in Europe

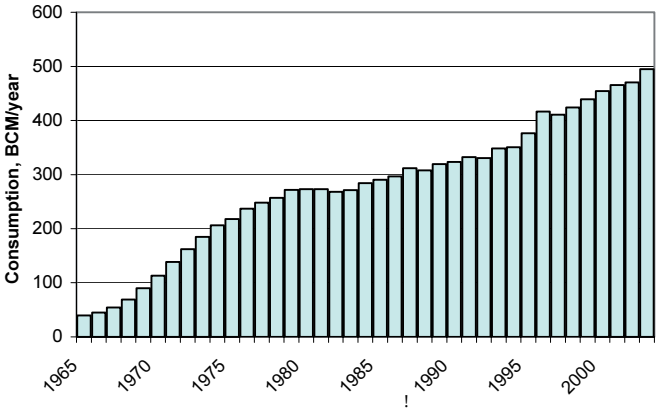
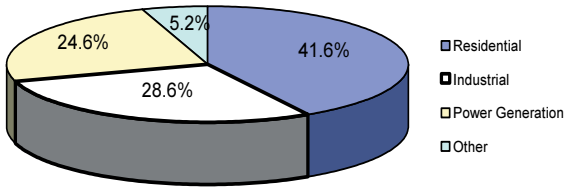


Figure 2. Distribution of Gas Consumption among Sectors

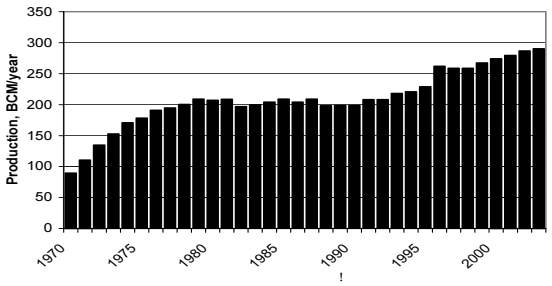


Environmental regulations, especially after the Kyoto Protocol, are forcing automobile manufacturers to build engines that give less emission. Low price as well as low emissions make natural gas a fuel for transportation, too.

Natural Gas Production in Europe

Natural gas production in Europe was pretty constant between 1976 and 1992. Although the demand for gas has increased 39.6%, the increase in production was only 8.9% during this period. Annual gas production was 191.1 Bcm in 1976 and 208.2 Bcm in 1992. Norwegian production, which started increasing in 1996, is expected to climb to 85 Bcm/year by 2010; on the other hand, this will barely offset the substantial decline in British production starting from 2005. Figure 3 below illustrates tnatural gas production in Europe since 1970.

Figure 3. Natural Gas Production in Europe



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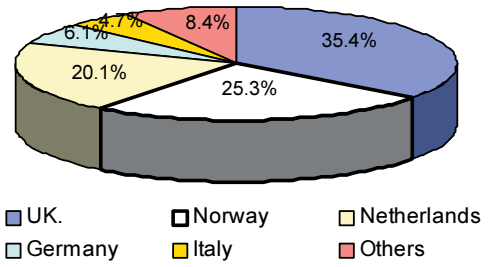
[1] See references at end of text.

Gas production in Europe has been increasing since 1996. Production reached 290.3 Bcm/year in 2003. On the other hand, despite the increase in Norwegian gas, United Kingdom production has been declining since 2000. UK annual production was 102.7 Bcm in 2003, having peaked in 2000 at 108.4 Bcm. Furthermore, natural gas production in Netherlands has also declined: to 58.2 Bcm/year from high 75.8 Bcm/year production of 1996. The distribution of natural gas production[4] among the European countries is given in Figure 4.

Figure 4. Distribution of Gas Production in Europe

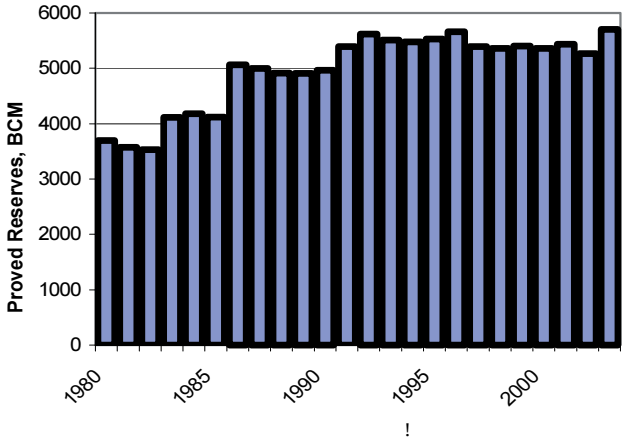


Romania with 4.3%, Denmark with 2.7%, and Poland with 1.4% of total production are other gas producing countries in Europe.

Gas Reserves in Europe

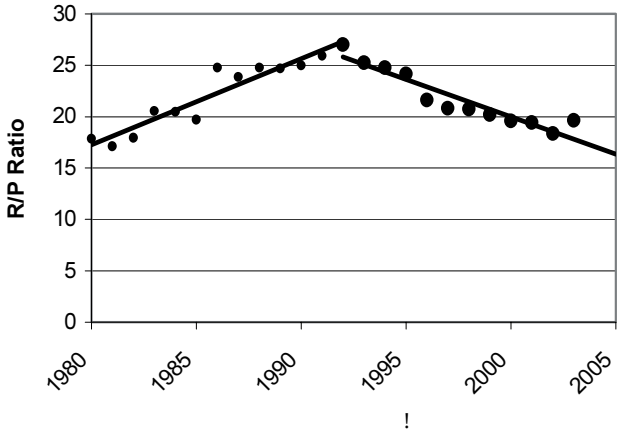
Natural gas reserves in Europe as of 2003 were 5.7 Tcm. Compared with world reserves of 175.8 Tcm, Europe is a reserve poor continent. Proved reserves trended upward until 1993 but is now declining. Reserve additions in Norway in 2003 could barely stop the decline and unfortunately the trend for other European countries is still down. Norway reserves account for the biggest amount with 2.46 Tcm followed by Netherlands with 1.67 Tcm. United Kingdom has the third biggest reserve, which is 0.63 Tcm. Figure 5 below presents the history of proved gas reserves in Europe since 1980.

Figure 5. Gas Reserves in Europe



Another, perhaps more accurate interpretation of reserves is the Reserve/Production (R/P) ratio. The R/P ratio for European gas reached a maximum in 1992, and has been in decline since then. Reserve additions in 2003 seem to be changing the trend to growth; on the other hand, the R/P ratio in 2003 is far below the 1992 level. Maintaining the same amount of reserves and producing the same volumes of gas, the latest data shows that Europe will run out of gas in about twenty years. Europe's R/P ratio is less than half of the global R/P. The R/P ratio of European gas since 1980 is shown in Figure 6 below.

