IAEE INTERNATIONAL ASSOCIATION for ENERGY ECONOMICS
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Newsletter

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First Quarter 2006

President's Message

I welcome the opportunity given to me at the start of this new year, to bring you news of our Association. May I first of all wish you the very best for 2006 in the hope that it will be a year full of personal and professional achievements for each and every one of you. On a worldwide scale my wish for 2006 would be for everyone to be able to live in a world with fewer natural disasters than in previous years and to witness the beginnings of a reduction of the economic, social, geopolitical and climate imbalance that affects our world today. Without wishing to bring everything down to the field of energy, it is my personal feeling that solving many of the pending energy problems could help contribute to a better world. Access to energy in sufficient quantities at affordable prices has been one of the mainsprings for the economic development of the Western world. Today, almost two billion people do not have access to modern commercial sources of energy, especially electricity. All possible sources of energy (fossil and non-fossil) should be mobilized to move toward a more satisfactory supply to meet the world's future energy needs. The energy industry is a heavy industry, which requires long lead times and high levels of capital expenditure. Input from economists is therefore crucial and the International Association for Energy Economics with its 3000 members in over 60 countries can and must serve as a guiding light in worldwide decision-making. The diversity of its members' backgrounds leads to a rich exchange between academic experts, industry, consultants and government organizations. In this way the IAEE can contribute in its own small way to the building up of secure access to energy at affordable prices whilst respecting the environment, the three main pillars of the European Union energy policy, which should perhaps also be an objective for the rest of the world.

These ambitious aims already form a permanent backdrop for the activities organized by the International Association and its Affiliates through meetings, symposiums and international conferences and through the in-depth economic analysis of the energy sector published over the years in The Energy Journal. The year 2005 was particularly successful in that regard thanks to the very rich programs of our conferences in Taipei and in Denver and the fruitful exchange which followed. At this point, I would like to thank once again all those involved in the organization of these events, and especially Vincent Siew, Jeffrey Bor, Marianne Kah, Carol Dahl and Dorothea El Mallakh. Looking to the future, 2006 will provide the exciting opportunity for us to meet up again at the 29th International IAEE Conference which will be held in Postdam, Germany on the subject of "Securing Energy in Insecure Times" and also the North American Conference in Ann Arbor, which will be entitled "Energy in a World of Changing Costs and Technologies".

Rome was not built in a day and our Association still has far to go. In 2005 the Council, at the instigation of the Association's President, Arnie Baker, decided that the time was ripe to begin a strategic planning process for the future of the IAEE. Four main focus areas were identified: membership, conferences, publications, and financial & operational issues.

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Editor's Notes

Dena Wiggins examines the need for LNG imports in the context of existing U.S. energy policy and the impact of the Domenici-Barton Energy Policy Act of 2005. Further, she discusses the impact formation of a natural gas cartel could have on U.S. reliance on LNG imports.

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29th IAEE International Conference

SECURING ENERGY IN INSECURE TIMES

June 7-10, 2006 Kongresshotel am Templiner See
Am Luftschiffhafen 1, D-14471 Potsdam near Berlin, Germany

Conference Chair: PROF. DR. GEORG ERDMANN (georg.erdmann@tu-berlin.de)
Program Chair: PROF. DR. ULF HANSEN (ulf.hansen@uni-rostock.de)
Sponsorship Chair: DR. ANDREAS AUERBACH (andreas.auerbach@rwe.com)

The German IAEE affiliate, the *Gesellschaft für Energiewissenschaft und Energiepolitik* (*GEE*) e.V., is honored to invite you to the 29th IAEE International Conference and would be proud if you will join this important energy economics meeting.

Conference Programme

7. June 2006, 17:30 – 19:00 h: Opening reception in the *Kongresshotel* Potsdam
8. June 2006, 9:00 – 17:30 h: Day on global issues with plenary sessions on "Energy in an Insecure World", "Securing Oil and Gas" (dual plenary) and "Kyoto and Beyond" (dual plenary). 18.00 – 22.30 h: Sunset dinner cruise on the lakes around Berlin/Potsdam
9. June 2006, 9:00 – 17:30 h: Day on securing energy under competition and regulation with plenary sessions on "Long term Contracts, Vertical Integration, and Competition in Electricity and Gas Markets", "Sustainable Transportation" (dual plenary) and "Renewable's Role in Securing Energy" (dual plenary). 18:00 – 22.30 h: Conference Dinner in the historic center of Berlin, "*Unter den Linden*"
10. June 2006, 9:00 – 13:00 h: Day on long-term technology and policy choices

Our host, the city of Potsdam, belongs to the most outstanding historical and cultural places in Germany. We have arranged offsite events that will give you the chance to enjoy the beauty of the city with its many castles, lakes and gardens. You will combine your stay with a visit of Berlin, which is an exiting city under tremendous transformation. If you are not interested in the historic and cultural highlights, you may take pleasure in the atmosphere of the soccer world cup in Germany.

For more details on the program, including themes and speakers of the plenary and the concurrent sessions, registration fees, the electronic registration, post conference tours, and other cultural events, please visit www.gee.de/2006-IAEE/.

The cut-off date for early bird registration is April 30, 2006. If you have any questions, please do not hesitate to contact the local organizing committee at IAEE@tu-berlin.de

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

Work will continue in these areas during 2006 with the objective of completing an integrated plan that can be implemented for 2007, if not sooner. I will keep you informed as work progresses. I would also welcome any ideas from you as to how we can improve the Association and the services it offers its members – please do not hesitate to contact me or Dave Williams, our Executive Director, if you have any suggestions.

I would like to extend a warm welcome to our new IAEE Council members in 2006. Please see page 3 for a pictorial listing of our new Council. I am particularly pleased to welcome Dr. Masahita Naitoh, Chairman and CEO of the Japan Institute of Energy Economics, as our President-Elect along with other new Council members from Italy, New Zealand, Saudi Arabia, Taiwan, the United Kingdom, and the United States. I very much look forward to working with them and with our returning Council members as well. This diversity is a characteristic of the Association, and the creation of the new affiliate in Hong Kong is yet another sign of our development, welcomed as an enriching expansion. On behalf of the Council, I would like to thank our colleague Larry Chow who was the guiding light for the creation of the Hong Kong affiliate, and Tony Owen, our Past President, for being a keynote speaker at their December 19th inaugural meeting in Hong Kong and for conveying how gratifying this development was for our Association.

The IAEE has developed over the years thanks to the active participation of its various members who have given up so much of their precious time, whether as part of the Council or at the level of the Affiliates. I would like to pay particular tribute to the memory of two former Presidents of the IAEE, Dennis O'Brien and Campbell Watkins, founders of the Association, who sadly passed away in 2005. Without them, our Association would not be what it is today. They will be very much missed by all those who had the opportunity to know them.

To conclude, I would like to mention the increasing number of student members. Thanks to the efforts of students who take part in the Council as Student Council Interns, and in particular Carole Le Henaff and Hadi Hallouche, the number of student members is now close to 200, 6% of the total membership. I am especially grateful to Carole, who has now moved into the professional energy world, for the diligence and enthusiasm that she put to the service of the student chapter of the French Affiliate and to the International Association. I extend a warm welcome to Ms Phillia Restiani, Postgraduate Research Student at the University of New South Wales, Australia, who will be replacing her in 2006. I am sure she will add her own dynamism to that inherited from her predecessors.

Lastly, may I take this opportunity to thank you for having chosen to elect me as President of the Association. I assure you that I will do my utmost to ensure that the IAEE continues to develop as a platform for discussion and reflection with the aim of creating a better energy world for the future.

Jean Philippe Cueille

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

Kenneth Zimmerman answers the question, "can energy companies meet the need for workable and fair solutions to energy issues?" with a probable, "no". In a philosophical explanation, he posits that rather then using economic reasoning in making choices, economic actions are based on prejudices, relationships, institutional arrangements, political power and emotions.

Doug Reynolds looks at why energy prices are likely to stay high and why we should encourage large oil producers to reduce output and maximize their profits. Energy alternatives will suffer from the entropy subsidy problem and so will not help as a substitute for oil.

PeckYean Gan, who won a best paper award at the Denver North American meeting, reports on an econometric model comparison of a business as usual case for Malaysian energy demand with a renewable energy alternative. She notes that the RE case could alleviate Malaysia's fossil fuel dependency, however field studies indicate that obstacles to RE development must be overcome in order to implement this alternative.

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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"

The Shifting Sands of U.S. Legislative and Regulatory Policy: Implications for Natural Gas Supplies from Foreign Sources

By Dena E. Wiggins*

Introduction

Natural gas is a critical source of energy and raw materials, providing nearly 25 percent of all U.S. energy requirements.[2] It also provides about 19 percent of electric power generation, supplying heat to over 60 million households, and over 40 percent of all primary energy for industries.[3] Even in the face of higher natural gas wellhead prices, which have increased from $1.85 per million cubic feet ("Mcf") in 1994 to $5.49 per Mcf in 2004,[4] U.S. demand for natural gas is expected to grow from 22.0 trillion cubic feet ("Tcf") in 2003 to 30.7 Tcf in 2025.[5]

Historically, the U.S. has relied heavily on North American sources of natural gas. However, traditional North American producing areas will provide only 75 percent of projected long-term U.S. needs.[6] Net pipeline imports of natural gas from Canada are expected to decline from current levels as Canadian fields mature and Canadian demand increases.[7] Similarly, U.S. domestic production, limited by access restrictions on exploration and production coupled with a declining resource base, will not be able to bridge the gap between supply and demand.[8]

Imports of liquefied natural gas ("LNG") are widely viewed as the solution, with LNG imports expected to rise from 5 percent of net U.S. natural gas imports in 2002 to 39 percent in 2010,[9] providing an anticipated 8 percent of our total U.S. demand by 2010.[10] Caught as we are in the energy policy vise between politics and practicality, natural gas imports are a vital and necessary supply option.

This paper examines the need for LNG imports in the context of existing U.S. energy policy, the impact of the Domenici–Barton Energy Policy Act of 2005[11] on LNG policies, including whether passage of this bill will serve to encourage additional imports. Finally, this paper discusses the impact that the formation of a natural gas cartel could have on U.S. reliance on LNG imports.

Natural Gas – Just Use It!