Figure 6. R/P Ratio Since 1980



Current Natural Gas Supply Paths for Europe

Three countries – the United Kingdom, Norway, and the Netherlands – currently account for 80.5% of total production. Annual domestic gas production reached 290.3 Bcm in 2003 accounting for 58.6% of total consumption. 41.4% of consumption (204.7 Bcm)[4] was imported from outside producers, mainly from Russia (130.6 Bcm), Algeria (30.8 Bcm), Nigeria (8.4 Bcm), Iran (3.5 Bcm) and the Middle East (5.5 Bcm).

Existing pipelines have a maximum supply capacity of 365 Bcm/year. Russia has the biggest export capacity with 165 Bcm/year via two export corridors across Ukraine and Belarus. The Norwegian natural gas transport network with six pipelines provides a capacity of 88 Bcm/year. 34.7 Bcm/year come from Algeria. The two pipelines, Pedro Duran Farel to Spain and Portugal, and Enrico Mattei to Italy and Slovenia are running at virtually maximum capacity. The UK-Continent Gas Interconnector, which also offers the possibility of exporting 10 Bcm/year to the United Kingdom, has the capability to provide 20 Bcm/year to the Continent. About 55 – 60 Bcm/year from Netherlands with the capacity extension on the Trans-Europe Naturgas pipeline to Italy also exists

Need for Supply Diversification

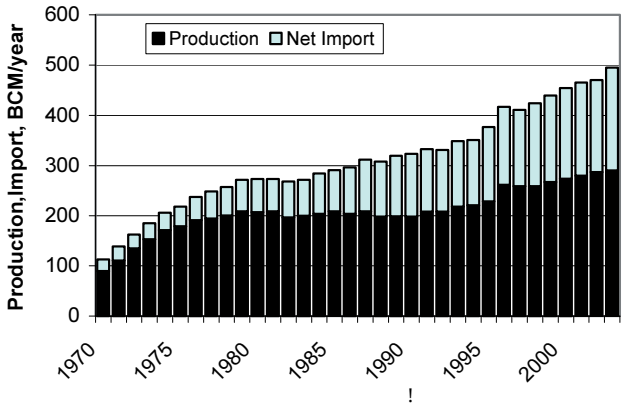
Currently, a large part of the gas consumed in the EU originates from non-EU countries such as Russia, Norway and Algeria. Due to EU enlargement and increasing gas demand in the EU, the gas import dependency on supplies from non-EU countries will increase substantially in the next decades. Dependency on a limited number of countries is, therefore, increasingly undesirable because of the political, economic and physical risks involved in long-distance supply routes. Supply diversification and transport efficiency in supplies are, therefore, necessary to manage and reduce the

risks. As prices are expected to rise, alternative countries and supply routes become viable to supply gas to EU in coming decades.

Europe has been successful diversifying its energy sources. Oil, gas, LNG, coal, nuclear, hydroelectricity, wind and solar energy are the substitutes in the energy mix. Natural gas, with a 22.7% share is now a major component of the European energy mix[5].

Supply diversification is also as important as the energy source diversification. The growing gap between total consumption and domestic production is driving Europe to be a net importer. Figure 7 below shows the growth in production and net imports since 1970. Knowing that 63.7% of imported gas is supplied by Russia, it can easily be said that Europe is highly dependent[6] on Russia in terms of supply security.

Figure 7. Europe Gas Production and Import Needs



Diversification has been a paramount element in strategies for security of gas supply in Europe. New pipelines from new suppliers enhance security of supply through both new routes and new sellers. New pipelines from "traditional" suppliers will contribute to a more reliable environment by both diversifying geographical routes and bypassing or putting the transit countries into competition with each other. New LNG projects for imports from countries with a foothold already in the market (Nigeria, Norway and Egypt), and new LNG projects for import from new players well placed to tap the European market (best opportunities for Middle East projects) will improve supply security and competition.

Energy issues make it critical for Europe, to maintain good relationships with the producer countries. Environmental and political conditions are always considered to be risks between buyers and sellers. Any political crisis between an importer and producer may result in failure to maintain the supply continuity and security. A good example would be Georgia. Georgia is fully dependent on Russian gas, and at politically tense times, the supplies by Russia have not been reliable[7].

The White Paper for Energy Policy, the departure point of European energy policy, states three main directions. These are: diversification of security of supply, competitiveness, and environmental protection. On this basis, three main dimensions determine energy security: political, economic and environmental. The liberalization of gas and electricity sectors is consequent to the economic dimension, which aims to establish a single and competitive energy market. The implementation of the Kyoto process and the integration of sustainable development affect many aspects of the European Union energy security concept. Finally, the impending enlargement to countries historically dependent on Russia for their energy supply constitutes a major challenge to the geopolitical dimension of energy supply.

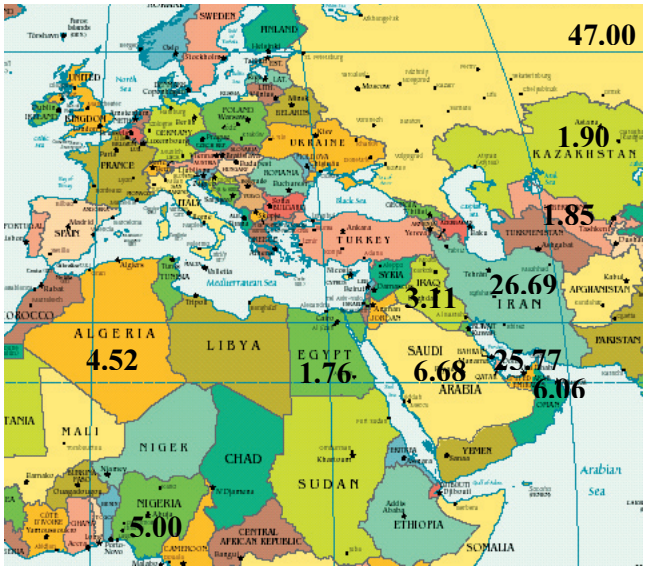
Alternative Supply Paths

Europe historically has been a region with a high reliance on foreign flows. During the last 30 years, many measures have been adopted that taken together have raised supply security to a high level. The major instruments[8] used so far by European gas companies for guaranteeing security of supply could be summarized as follows:

- Long-term Take-or-Pay (ToP) contracts with additional risk management tools;
- Correct investment and regulatory climate;
- Diversification of sources and transit routes; and
- Regular dialogue with producing countries.

Europe's increasing demand for imported natural gas – due to the fact that indigenous production is declining – will confirm the need for strong political and physical links to North Africa and Russia, and increase the attraction of suitable pipeline links to the Middle East and Central Asia. Figure 8 is a brief illustration of the gas reserves[4] around Europe.

Figure 8. Natural Gas Reserves at Prospective Suppliers



The primary issue for the natural gas industry in the twenty first century will be that gas consumers are geographically remote from gas producers. 40% of the world's gas resource lies in the Caspian and Gulf states, some thousands of kilometers from 20% of the world's gas consumers in Europe. What will it take to connect the two by pipeline?

The Caspian and Gulf are complex from a geopolitical point of view. However Europe's desire for supply diversification, the prevention of economic dominance by any one

supplier, and resource owners´ desire to bring their product to market, provide strong drivers for political solutions. Many of the gas markets along proposed pipeline routes are immature and not readily accessible by alternative gas supply sources. In order to encourage investment and stimulate market growth, and hence encourage the development of a transit pipeline to Europe, gas market liberalization is needed. The extension eastwards of the European Union and its policy instruments provides a driver for market reform. Finally, any pipeline project will require massive capital investment running into billions of euros, hence private capital will be essential. Such capital will require adequate returns; hence the project must be fundamentally economic.

Analysis of Europe's supply and demand shows that by 2010 additional tens of Bcm will be required. This will increase to an additional few hundred Bcm by 2025. This emerging gap is driven by strong annual growth principally because of increased use of gas by the power sector. Thus there will be a growing customer base for additional gas supply sources. Caspian and Gulf pipeline gas will have to compete for this increased demand with the four existing supply sources, namely pipeline gas from the North Sea, Algeria and Russia, and LNG from Africa and the Gulf.

Table 1. Unit Cost of Energy by Pipeline to Europe[9]

Supply Point	Transit	Cost ($/mmbtu)
Russia - Yamal	Belarus	3.31
Russia - Nadym-Pur-Taz	Ukraine	2.79
Russia - Volga Ural	Ukraine	1.92
Russia -Volga Ural	Turkey	2.55
Uzbekistan	Turkey	2.15
Turkmenistan	Turkey	2.12
Azerbaijan	Turkey	2.05
Iran	Turkey	2.17
Iraq	Turkey	1.97

Of course, there are various gas reserves and resources available outside the EU to satisfy the growing demand of European economies, but this requires a further development and expansion of the gas transport infrastructure between Europe and today's key gas suppliers of Norway and Russia, along with countries in North Africa. Beside environmental and political benefits, diversifying the supply will cost something. The economic dimension of supply diversification is very important to the consumer. Building new pipelines, diversifying the supply source and supply routes will cost billions of dollars, on the other hand, continuity and security of supply will be achieved. The production cost of gas varies for different regions. Length and size of the pipeline affects the construction and operational cost of the system. Table 1 shows the cost of energy carried by pipelines to Europe from various sources and via various transit countries. This study[9] was performed by OME (Observatoire Méditerrannéen de L'Energie), which is an association of energy companies in the Mediterranean countries. In this calculation, production cost, transport cost and transit fees are taken into consideration while producer country royalties are excluded.

The Caspian and Gulf reserve base is enormous. Some 6 Bcm of proven reserves are available to the states surrounding the Caspian Sea and some 50 Bcm is available in the Gulf. In the case of the Caspian, these reserves could go to market by a pipeline west to Europe, but other options exist: north to Russia, South to Iran, and East to Asia.

Three basic pipeline routes[6] to Europe from the Caspian and Gulf have been proposed:

- Turkey to Austria via Bulgaria, Romania and Hungary
- Turkey to Austria via the Balkans
- Turkey to Italy via Greece.

Role of Turkey

Projections performed by various research institutions and energy companies that are future candidates for new projects in the Caspian and the Middle East are giving signals of some 100 BCM natural gas annual throughputs to be transported via Turkey to the European countries in 2020. This is really an encouraging figure that forces Turkish gas companies to work with high motivation on the way to the western markets. An energy importer[10] and itself a major energy market, Turkey's importance lies in its ability and willingness to develop major transit systems for oil and gas thus enabling energy resources to access European markets by pipelines from such diverse regions as the Caspian, Central Asia, and the Middle East. Being between the resources and consumers, Turkey is willing to be the "Energy Corridor" between Europe and Middle East and Central Asia.

Definitely, it is essential for Europe to maintain satisfactory relations with transit countries[11] for providing a stable access to the sources and to the energy products it needs. This is especially true for gas, where the main risk lies in transit conditions and continuing diversification of transport routes, not in the status of proven reserves.

To date, Turkey has managed to make various supply connections with different production points within the aim of supply diversification. While doing that, the diversification strategies of the European Union as well were kept in mind. Table 2 below shows the supply contracts signed between Turkey and the producing nations.

Table 2. Turkey's Gas Supply Contracts[10]

	Max. Capacity (Bcm/year)	Term (Year)	Starts (Year)	Ends (Year)
In Operation				
Russian Federation (West)	6.0	25	1987	2011
Algeria (LNG)	4.0	20	1994	2014
Russian Federation (Turusgaz)	8.0	23	1998	2020
Nigeria (LNG)	1.2	22	1999	2021
Iran	10.0	25	2001	2026
Russian Federation (Blue stream)	16.0	25	2003	2027
Turkmenistan	16.0	30	2006	2035
Planned				
Azerbaijan	6.6	15	2006	2020
Total	**67.8**			

With its existing and planned institutional and technical infrastructure, it is time to play the key role for Turkey as a transit country on the way to Europe with its brand-new, ever-expanding and consistent grid of gas pipelines. Table 3 and Figure 9 shows the Turkish pipeline network. While

working hard to realize extensive investment in gas infrastructure, it was not the sole target of Turkey to transmit gas to every town in Turkey. Together with that mission, it is also determined to open the door of the major gas markets of Europe.

Table 3. Turkey's Pipeline Network[10]

Existing System	4700 km
Under Construction	2400 km
Planned	1000 km
Total	8100 km

Together with its existing gas takings from Russia, Algeria, Nigeria and Iran, Turkey is looking forward to increasing supply sources and routes. In this regard, the Shah Deniz Project[2] is plannned for the transportation of gas produced in Azerbaijan. Natural gas sales and purchase agreements were signed with Azerbaijan in 2001 and gas deliveries are planned to start in 2006 with 2 Bcm; to reach a plateau volume of 6.6 Bcm in 2009. This project is considered to be the first step in Caspian-Europe gas supplies.

A second step, the agreement with Turkmenistan to buy 16 Bcm of gas for Turkey, and an additional 14 Bcm for European demand is pending at the moment because of some sticking points, which are mostly politically based[2]. However, as soon as those issues are solved, with the completion of the Azerbaijan Project and opening of the route from the Caspian, Turkmenistan gas will follow.

A natural gas sales and purchase contract for the delivery of 4 BCM/year of Egyptian gas to Turkey by an offshore pipeline is planned with Egypt. This Agreement will be rearranged in case additional gas is required[2]. Another project, 10 Bcm gas from Iraq, is also under consideration. Development of this project has been slowed by UN sanctions so far, but with new conditions in the region, this project is likely to come onto the scene with a new direction towards Europe.

In addition to gas transit pipeline projects, Baku-Tbilisi-Ceyhan[10] crude oil pipeline is also under construction. After the breakup of the Soviet Union, hydrocarbon reserves of the Caspian Region started to attract the attention of the world. International gas and oil companies started to establish joint ventures in order to explore and develop those reserves as well as their transportation. After long negotiations and discussions the Baku-Tbilisi-Ceyhan Crude Oil Pipeline Project came to the fore leaving behind the other alternatives.