As a political matter, our energy policy vise promotes natural gas as the safe, clean burning, efficient, environmentally preferred fuel; meanwhile, coal, fuel oil and nuclear power continue to be derided as the purveyors of all matter of harm to the environment, to our air quality and to the general safety of the population. The preference for natural gas and the negative views of other fuels have led to environmental policies that have increasingly pushed industrials and power generators to use more natural gas while at the same time making it increasingly difficult for them to rely on other sources of energy. For example, The Clean Air Act Amendments of 1990 focused on reducing sulfur dioxide and nitrogen ozone emissions from electric power plants as well as from industrial and transportation sources. In order to comply with the mandates in this Act, generators and industry increasingly turned to natural gas.[12] Although this switch to natural gas may have reduced emissions, it has left power generators and industrials more reliant on natural gas and less able to use alternate fuels, even in the face of rising natural gas prices.[13]

The policy choices favoring natural gas at the expense of other fuels are now embedded in the fabric of our regulatory and legal landscape, and it seems unlikely that any credible effort could be launched that would result in the dramatic lessening of this preference. However, even as the preferred fuel, natural gas is apparently only appealing when it is being consumed. Remarkably, the exploration and production of this preferred fuel is not embraced in the same way that its use is embraced. Vast potential resources are either off-limits to exploration and production or effectively off-limits due to prohibitive conditions on lease approvals, including resources in the Rocky Mountains, the Outer Continental Shelf ("OCS") and Alaska. The 2003 National Petroleum Council ("NPC") Study found that approximately 69 Tcf or 29 percent of the technical resource base in the Rocky Mountains is currently off limits, and that access-related regulatory requirements impede access to an additional 56 Tcf of potential resources.[14] The NPC Study also estimated that 80 Tcf of technically recoverable resources potentially underlie the OCS areas that are currently off-limits to exploration and production.[15]

In the recent debate on the Domenici-Barton Bill, and in the face of natural gas wellhead prices that have almost tripled in the past ten years,[16] there was significant opposition even to conducting a study to determine the amount of potential gas reserves in the OCS. Senator Bill Nelson (D-FL), one of the more outspoken opponents of this inventory provision, said "[w]hat [this inventory provision] is is the first step to drilling. It is the proverbial camel's nose under the tent. Once he gets his nose under the tent, the tent is going to collapse, and there is going to be drilling all off the coast of Florida, all off the eastern seaboard and all off the western Pacific coastline."[17]

Perhaps this is one tent that should collapse, and perhaps there should be drilling off the coast of the U.S. At a minimum, however, the American public deserves the opportunity to make an informed decision on whether this tent should stand or fall – a decision that cannot be made without the resource inventory information collected pursuant to the Domenici-Barton Bill.[18] Continued efforts to oppose offshore drilling and even to oppose the collection of sound data regarding the resources we are foregoing, though politically

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[1] See footnotes at end of text.

transparent, are substantively astounding in light of the U.S. demand for natural gas. Fortunately, neither the efforts to stop the inventory nor other efforts to permanently ban exploration and production in portions of the OCS has been successful.

In short, the critical paradox of our energy policy is that we have enacted laws promoting natural gas as the favored fuel to run the economy and to protect our environment while at the same time enacting other laws thwarting producers in their efforts to explore for, drill or produce natural gas – a paradox that simply defies rational explanation.

Domestic Natural Gas Production – Running Faster to Stay Even

The other arm of the energy policy vise that limits domestic supply options is the reality that domestic producers are drilling in a declining resource base. With prices up, producers have every incentive to produce as much natural gas as possible. Rumblings that producers are somehow incentivized not to produce in order to artificially prop up prices are ludicrous and reminiscent of similar claims related to domestic oil production in the 1970s. Domestic producers' efforts are hampered not only by the off-limits areas but also by the declining reserves in the areas that are available for exploration and production. As the NPC Study on the domestic resource base reported, "[t]he key finding from this analysis was that, on average, initial production rates from new wells have been sustained through the use of advancing technologies; however, production declines from these initial rates have increased significantly, and recoverable volumes from new wells drilled in mature producing basins have declined over time."[19] Producers spent more in 2004 on exploration and production than in 2003, and the number of drilling rigs was 15 percent higher than in 2003.[20] Despite these increased efforts, domestic production did not enjoy an overall increase. Similarly, efforts to drill in new areas such as deep gas and coal bed methane have done very little to increase overall domestic production.[21] These statistics bolster the producers' claims that they are "running harder to stay even."[22]

In short, despite wellhead decontrol of natural gas prices, the U.S. does not have a free market for natural gas. Demand is artificially inflated and supply is artificially constrained. Long term, the policy path forward should be an energy policy that encourages energy production from a variety of fuels, including coal, natural gas, nuclear, solar, and hydroelectric power, along with a continued emphasis on renewables and conservation. The Domenici-Barton Bill is an important step in realizing this goal. Nonetheless, in the near term, the U.S. will remain heavily dependent on natural gas and, given the political and practical realities of the vise constituting our natural gas policy, part of this dependence must be satisfied by imported natural gas.