The basic and detailed engineering studies were completed successfully and in timely manner. As of September 2002, the "Land Acquisition and Construction Phase" of the Project was initiated. And finally, on 26 September 2002, construction of the Turkish Section of the line was begun. As an "Energy Corridor between the east and the west", Turkey now enjoys the steps taken so far that aims at supplying Caspian oil to the world market through Turkey. This project

Figure 9. Turkey's Pipeline Network [10]

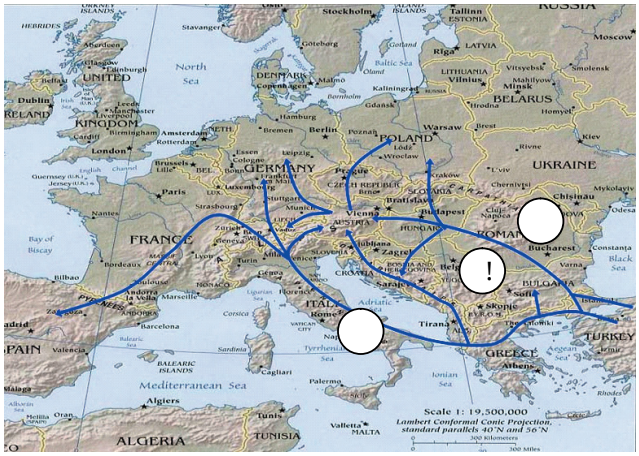
could cement the independence and political stability of the countries in the region.

Gas to Europe

There are some feasibility studies and negotiations going on regarding projects undertaken internationally for the purpose of transportation of the regions' gas to the European market. The proposed supply routes from the Caspian, Central Asia and Middle East via Turkey are:[6]

1. To Italy via Greece
2. To Austria via Bulgaria, Romania and Hungary
3. To Austria via the Balkans

Figure 10. Proposed Natural Gas Pipelines to Europe[10]



These are illustrated in Figure 10. Each of these routes has its own technical challenges, cost bases and transit markets. Detailed economic examination of each of these three pipeline projects allows comparison with both the existing four European supply sources, and the other options Caspian and Gulf states have to bring their gas to market. In this way it is possible to identify those criteria necessary for an economically viable pipeline project from the resource rich Caspian and Gulf to a growing customer base in Europe.

The Turkey-Greece Natural Gas Pipeline Project has been developed to meet European gas demand. Within the framework of the studies conducted, the first step will be the interconnection of natural gas networks of both countries by a pipeline, to form the first and most important section of the South European Gas Ring.

A natural gas sales and purchase agreement was concluded in December 2003 between BOTAS, the Turkish National Pipeline Company, and the Greek company, DEPA. Construction of the pipeline began in September 2004. The total length of the Interconnector, including the Greek section, will be nearly 300 km's and it is expected that gas sales to Greece through this pipeline will start in 2006. Dr. Pala, Head of the Foreign Relations and Strategies Department of BOTAS said[2], "We believe that this is a very significant development and it is going to be a pipeline of peace and prosperity and coexistence".

Meanwhile, the search for alternatives to transport the gas to the European markets after Greece is in progress. A further extension of this line is the Italy-Greek Interconnector for which a feasibility study is being made.

European Union TEN funds have been made available for engineering and feasibility studies of these projects and the projects are moving in accordance with that schedule. A gas supply cost analysis made by OME is also being examined by EU TEN for about 35 different route options for European gas supply. The evaluation of the supply costs shows that the supply routes from Turkey are in a very favorable position among the various route alternatives, especially from the Eastern and Northern sources to Europe.

Dr. Pala[2] said, "The OME study report ends up with saying that the European Investment Bank which is currently supporting the TEN projects has a key role in the development of partnerships. It also stresses the importance of political and financial support of the European Commission and the European Investment Bank and importance of the Energy Charter Treaty as a framework for energy trade between the EU and its external energy suppliers".

TheTurkey-Bulgaria-Romania-Hungary-Austria[10] Natural Gas Pipeline Project is also under consideration. With all the encouraging developments, the studies for another route to reach the European market have been initiated. This additional route is envisaged to carry the gas coming from Eastern sources together with the route through Greece. The Project called Nabucco aiming to link Turkey to Bulgaria, Romania, Hungary and Austria is moving ahead. This route will be the gate to Europe from another angle. This Project is also receiving financial support from EU funds.

Within this framework, negotiations were initiated between the related gas companies of the countries, OMW Gas of Austria, MOL of Hungary, Transgaz of Romania, Bulgargaz of Bulgaria and BOTAS of Turkey. These five companies signed a cooperation agreement in October 2002 in Vienna and have established a project company. The project company will discuss with all the suppliers for throughput options and will invite the suppliers to use the new route. Initially existing spare capacities of countries will be used to serve the market and full development of the pipeline system will be handled in a step-by-step approach.

TheTurkey-Greece-Balkans-Austria[10] Natural Gas Pipeline Project is another alternative, which would also come from Greece and follow a route along the Adriatic Sea. In order to study that additional corridor, on April 2003 BOTAS and DEPA signed a protocol with the respective gas companies of Bosnia-Herzegovina, Croatia, Slovenia, Serbia-Montenegro, Macedonia and Albania in Thessalonica. The expected growth rate of gas demand in Europe, especially beginning in 2015, together with the decline in domestic supplies, indicates the need for a third route option to follow the Turkey-Greece-Italy and Turkey-Austria (Nabucco) Projects. Those dates will probably bring higher demand figures in these potential transit countries as well. An economic and secure supply option will likely be welcomed in the area.

Discussion

In geographical terms, Turkey is well placed to serve as

a central transit supplier for the anticipated increases in EU demand. In this respect many companies in central, southern and southeastern Europe are actively involving in bringing gas resources from the Caspian and the Middle East to European markets through full commercial pipeline systems transiting Turkey. For European countries, development of Turkey as a transit route helps promote energy security through diversification of gas supply routes.

As Turkey's importance as a gateway grows, so it further increases European energy security by ensuring increased access to Caspian reserves on a commercial basis, as well as offering Middle East producers the option of transporting gas to Europe. It should be noted that such projects would also provide great benefits for the transit countries in terms of their economies and political stabilities[10] as well.

In order to form a proper and suitable source alternative, Turkey has to present reasonable conditions for gas transmission to Europe. This is also the case for the demand markets on the West and the supply countries in the Caspian Region, Middle East and others. Both the countries and the companies have to consider the needs for structuring a new supply source and a new route.

The supplier countries and producer companies in the region have to provide reasonable conditions to open the gate. This is also the case for the transit countries to form the best grounds for the mission, both technically and economically. And last, the demanding countries, together with their organizations, have to support these projects taking into consideration the cost of supply diversification, in order to benefit from more secure, economic and liberalized market conditions in the future.

Conclusions

Studying the European gas market in terms of reserves, production, consumption, import dependency and the desire to diversify supply, the following conclusions have been reached.

1. Existing proved reserves cannot satisfy Europe's energy needs.
2. Profiles show that European regional gas production is in decline.
3. Natural gas consumption is increasing due to economic-growth and environmental concerns.
4. The growing gap between consumption and production increases import dependency.
5. For the sake of supply security and continuity, it is essential to diversify supply sources and routes.
6. Detailed engineering studies show that building pipelines to Europe via Turkey is feasible.
7. Turkey, as a transit country, is going to be the *Energy Corridor* between the producers in Caspian, Central Asia and Middle East and Europe.

Nomenclature

Bcm	Billion Cubic Meters
BTC	Baku-Tbilisi-Ceyhan
EU	European Union
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gases
R/P	Reserve/Production Ratio
Tcm	Trillion Cubic Meters

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Natural Gas in the Mediterranean: A Note for the Barcelona Process 10th Anniversary

By Hadi Hallouche*

Introductory Remarks

A wise man once said "politicians build walls between nations, industrials build bridges".

In the case of the Mediterranean, a region with millennia-long history and a rich cultural and social mix of peoples, this statement is only half true.

On the infrastructural level, the Mediterranean region has witnessed over the last decade -and still is- tremendous integrative changes, notably through natural gas projects.

The complementarity between the EU and the South and East Mediterranean (SEM) countries, on the energy front, particularly natural gas, is overwhelming: the EU needs secure, reliable partners at proximity and SEM countries are interested, on the strategic level, to have a special and sustainable relationship with the EU.

On the outset, over and beyond the social, cultural, historical and other commercial elements that may link peoples and corporations in the Mediterranean, natural gas is most probably one of few industries that has actually presented strategically enough incentives to create inter-dependent links between countries.

On the political front, the Barcelona Process Initiative in 1995, bringing together the EU Member States with SEM countries, came as an expression of a strong political will for a tighter relationship between Europe and the Mediterranean.

While one might argue that the industry (more particularly here the natural gas industry) *has* built bridges in the Mediterranean, it is not fair nonetheless to subscribe to the idea that politicians have built walls.

This being said, there is general agreement that the spirit of the Process has faded away. There is a pressing need to revive it in light of new political, strategic and economic variables: the EU enlargement, the Euro, Turkey's prospects for membership, recent developments with Libya, recent developments in the Middle-East, the 11th of September events and important changes in the energy markets, for instance.

The Process will celebrate its 10th anniversary this November and a summit of similar importance is expected, or hoped, to bring the revitalisation of the Euro-Mediterranean partnership.

Europe Needs Gas

There is little doubt that Europe is moving towards a higher dependence on imports for its energy needs. The booming growth of energy consumption in some EU Member States coupled with slow, if any, growth in primary energy production overall means that imports will grow importantly.

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It is clear also that with the Kyoto Protocol coming into force, and the concerns of the commission voiced through the Green Paper for Energy on environment friendliness, further pushes for a higher consumption of natural gas in the EU energy mix puts a particular upward pressure on imports of natural gas.

EU Member States are increasingly poorly endowed with natural gas. Security of supply – also voiced through Green Paper- is, therefore, a matter of importance. The EU Commission Directive on Security of Supply for Natural Gas, for instance, notes different logistical (e.g., storage) and economic instruments (e.g., diversification of partners) to move closer towards achieving security of supply. But more can be done.

The longer term strategic tools to move closer to security of supply may come under the form of closer cooperation and the establishment of a state of inter-dependence between the EU and SEM countries as well as consistent dialogue.

Dialogue is probably the long term solution. The Euromed Forum for Energy, which came about in the spirit of the Barcelona Process, provides the platform for such dialogue. The Forum was, however, not able to efficiently solve some of the issues related to natural gas trade that have arisen between the EU and some of its southern neighbours.

SEM Countries and Current Projects

Algeria, the world's oldest LNG exporter, has a strong market share in the EU. Algeria is linked to Europe by two underwater pipelines, one via Morocco serving Spain through to Portugal and the other one via Tunisia serving Italy and Slovenia. These two pipelines, while providing an extremely important basis for security of supply to the buyers (and security of market for Algeria), also effectively brought both transit countries into the gas trade value chain.

Construction of the the Medgaz project, a pipeline linking directly Algeria to Spain (and potentially France), is due to start this year. The GALSI project, a direct under-water pipeline to Sardinia, Italy (and again potentially to France), has seen the commitment of the Algerian and Italian governments as well as a number of companies.

It is worth mentioning that Spain's legislation states that imports from any one producer cannot exceed 60% of total imports, a security of supply motivated measure. Algeria, having the strongest absolute advantage in selling gas to Spain due to the proximity, finds its exports artificially impeded. If gas cannot be exported, electricity can; bearing in mind that electricity drives most of the gas consumption growth. Indeed, along the construction of the Medgaz project, an electricity connector cable is expected to be laid.

Further, discussions are underway between the Algerian and Nigerian governments for the construction of a Sahara-crossing pipeline, called NIGAL, linking the Nigerian fields to the Algerian-EU pipeline export infrastructure. This project has been greeted with some scepticism by some market observers but has witnessed strong political will from the Algerian and Nigerian governments, even at the level of heads of states, through the New Partnership for African Develop-

ment Initiative. This project will offer Nigeria flexibility for its exports (besides LNG) and will place Algeria, in some terms, as a natural gas hub in the sub-region.

Another important pipeline project is the Greenstreem, inaugurated last year, linking Libya to Italy offering Italy a more diversified portfolio for its pipeline exports. Libya's LNG exports, which stagnated for a long time, are also expected to grow sharply in the light of recent developments of Libya's relations with the EU.

Egypt's pipeline, under construction, transporting gas to Jordan, Syria, Turkey and subsequently to the EU is probably the project that unites the largest number of countries. It also offers the opportunity to other potential exporters to join in, for example Iraq and Saudi Arabia.

Turkey also has the potential of becoming, if it is not already, a natural gas hub, due to its geographical situation as transit country for Iranian, Azerbaijani and Russian piped gas. Lower than expected demand due to the recent monetary turmoil meant that Turkey is over-contracted for some time. There is, therefore, potential for Turkey to become a seller of LNG (through redirections) as well as a transit country.

Southern Integration

As a group, North African countries have not done enough to create an environment of integration at least remotely similar to that in the EU. The UMA (*Union du Maghreb Arabe*) has been at a standstill for more than a decade and so are many projects that were expected to be conducted under its umbrella.

The UMA is composed of Mauritania, Morocco, Algeria, Tunisia and Libya. Egypt has also expressed interest in joining.

On the energy front, the Maghreb electricity ring is one of the projects supported by the Euromed Forum for Energy and is one that should benefit from high political sponsorship. There should also be more "soft" cooperation (uniformisation of standards, common data banks, common energy charters…etc).

The Maghreb integration makes sense in the dynamic of the Euromed Partnership and more generally in the dynamic of globalisation. More importantly, the synergies that exist between North African Countries, particularly in energy and natural gas, mean that this integration is in the national interests of all. Its failure over the last decade can only be credited to political immobilism. The recent initiatives to revitalise the UMA, especially the energy working groups, can only be encouraged.

Natural Gas Pipelines: Trust and Integration

Natural gas in the Mediterranean, has been, is, and is likely to remain an industry of trust.