LNG – the Path Forward to Bridge the Gap Between Supply and Demand

The practical need for increased levels of LNG to meet long-term economic demand and exert a downward pressure on commodity prices has been widely recognized in Washington. In the oft-quoted remarks of Federal Reserve Board Chairman Alan Greenspan, "[t]oday's tight natural gas markets have been a long time in coming, and distant futures prices suggest we are not apt to return to earlier periods of relative abundance and low prices anytime soon …. As the technology of LNG liquefaction and shipping has improved, and as safety considerations have lessened, a major expansion of U.S. import capability appears to be under way. These movements bode well for widespread natural gas availability in North America in the years ahead."[23]

Despite widespread recognition of the economic need for additional LNG from overseas, the LNG issues were among the most contentious issues discussed during the energy bill debate, often replacing methyl tertiary butyl ether ("MTBE") liability and Arctic National Wildlife Refuge ("ANWR") drilling as the lightening rod issues. It was far from certain that the political support needed to affirm a centralized, federal siting authority, remove regulatory barriers to LNG import development and eliminate price controls associated with open access requirements would survive the rough and tumble of the energy bill politics. As enacted however, Domenici-Barton crossed the finish line with the key LNG provisions intact. Of particular note, and as discussed below, Domenici-Barton affirms the Federal Energy Regulatory Commission's ("FERC") role as the exclusive authority to approve applications for siting, construction, expansion or operation of an LNG import terminal and codifies FERC's Hackberry[24] policy allowing importers to negotiate private contracts for access to import terminals, thus encouraging additional investment in the LNG supply chain that will ultimately bring additional LNG supplies to the U.S.[25]

The Reality of Domenici-Barton – the Myth of the Federal Siting Debate

With all of the sturm and drang over the LNG siting provisions during the energy bill debates, it would be easy to conclude that the Domenici-Barton Bill completely eviscerates the states' role in LNG permitting. Nothing could be further from the truth. First and foremost, as to siting per se, all this bill does is re-state existing law – FERC has exclusive jurisdiction over siting of LNG import terminals. Second, and equally as important, Domenici-Barton does nothing to degrade existing substantive state rights under the Clean Air Act ("CAA"),[26] the Coastal Zone Management Act ("CZMA"),[27] or the Clean Water Act ("CWA").[28]

Had it not been for the court appeal filed by the Californians for Renewable Energy in the United States Court of Appeals for the Ninth Circuit, the siting provision of this legislation may not even have been necessary.[29] FERC has properly found that Section 3 of the Natural Gas Act ("NGA") requires prior its authorization for the importation of any LNG or natural gas from a foreign country as well as for the construction, siting and operations of the facilities related to such imports. When enacted in 1938, Section 3 of the NGA was administered by the Federal Power Commission ("FPC"), the

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predecessor to FERC. Subsequently, President Eisenhower issued Executive Order 10485 giving the FPC the additional authority to receive "all applications for permits for the construction, operation, maintenance, or connection, at the borders of the United States, of facilities for the exportation or importation of natural gas to or from a foreign country."[30]

Neither Section 3 nor Executive Order 10485 specifically reference the FPC's authority over construction, siting and the operation of import facilities, such as LNG terminals, that are not at the border. However, the United States Court of Appeals for the District of Columbia Circuit determined in Distrigas Corporation v. FERC,[31] that "[u]nder Section 3, the Commission's authority over imports of natural gas is at once plenary and elastic." The Court thus found it "fully within the Commission's power … to impose on imports of natural gas the equivalent of Section 7 certification requirements both as to facilities and … as to sales within and without the state of importation."[32] Thus, this decision found that the FPC had authority, through its conditioning power under Section 3, over import facilities.

These NGA Section 3 authorities over both imports of LNG and natural gas as well as the construction, siting and operations of import facilities were transferred to the Secretary of Energy in 1977 pursuant to the Department of Energy Organization Act.[33] This same Act also abolished the FPC and created the FERC. Certain functions formerly carried out by the FPC were transferred to FERC under the Act; however, the authority over imports and exports of gas was reserved for the Secretary of Energy, who in turn was given the authority to assign it to FERC.[34]

Subsequently, in 1984, the Secretary of Energy delegated to the Administrator of the Economic Regulatory Administration ("ERA") the authority to regulate imports of natural gas[35] and delegated to FERC the authority over the construction, siting and operation of import facilities.[36] The authority delegated to ERA was later transferred to the Assistant Secretary of Energy for Fossil Energy.[37] The Order delegating construction, siting and operational matters over import facilities was subsequently rescinded in 2002 by Delegation Order No. 00-004.000, which then re-delegated to FERC the exact same authority over construction, siting and operation of import facilities.[38] The Energy Policy Act of 1992 ("EPACT") removed jurisdiction over the commodity sales of imported LNG (by treating them as non-jurisdictional first sales), however there is nothing in the EPACT or the legislative history to even suggest that Congress removed FERC's jurisdiction over the siting, construction and operation of LNG import facilities. [39]

In sum, even prior to the passage of Domenici-Barton, the authority to authorize LNG and natural gas imports rested with the Department of Energy's ("DOE") Office of Fossil Energy and the authority to approve or disapprove the construction, siting and operation of import facilities, such as LNG import terminals, rested with FERC. Section 311(c)(2) of the Domenici-Barton Bill may provide a clear federal trump card in the pending Ninth Circuit case, but even without Domenici-Barton, this history, albeit somewhat tangled, demonstrates that FERC already had exclusive authority over siting, construction and operation of LNG import terminals.