Indeed, natural gas projects (Liquefaction terminals, regasification terminals, pipelines and others) are highly capital intensive and front loaded. Long Term Contracts, about 25 years, come to bind companies and indeed countries.

While it might be a matter of debate to grant natural gas the status of strategic commodity, natural gas projects, at the buyers and sellers side, are most surely of a high strategic importance, from the supply and from the finance viewpoints.

As a result, the tremendous natural gas infrastructural changes, besides fulfilling their logistical aim, have served to establish strong links between large (until lately) monopolistic corporations – in effect extensions of the State – in EU Member States and SEM countries. Beyond this, they have indeed established and sustained a higher level of trust, at the highest political levels, between governments.

Beyond the well-known commercial and strategic impact that pipelines provide, their construction provides unparalleled economies of scale required to lay other important projects such as electricity interconnections and fibre optic cables for telecommunication. This is particularly true for under-water projects. Given the fact that these industries (gas, electricity and telecommunications) are slowly liberalising on both sides of the Mediterranean, commercial integration - and more - will undoubtedly follow.

Dialogue

The Euromed Energy Forum should have played a much more central role especially with regards to the recent debates on the Gas Directive and the Natural Gas Destination Clause: some SEM Countries complained that they were not consulted by the EU Commission on the former, which was about to bring important changes to the market, and the EU Commission deemed the latter as anti-competitive in spite of the fact that it was common market practice for a long time. Both these issues have been – mostly – resolved, but in a way that was not as smooth as it should have been in an industry where trust is so important.

These misunderstandings, together with high U.S. gas prices, will certainly make more North-African gas go to the U.S. Security of supply also means that the EU should make itself an attractive buyer.

The Euromed Forum for Energy is young, loosely structured and meets infrequently. Given the importance of natural gas in particular, and energy in general, in playing a pivotal role in Euro-Mediterranean integration, this forum cannot afford to stay at its present state. It needs to gain more importance and more structure.

Political Will and Integration

The Barcelona process provided, ten years ago, a good starting point for a blueprint of the relationship between the EU and its southern neighbours. The Process is undoubtedly of a high strategic importance, in more aspects than one, for both sides. The Process aimed, amongst other things, to establish a free trade area in the Mediterranean by 2010, to provide structural funds to the SEM countries in a comparable fashion as those channelled to the Eastern European countries, and to promote projects of importance (a number of which infrastructural, and energy).

The Process achieved a lot, not least of which were the association agreements ratified by many SEM countries and a substantial increase in investment. The Process, however, did not do enough, by the standards of many commentators. The Process came further to be overshadowed by the "EU

Neighbourhood Policy" which, as it puts countries of fundamentally different relationship patterns in the same basket, was to be criticised by many experts.

The situation in the Middle-East is, also, a highly destabilising element. While the Barcelona Process was launched in a time of momentum – only two years after the Oslo Agreement was signed, it finds itself today in a much different situation. Obviously, notwithstanding the effect that the conflict has on the integration of the East Mediterranean Region, it also puts high barriers, long term, on a potential institutional consolidation at the Euromed level.

Concluding Remarks

The complementarity and the proximity between the EU and its Mediterranean neighbours, especially in the natural gas trade, offers opportunities for a strong alliance between them.

Natural Gas trade, being an industry based upon trust between partners, infrastructural natural gas projects, especially pipelines, have succeeded in achieving more of it between partners: sellers, buyers and transit countries.

Besides the economic repercussions directly and indirectly, natural gas projects, again especially pipelines, offer economies of scale for electricity and telecommunications (fibre optic) connections which further enhances the general level of integration in the region.

Along with trust comes dialogue. The Euromed Forum for Energy probably did not do enough to tackle the major energy related issues. This forum should gain in importance and in structure. Above all, the forum should be used more often by the SEM countries and by the Commission for consultation on mutually important energy issues.

Above all, such dialogue should be looked at in an optic of security of supply by the EU Commission. With the U.S., Indian and Chinese LNG markets growing and the LNG market becoming more liquid and slightly shifting from demand-led to supply-led; the EU has to make itself more attractive as a buyer.

From its side, SEM countries – more particularly North African – should deploy the political efforts required to integrate and consolidate their energy infrastructure (and other aspects) further. The example of the Maghreb electricity ring as well as natural gas interconnections should be at the forefront of discussions.

The 10th anniversary of the Barcelona Process this November is expected to be an attempt to revitalise the partnership taking into consideration the new security, social and economic imperatives. It should also give energy, and natural gas, the importance that it deserves in the integration of the Mediterranean by strengthening the dialogue tools and further facilitating investment.

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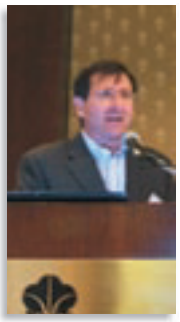


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Science and Technology Policy • Basic research and commercialization strategies for vehicle technologies, electricity generation, and carbon sequestration • S&T policy for to realize "learning by doing" and diffusion externalities	

**** CALL FOR PAPERS ****

Abstract Submission Deadline: April 28, 2006

(Please include a short CV when submitting your abstract)

Abstracts for papers should be between one to two paragraphs (***no longer than one page***), giving a concise overview of the topic to be covered. At least one author from an accepted paper must pay the registration fees and attend the conference to present the paper. The lead author submitting the abstract must provide complete contact details - mailing address, phone, fax, e-mail, etc. Authors will be notified by June 2, 2006, of their paper status. Authors whose abstracts are accepted will have until August 4, 2006, to return their papers for publication in the conference proceedings. While multiple submissions by individuals or groups of authors are welcome, the abstract selection process will seek to ensure as broad participation as possible: each speaker is to present only one paper in the conference. No author should submit more than one abstract as its single author. If multiple submissions are accepted, then a different co-author will be required to pay the reduced registration fee and present each paper. Otherwise, authors will be contacted and asked to drop one or more paper(s) for presentation. Abstracts should be submitted to:

David Williams, Executive Director, USAEE/IAEE, 28790 Chagrin Blvd., Suite 350, Cleveland, OH 44122 USA

Phone: 216-464-2785 / Fax: 216-464-2768 / E-mail: usaee@usaee.org

Students: Please submit your paper for consideration of the USAEE Best Student Paper Award (cash prizes plus waiver of conference registration fees). If you are interested, please contact USAEE Headquarters for detailed applications / guidelines. Students may also inquire about our scholarships for conference attendance. Visit www.iaee.org/en/conferences for full details.

Travel Documents: All international delegates to the 26th USAEE/IAEE North American Conference are urged to contact their consulate, embassy or travel agent regarding the necessity of obtaining a visa for entry into the U.S. If you need a letter of invitation to attend the conference, contact USAEE with an email request to usaee@usaee.org The Conference strongly suggests that you allow plenty of time for processing these documents.

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Dennis O'Brien

We were all shocked and saddened to hear of the passing of our good friend and colleague, Dennis O'Brien. In typical Dennis style, he passed away, passionately involved, on the frontlines and on his return from an IAEE Conference.

I am honored to be asked to write a eulogy for my friend Dennis. I talked to a number of his friends to compare notes and I found that we all had similar stories. We concluded that for anyone who really knew Dennis, no eulogy could possibly do him justice. For those who were not privileged to know Dennis well, no eulogy could convey who the man was, who the friend was, and who the person was we grew to admire and respect.

Dennis and his devoted wife Beverly were frequent attendees at energy conferences. It was always a treat to be with them.

Dennis taught us all, by example, humility, concern for others, and the need to consider all points of view. He was particularly fond of helping students or energy economists in the early stages of their career. It is a tribute to him that his students have won the "Student Best Paper Award" on a number of occasions.

A graduate of the University of Missiouri, Dr. O'Brien worked in the Department of Energy as a Deputy Assistant Secretary in the 1970s. He later served as Chief Economist at CALTEX. In his last assignment he was Director of the Sarkey Energy Center at the University of Oklahoma. Throughout his career, he was professional and committed to excellence.

Dennis started the US Association of Energy Economics as a chapter of the IAEE with me in the early 1990s. He always put others first. He told me, "you be the first president and I'll be your vice president." From 1994-95, he was President of the US chapter. In 1997, he was elected President of the International Association.

Dennis was a man of ideas. He was always thinking of new ways to bring people together to debate energy issues. He enjoyed gatherings of oil analysts and industry folks as an intellectual discourse without worrying about compensation for himself. His long term colleague Fereidun Fesharaki relates a story that Dennis was planning an energy roundtable in the Napa Valley. Since Napa is noted for another liquid than oil, one might wonder why Napa, until you figure out that his children lived there. Dennis claimed oil and wine mixed well.

Beyond his brilliance and his commitment to furthering energy economics, Dennis was a man of courage and curiosity. When attending an energy conference with Fesharaki at the time of the fall of the Iran Revolution, at great risk to himself, he talked to the Revolutionary guards and took a number of photos with the guards. He sustained this curiosity and courage throughout his career. Recently, he introduced weather forecasting as a discipline within the Sarkey Center.

Dennis had a wonderful sense of humor and concern for his colleagues. I know this from my own experience as Dennis's good friend and from countless stories from his friends and colleagues.

Dennis was quite the traveler. He had a passport that required a number of additional addenda. He knew what to wear in what country, how to best get there economically, what the best restaurants were, and who on the energy scene he should meet.

I remember when I joined Dennis as an invited participant in an energy forum in Moscow. I was late and neglected to properly enter the then Soviet Union. Dennis helped me find and forge a visitor's document so that I could exit the country safely. Another time in Luxemburg, Dennis ordered a salad and ate it with gusto. At the bottom of the salad was a worm, very much alive. He called over the waitress and asked for a refund in a humorous way. He had a good laugh when the waitress told him that the worm was "on the house."

One time that I will remember about Dennis is how much he loved his wife Beverly and his children, Kevin and Pam. Whenever we were in the world and no matter what the topic of discussion was, his conversation was always redirected to his family.

Wherever Dennis went, people respected him and welcomed him. We will miss him. As the old Irish blessing goes, "Dennis, until we meet again. May God hold you in the hollow of His hand."

Tony Finizza and Dennis's friends

CZ AEE Czech Association for Energy Economics

IAEE INTERNATIONAL ASSOCIATION FOR ENERGY ECONOMICS

2nd ANNUAL INTERNATIONAL CZAEE CONFERENCE

7 – 9 December, 2005
Prague, Czech Republic
Venue will be announced

ANNOUNCEMENT

Conference Theme :

CRITICAL INFRASTRUCTURE PROTECTION AND BUSINESS CONTINUITY PLANNING (BCP)

THE EVENT

Situated in the heart of Europe, Prague's rich history and vast infrastructure network provide a perfect location for the conference. The conference will be an excellent environment to meet and exchange information with your peers.

This year's conference will focus on infrastructure security.

Speakers will include distinguished experts from Czech Republic, Germany, United Kingdom, USA, and other countries. The 2004 CZAEE conference was attended by almost 200 participants from 16 countries.

ORGANIZATION TERMS AND REGISTRATION

For details about program and registration please contact:

Ivana Kubatova
Production
ph: +420 222 891 209
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e-mail: kubatova@abf.cz

PhDr. Monika Svecova
Conference manager
ph: +420 222 891 117
fax: +420 222 891 199
e-mail: svecova@abf.cz

IF YOU INTEND TO PARTICIPATE IN THE EVENT AS A SPEAKER OR PANELIST, PLEASE CONTACT MR. IVAN BENES AT ivan.benes@cityplan.cz

SCHEDULE

The conference will begin on December 7 with a Welcome Reception followed with presentations and panel discussions on December 8 and 9.

OFFICIAL LANGUAGE AND TRANSLATION

The official languages of the conference are English and Czech. Simultaneous translation will be provided for Ceremonies and Sessions.

Sponsor and partners : E-ON, CEZ Group, Czech Energy Agency, CITYPLAN Ltd.

PROGRAM TOPICS

Long-term Prospects in Critical Infrastructure Security
Public and Private Partnership and Coordination in Critical Infrastructure
Vulnerabilities of Critical Infrastructure in Transportation Sector
Vulnerabilities of Critical Infrastructure in Energy Sector
Banking and Information Systems
Business Continuity
Facility Management

CONFERENCE WEBSITES:

http://www.abf.cz/kie-czaee

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Conference Proceedings on CD Rom
28th IAEE International Meeting
Taipei, Taiwan, June 3 to 6, 2005

The Proceedings of the 28th International Conference of the IAEE held in Taipei, Taiwan are available from IAEE Headquarters on CD Rom. Entitled **Globalization of Energy: Markets, Technology and Sustainability**, the price is $100.00 for members and $150.00 for non members (includes postage). Payment must be made in U.S. dollars with checks drawn on U.S. banks. Complete the form below and mail together with your check to Order Department, IAEE, 28790 Chagrin Blvd., Suite 350 Cleveland, OH 44122, USA.