As to other laws that impact the siting of LNG terminals, the Domenici-Barton Bill does nothing to alter the states' substantive rights under CZMA, CAA, or CWA. Each of these laws provides states with significant input into the ultimate approval for a new LNG import terminal. For example, under CZMA, states are required to develop management plans for energy facilities significantly affecting the coastal zone.[40] If a state does not concur that a facility, such as an LNG import terminal, complies with the state's coastal zone management plan, the FERC cannot issues a license or permit.[41]

Under the CAA, all sources of air pollution must be in compliance with permits issued by the state permitting authority.[42] Former FERC Chairman Patrick Wood III has indicated that FERC believes it unlikely that an LNG project would not require a CAA permit, which the state has the discretion to either grant or deny.[43]

Similarly, under section 401 of the CWA, any applicant for a federal license to conduct any activity that may result in the discharge into navigable water must provide a certification form the state in which the discharge originates.[44] If the state denies the certification, no federal license of permit may be issued. Here again, former Chairman Wood indicated that FERC is aware of no instance in which a proposed LNG project does not involve a discharge requiring state certification.[45]

In a recent interview, former Chairman Wood commented that "[a]ffirming FERC's natural gas authority will not diminish the important and considerable authorities that state and local governments bring to the LNG import terminal authorization process."[46] Wood also noted that "states, acting under the authority given to them by the Coastal Zone Management Act, the Clean Water Act and the Clean Air Act, could effectively veto any proposed LNG terminal, regardless of FERC's approval."[47]

In fact rather than diminishing states' rights, Domenici-Barton gives states additional rights beyond the rights states currently enjoy. As amended by Domenici-Barton, Section 3 of the NGA requires FERC to promulgate regulations establishing a pre-filing process under the National Environmental Policy Act ("NEPA").[48] This pre-filing process requires every applicant seeking to construct an LNG terminal to engage in a 6-month pre-filing process and encourages the applicant to cooperate with State and local officials.[49] Moreover, Domenici-Barton directs the Governor of a state in which an LNG terminal is to be located to designate a state agency as the state contact for consulting with FERC.[50] The FERC is then required to consult with this state agency regarding state and local safety consideration prior to issuing an order on the terminal application. Finally, the state agency is allowed to furnish an advisory report on state and local safety considerations to FERC. FERC is then directed to review and respond to the issues raised by the state agency before issuing an order authorizing an LNG applicant to site, construct,

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expand or operate an LNG terminal.[51]

Domenici-Barton also provides for continuing state involvement in the operation of an LNG terminal even after the terminal is authorized by FERC. In particular, the state is granted the authority to conduct safety inspections upon written notice to FERC and to report any safety problems to FERC.[52] In turn, FERC is required to transmit such information to the appropriate federal agency which is directed to take the appropriate action and report back to the State agency. Finally, FERC is directed to require any LNG terminal operator to develop an Emergency Response Plan in consultation with the U.S. Coast Guard as well as State and local agencies.[53]

The provisions granting states more authority over inspections and giving the states a clear role in the consultation process were controversial. Originating in the House version of the energy bill, both Secretary of Energy Bodman and then-FERC Chairman Wood expressed concerns over the olive branch being extended to the states. Wood expressed misgivings about the language giving states a role in safety inspections and said, "I don't think any state has that expertise now. That's our job. It's been our job for over 30 years to do the safety investigation. When an entity has two masters, it becomes a pretty hard place to live."[54]

Thus, post Domenici-Barton, states retain a power voice in the ultimate decision as to whether new import terminals will be constructed and whether existing import terminals will be expanded. In light of the fact that it is highly unlikely that any of the arrows in the states' quivers impacting LNG terminal construction will be eliminated, it will continue to be important for LNG terminal developers as well as the LNG importers to work closely with the states and the relevant state agencies. Meanwhile, federal, state and local policymakers need to be mindful of the future demand for natural gas in this country, which, as discussed earlier cannot be satisfied by domestic supplies, as well as the favorable political and regulatory environment for LNG that already exists in other countries. (For example, Japan's natural gas demand is met almost 100 percent by LNG.[55]) If states continue to place roadblocks in the way of LNG importers and terminal developers, LNG suppliers may find that the cost of penetrating the U.S. market is not worth the effort and concentrate their efforts on more welcoming markets. Although the affirmation of FERC's siting role in Domenici-Barton is a critical element impacting the future of LNG import terminals, it does not serve as a magic bullet to guarantee the success of any new project.

Hackberry – Regulatory Certainty in the Full Supply Chain

In addition to affirming FERC's role in siting, Domenici-Barton also codified FERC's important Hackberry decision, removing open access and cost-of-service requirements for new onshore and expanded onshore LNG terminals. Prior to FERC's decision in Hackberry, LNG import terminals were generally regulated under NGA Sections 4, 5, and 7 as open-access facilities, with the rates and terms of service set forth in FERC-approved, publicly available tariffs. This meant that a party providing LNG import terminal service had to hold an open season to award capacity at that terminal to parties desiring to import natural gas. A party desiring to obtain some or all of the capacity had to bid for that terminal capacity along with all others who desired capacity. Under FERC ratemaking policies, the rates for this capacity were approved by FERC and were generally based on a cost-of-service ratemaking methodology designed to afford the terminal service provider to recover its costs, plus an allowed return. In addition, under FERC's open access policies, the terminal service provider had to accommodate all winning bidders.

This pre-Hackberry approach was a barrier to bringing increased natural gas supplies into a competitive market, and it denied consumers the benefit of lower prices that should result from such increased supplies. It also denied foreign suppliers the certainty of access to the terminal capacity necessary to justify their enormous upstream investment – in the billions of dollars – in the development of gas reserves, liquefaction facilities and the transportation system to bring these supplies to market.

FERC adopted a new policy for LNG import facilities in Hackberry. In this order, FERC removed open access and cost-of-service requirements for a new onshore LNG terminal in Louisiana and relied on NGA Section 3 to authorize this facility to provide terminalling services at market-based rates. This decision effectively means that an entity desiring to construct an LNG terminal is free to negotiate an arms-length contract with any creditworthy counterparty that wishes to bring LNG into the U.S. and make use of such terminal facility, with the financial and service arrangements between these two parties remaining a matter of private contract and not publicly-disclosed.