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Publications

From Edison to Enron – The Business of Power and What it Means for the Future of Electricity. Richard Munson (2005). 216 pages. Price: US$39.95. Contact: Greenwood Publishing Group, Customer Service, 88 Post Road West, P.O. Box 5007, Westport, CT 06881-5007. Phone: 203-226-3571 ext. 3441. Fax: 603-431-2214 Email: sales@greenwood.com URL: www.praeger.com

Calendar

28-29 November 2005, 1st Annual European Energy Policy Conference: Shaping the Future of the Energy Industry in Europe at Le Chatelain All Suite Hotel, Brussels. Contact: Dan Craft, Epsilon Events Ltd, 12 Coopers Yard, Curran Rd, Cardiff Bay, Cardiff, CF10 5NB, United Kingdom. Phone: +44 (0) 2920 642701. Fax: +44 (0) 2920 642742 Email: dcraft@epsilonevents.com URL: www.epsilnoevents.com

29-30 November 2005, 10th IIES Oil & Gas Forum at Tehran, Iran. Contact: Seyed Alavi, Conference Executive Director, Ilia International Services Company, No 25 Zagros St, Argentine Square, Tehran, 15166, Iran. Phone: 9821-88-87-81-52. Fax: 9821-88-78-55-96 Email: info@ilia.ir URL: www.ilia.ir

29-29 November 2005, PetroAfricanus Exploration For Africa, 7th Club Dinner at Radisson Edwardian Mountbattern, London. Contact: Jerry van Gessel, Marketing Manager, Global Pacific & Partners, 266 Groot Hertoginnelaan, The Hague, 2517EZ, The Netherlands. Phone: +31 70 324 6154. Fax: +31 70 324 1741 Email: jerry@glopac.com URL: www.petro21.com

3-8 December 2005, The Asian Energy Challenge and Implications for the United States and Europe at Salzburg, Austria. Contact: Conference Coordinator, Salzburg Seminar, Box 129, Salzburg, A-5010, Austria. Phone: 43-662-839830. Fax: 43-662-839837 Email: admissions@salzburgseminar.org URL: www.salzburgseminar.org

5-5 December 2005, The New European Landscape for Electricity Markets – Developments in Liberalisation and Security of Supply at The IEE, Savoy Place, London, UK. Contact: Dorothee Archambault, Miss, The IEE, Stevenage, UK. Phone: +44(0) 1438 767295. Fax: +44(0) 1438 76305 Email: darchambault@iee.org.uk URL: http://www.iee.org/Events/NELEM.cfm

6-8 December 2005, Sand Control And Management Asia 2005 at Mandarin Oriental Hotel, Kuala Lumpur, Malaysia. Contact: Zhilin Yuan, Conference Manager, Oil and Gas IQ - a division of IQPC, 1 Shenton Way #13-07, Singapore, 068803, Singapore. Phone: 65 6722 9388. Fax: 65 6720 3804 Email: enquiry@iqpc.com.sg URL: www.oilandgasiq.com/AS-3190/web

6-8 December 2005, Asia Biofuels Conference & Expo at TBA. Contact: Wendy Vincent, Global Events Manager, The Stratton Group, 100 S. Dakota Ave., Sioux Falls, SD, 57104, USA. Phone: (605) 338-6829. Fax: (605) 332-4880 Email: wendyv@thestrattongroup.com URL: www.asiabiofuels.com

7-8 December 2005, Fundamentals of Refinery Economics (Singapore) at The Gallery Hotel, Singapore. Contact: Easwaran Kanason, Managing Director, IQPC Worldwide Pte Ltd, 1 Shenton Way #13-07, Singapore, 068803, Singapore. Phone: 65 6722 9388. Fax: 65 6720 3804 Email: seminars@iqpc.com.sg URL: www.iqpc.com.sg/AS-3194/web

7-9 December 2005, Using Real Options to Value & Manage Natural Resource Projects at Simon Fraser University Conference Center, Vancouver BC. Contact: Graham Davis, Associate Professor, Colorado School of Mines, 1600 Arapahoe, CSM Annex,

(continued on page 36)

Golden, CO, 80401, USA. Phone: 303-273-3321. Fax: 303-273-3314 Email: space@mines.edu URL: www.mines.edu/outreach/cont_ed/options.html

8-8 December 2005, The Hunter Memorial Lecture and Dinner 2005 at Austin Court, Birmingham, UK. Contact: Dorothee Archambault, Miss, The IEE, Stevenage, UK. Phone: +44(0) 1438 767295. Fax: +44(0) 1438 76305 Email: darchambault@iee.org.uk URL: http://www.iee.org/Events/hunter.cfm

8-9 December 2005, 2nd CZAEE Annual International Conference at Prague, Czech Republic. Contact: Jan Myslivec, General Manager, CityPlan spol s r o, Odboru 4, Prague 2, 128 00, Czech Republic Email: jan.myslivec@cityplan.cz URL: www.iaee.org/en/conferences/

23-24 December 2005, Drilling Fluids, Cuttings Management & Environmental Excellence 2005 at Mandarin Oriental, Kuala Lumpur. Contact: Jamie, Marketing Manager, IQPC Wordlwide Pte Ltd, Singapore. Phone: 65 6722 9388. Fax: 65 6224 2515 Email: enquiry@iqpc.com.sg URL: www.oilandgasiq.com/AS-703/f13

17-18 January 2006, Enhancing Procurement & Supply Chain Strategies for Oil & Gas at The Shangri-La Hotel, Jakarta, Indonesia. Contact: Rizal Hafidz, Conference Manager, Oil and Gas IQ - a division of IQPC Worldwide Pte Ltd, 1 Shenton Way #13-07, Singapore, 068803, Singapore. Phone: 65 6722 9388. Fax: 65 6720 3804 Email: enquiry@iqpc.com.sg URL: http://www.oilandgasiq.com/AS-3215/web

16-17 February 2006, Biofuels Markets at Brussels. Contact: Sarah Ellis, Green Power Conferences Email: info@greenpowerconferences.com URL: www.biofuelsmarkets.com

24-26 February 2006, 32nd Annual Conference of the Eastern Economic Association at Philadelphia, PA. Contact: Dr. Mary Lesser, Conference Coordinator, Eastern Economic Association, Iona College, 715 N Avenue, New Rochelle, NY, 10801, USA. Phone: 914-633-2088. Fax: 914-633-2549 URL: www.iona.edu/eea

1-3 March 2006, World Sustainable Energy Days at Wels, Austria. Contact: Conference Coordinator, O.O. Energiesparverband, Landstrasse 45, Linz, A-4020, Austria. Phone: 43-732-7720-14386. Fax: 43-732-7720-14383 Email: office@esv.or.at URL: www.esv.or.at

6-10 March 2006, MAREC 2006 - Marine Renewables: The Challenge at London, UK. Contact: Events Department, IMarEST, 80 Coleman St, London, EC2R 5BJ, United Kingdom. Phone: 44-20-7382-2655. Fax: 44-20-7382-2667 Email: events@wmtc2006.com URL: www.wmtc2006.com

28-30 March 2006, ACDC 2006 at The IEE, Savoy Place, London, UK. Contact: Dorothee Archambault, Miss, The IEE, Stevenage, UK. Phone: +44(0) 1438 767295. Fax: +44(0) 1438 76305 Email: darchambault@iee.org.uk URL: http://conferences.iee.org/acdc/welcome.htm

4-7 April 2006, Asian Energy Week 2006 at Beijing. Contact: Ms. Elisabeth Brusse, Conference Manager, Synergy, P.O. Box 1021, Maarssen, 3600 BA, The Netherlands. Phone: +31 346 590901. Fax: +31 346 590601 Email: elisabeth@synergy-events.com URL: www.asianenergyweek.com

11-15 June 2006, Probabilistic Methods Applied to Power Systems at Stockholm, Sweden. Contact: PMAPS Secretariat, PMAPS, Teknikringen 33, Stockholm, 10044, 10044, Sweden Email: info@pmaps2006.org URL: www.pmaps2006.org

IAEE Newsletter

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