For the importer, the contractual arrangements to secure terminal capacity become part of the cost of producing and delivering LNG and would generally be recovered through its sales of LNG and natural gas, the price of which is governed solely by the competitive U.S. market. Thus, consumers will not suffer from the consequences of poor business decisions by LNG importers and will benefit from the lower prices that should result from increased gas supplies.

It was crucial for the future of increasing LNG supplies in the U.S. that Congress codify Hackberry in the Domenici-Barton Bill in order to remove any regulatory uncertainty as to whether FERC would continue to apply this policy. Given the billions of dollars necessary to invest in the full LNG supply chain, any degree of regulatory uncertainty could have thwarted additional investment in the U.S. import market and would have inhibited the ability of LNG imports to bridge the gap between domestic supply and anticipated demand.

The GECF – Friend or Foe?

An important factor for policymakers even post Domenici-Barton, is the potential development of a natural gas cartel.[56] As international demand for natural gas grows and new technolo-

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gies emerge to help spur new LNG and pipeline infrastructure and bring down shipping costs, there is a risk that an OPEC-like cartel could emerge with the goal of affecting prices. In 2001, the Gas Exporting Countries Forum ("GECF") was created by leading natural gas exporters to enhance the coordination among natural gas producers. The GECF includes Algeria, Brunei, Egypt, Indonesia, Iran, Libya, Malaysia, Nigeria, Oman, Qatar, Russia, Trinidad & Tobago, the United Arab Emirates, and Venezuela, with Norway as an observer.

There are two concerns with the formation of the GECF. The first is the potential for the GECF to control prices or access to LNG, in much the same way that OPEC has controlled the supply and price of crude oil. However, even if the GECF takes no formal action on price and supply, the second, broader political concern remains that the very existence of the group could be used by LNG opponents to argue that the U.S. is once again being held hostage to foreign energy sources.

Thus far, the GECF has tried unsuccessfully to exercise collective influence in the European market. The first example is its attempt to create a unified response to liberalization in Europe. At the second official meeting of GECF in Algiers in early 2002, a working group, including Russia and Algeria, was set up to discuss gas supply issues with the European Union (EU). Following working group sessions, Algeria and Russia made clear that they wanted to join with other gas exporters to resist EU attempts to outlaw destination clauses that prevent buyers from reselling gas. The option to resell gas is a pivotal mechanism for market arbitrage and efficiency that can restrict sellers from segregating markets and exercising monopolistic influence.

In another example of attempting to influence markets, at the third Ministerial meeting of GECF in Qatar in February 2003, Egypt proposed that the exporter group initiate a gas pricing change in Europe by ending the link to crude oil prices to create better market penetration for gas. Both of these proposals have been rejected by the GECF.

Leading to further concerns about the GECF turning into an OPEC-like cartel is the fact that some aspects of the natural gas industry are strikingly similar to that of the oil industry, thus suggesting an environment conducive to the creation of a cartel. Oil and natural gas reserves are concentrated in just a few countries. Sixty-two percent of the global reserves of both oil and natural gas are located in just five countries. The top ten countries control 81 percent of the global oil reserves and 76 percent of the global natural gas reserves. This market concentration suggests a positive environment for the formation of an economic oligopoly similar to OPEC.

However, energy economist David Victor, director of the energy and sustainable development program at Stanford University, postulates that huge gas reserves will not necessarily mean success in LNG. He predicts the lead countries in a global LNG market will not be those with the deepest reserves. Rather, because LNG is much more capital intensive than oil, the lead countries will be those that create the best environment for private investment to attract the technology needed for LNG processing.[57] Victor estimates that the LNG industry will need $3.1 trillion in capital investment over the next 30 years, largely in the areas of exploration and development and liquefaction technologies.[58] With LNG, producers will have to run LNG operations at full capacity to recoup the costs. In contrast, OPEC's clout in the oil market stems to a great extent from keeping capacity in reserve, cutting back capacity to boost prices or using excess capacity when market conditions are favorable. Successful LNG trading countries will be those that commit to building capital intensive facilities, not merely those with large reserves. For example, Norway, with just 1.4 percent of the world's natural gas reserves, likely will become a significant LNG exporter through its Snøhvit liquefaction facility.[59]

Conclusion

Ultimately, the long term outlook for U.S. supplies of natural gas will be affected heavily by legislative and policy decisions on both the state and federal levels. The economics of the natural gas industry may depend as much on the decisions by Congress and FERC, as they do on the upstream production capacity and downstream consumer demands. The future impact of the GECF, whether due to actual initiatives or a perceived threat, loom large as a key uncertainty affecting the ability of imported LNG to bridge the gap between domestic natural gas demand and supply.

Footnotes

[1] Although the views expressed herein are solely those of the author, Ms. Wiggins wishes to express her gratitude to David L. Wochner for his advice and assistance in the preparation of this paper.

[2] National Petroleum Council, Balancing Natural Gas Policy; Fueling the Demands of a Growing Economy, Vol. I, Summary of Findings and Recommendations, at 8 (Sept. 2003) ("NPC Study").

[3] Id.

[4] Energy Information Administration, U.S. Department of Energy, Annual U.S. Natural Gas Wellhead Price, http://tonto.eia.doe.gov/dnav/ng/hist/n9190us3A.htm.

[5] Energy Information Administration, U.S. Department of Energy, Annual Energy Outlook 2005, at 95 (Feb. 2005), DOE/EIA-0383 (2005).

[6] NPC Study, Vol. I, at 33.

[7] Energy Information Administration, U.S. Department of Energy, The Global Liquefied Natural Gas Markets; Status and Outlook, at 29, (Dec. 2003), DOE/EIA-0637 (2003), http://www.eia.doe.gov/oiaf/analysispaper/global/pdf/eia_0637.pdf.

[8] Id.

[9] Id.

[10] Id. at 1.

[11] H.R. 6, 109th Cong. (2005) ("Domenici-Barton Bill" or "Domenici-Barton).

[12] NPC Study, Vol. III, Demand Task Group Report, at 6-5.

[13] The NPC indicated that although "publicly available information presents an optimistic view on industrial fuel switching capability," in fact, "fuel switching is inhibited by local siting restrictions and State/Federal air standards, [with] *multiple examples cited by range of industries*." For these reasons, the NPC estimated that industrials are only able to switch about 5 to 10 percent of their natural gas consumption to alternative fuels. NPC Presentation before FERC, "Balancing Natural Gas Policy, Fueling the Demands of a Growing Economy," October 14, 2003.

[14] NPC Study, Vol. I at 35.

[15] Id. at 36.

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[16] Energy Information Administration, U.S. Department of Energy, Annual U.S. Natural Gas Wellhead Price, http://tonto.eia.doe.gov/dnav/ng/hist/n9190us3A.htm.

[17] 151 Cong. Rec. S6877 (daily ed. June 21, 2005) (statement of Sen. Nelson).

[18] In addition, there was legislation introduced in Congress designed to place the OCS off the states of Florida and New Jersey permanently off-limits to exploration and production. H.R. 3251 109th Cong. (2005); H.R. 1571 109th Cong. (2005).

[19] NPC Study, Vol. I at 35.

[20] Office of Market Oversight and Investigations, Federal Energy Regulatory Commission, 2004 State of the Markets Report, at 142 (June 2005).

[21] Id. at 143.

[22] NPC Study, Vol. I at 30.

[23] Testimony of Chairman Alan Greenspan, Federal Reserve Board, Before the Committee on Energy and Natural Resources, U.S. Senate July 10, 2003.

[24] Hackberry LNG Terminal, L.L.C., 101 FERC ¶ 61,294 (2002), order issuing certificates and on reh'g, Cameron LNG, L.L.C., 104 FERC ¶ 61,269 (2003).

[25] H.R. 6, 109th Cong. § 311(c)(2).

[26] 42 U.S.C. § 7401, *et seq.* (1994).

[27] Coastal Zone Management Act of 1972, 16 U.S.C. § 1452 (1994).

[28] Federal Water Pollution Control Act., 33 U.S.C. § 1251, et seq. (1994).

[29] *Californians for Renewable Energy, Inc. v. FERC, Nos. 04-73650, et al. (9th Cir. filed July 23, 2004).*

[30] Executive Order 10485, Sec. 1(a)(2), 18 Fed. Reg. 5397 (Sept. 9, 1953).

[31] 495 F.2d 1057 (D.C. Cir. 1974).

[32] Id. at 1064.

[33] (Pub. L. No. 95-91, 42 U.S.C. § 7101 et seq.)

[34] In 1978, Executive Order 12038 amended Executive Order 10485 and gave the authority previously vested in the FPC over construction, operation, maintenance, or connection of export and import facilities at the borders of the United States, to the Secretary of Energy. Executive Order 10238, Sec. 2(a), 43 Fed. Reg. 4957 (Feb. 3, 1997).

[35] Dept. of Energy Delegation Order No. 0204-111, 49 Fed. Reg. 6684, 6690 (Feb. 22, 1984).

[36] Dept. of Energy Delegation Order No. 0204-112, 49 Fed. Reg. 6684, 6690 (Feb. 22, 1984).

[37] Dept. of Energy Delegation Order No. 0204-127, 54 Fed. Reg. 11,436 (Mar. 20, 1989).

[38] Dept. of Energy Delegation Order No. 0204-111, 49 Fed. Reg. 6684, 6690 (Feb. 22, 1984).

[39] Sound Energy Solutions, 106 FERC ¶ 61,279, at P 19 (2004) ("Had Congress intended the Energy Policy Act of 1992 to eliminate siting authority that the Commission had exercised without question for the previous 18 years, we believe it would have done so expressly, in addition to expressly treating the importation of gas as a first sale.").

[40] 16 U.S.C. § 1455(d) (1994).

[41] 16 U.S.C. § 1456(c) (1994).

[42] 42 U.S.C. § 7661a(a) (1994).

[43] Letter dated June 14, 2005 from FERC Chairman Patrick Wood III to The Honorable Senator Dianne Feinstein, attachment entitled "States Rights in Administering Federal Laws."

[44] 33 U.S.C. 1341 (1994).

[45] Id.

[46] Natural Gas Week, "Senate Maintains Drilling Ban Status Quo, Inventory Sought" (May 30, 2005).

[47] Id.

[48] National Environmental Policy Act of 1969, 42 U.S.C. § 4321, et seq. (1994).

[49] H.R. 6, 109th Cong. Sec. 311(d).

[50] Id.

[51] Id.

[52] Id.

[53] Id.

[54] Platt's Inside F.E.R.C., "House Panels Pass Measures to Boost FERC LNG Siting Authority, Repeal PUHCA," p.1 (April 18, 2005). The Administration's biggest concern with the House version of the LNG provision was the omission of the word "exclusive" in referencing FERC's authority over LNG siting. This concern was addressed in conference and the final version as agreed to by the Conference does, in fact, state that the Commission has exclusive authority over LNG import terminal siting.

[55] Energy Information Administration, U.S. Department of Energy, The Global Liquefied Natural Gas Markets; Status and Outlook, at 7, (Dec. 2003), DOE/EIA-0637 (2003), http://www.eia.doe.gov/oiaf/analysispaper/global/pdf/eia_0637.pdf.

[56] Press reports on a GECF meeting appeared about the same time that Congress was wrestling with various versions of the energy bill that included provisions to encourage new supplies of LNG. This meeting and these reports were particularly ill-timed, and could have de-railed any pro-LNG legislation, regardless of whether the GECF's goals were truly nefarious. Fortunately, these press reports failed garner significant attention and similarly failed to alter the course of the LNG provisions in the energy bill.

[57] H. Josef Hebert, OPEC-like cartel in natural gas more difficult but not impossible, The Boston Globe, January 22, 2005.

[58] Amy Jaffe and David Victor, Geopolitics of Gas Working Paper Series, Executive Summary, at 1, Revised August 2004, Joint Project of the Program on Energy and Sustainable Development at Stanford University and the James A. Baker III Institute for Public Policy of Rice University, http://iis-db.stanford.edu/pubs/20699/Gas_Exec_Sum.pdf.

[59] Supra, note 53.

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The Energy Crises and the Corporate Way of Life: Can Energy Corporations Meet the Need for Workable, Fair, and Comprehensive Solutions to Energy Issues?

By Kenneth R. Zimmerman*

The short answer to the question posed in the title of this paper is probably NO. The real topic of focus for this paper is not so much the answer to the question, but rather the reasons that NO is the answer. Economists conclude that in most situations people make choices based on economic reasoning. That is, price is one of or perhaps "the" primary determinant of most major decisions. The expansiveness of this answer varies between economists, some contending[1] that even such actions as marriage and choices about having children are covered within this same economic logic. I stand this usual convention of economics, even in its mildest forms, on its head in this paper. I propose instead that economic decisions and actions are the result of the same factors as every other decision and action people take. Economic actions are the result of a long list of prejudices (beliefs about people and things), relationships (between individuals, between organizations, and between individuals and organizations), institutional arrangements, political power, and emotions. From this starting point I examine the particular constellation of these factors that seem to be the primary influencing factors in decisions and actions for both major and smaller energy corporations (both US based and non-US based). Based on the constellations of factors just described I then describe, at a very general level, the "definition" of the energy crises we face and the forms of the solutions to these crises that might spring from these factors, recognizing of course that contrariness, rebellion, and mistakes are also characteristics of people that might alter both the definition of the situation that emerges and potential solutions proposed.

Introduction

I do not say anything new in this paper. I simply take insights about other areas of human action and apply them to "economic" actions. I also begin from the assumption that economic actions, including the market institution have no *a priori* claim to certainty or acceptance. All human action is the result of human social creativity. That is, I assume there is no grand design driving human actions in a particular direction or toward a particular end. Human action is in fullest sense *ad hoc*, recognizing, of course, that once created even *ad hoc* actions impact the options one has to act in the future.

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I also assert there is no such thing as "economic" action or behavior. There is only human action/ behavior. Therefore, understanding and explaining (to the extent we can) "economic" action is no different than understanding and explaining "religious" action, "political" action, romance, or any of the other daily actions of people. That is to say, the types (although not the forms of each type) of factors leading to and framing these actions are the same. Let us briefly catalogue the types of factors I consider in this paper.

Shared Beliefs and Understandings

Viviana A. Zelizer defines culture as "shared understandings and their representations in objects and practices." (Zelizer, 2002) When I speak of culture in this paper it is this definition I am applying.

Institutions

In defining an institution I generally am guided by such sociologists as Bellah, Fligstein, and DiMaggio. Fligstein, in his paper "Fields, Power, and Social Skill: A Critical Analysis of The New Institutionalisms" (1999) presents basics of this definition. He states, "Institutions are rules and shared meanings (implying that people are aware of them or that they can be consciously known) that define social relationships, help define who occupies what position in those relationships, and guide interaction by giving actors' cognitive frames or sets of meanings to interpret the behavior of others. They are intersubjective (ie. can be recognized by others), cognitive (ie. depend on actors' cognitive abilities), and to some degree, require self reflection for actors (see Scott, 1995, ch. 3 for a good review of the various bases on institutions). Institutions can, of course, affect the situations of actors with or without their consent or understanding."[2] Generally, Fligstein's comments seem on target, although I am not nearly as certain as he that people are fully aware consciously of institutions. In fact, I would be greatly surprised if this were the case, for several reasons. First, focusing consciously on institutions is mentally taxing and extremely time consuming. Most people lack the mental energy, time, or both to accomplish the task. Second, the very complexity of many institutions argues against full conscious awareness. Finally, institutions exist historically, making it difficult, and in some case impossible, for any person to be consciously aware of all aspects of the social construction of the institution through time. Following Berger, Luckmann, Gadamer, and Barnes, I tend to believe that people act based on general cultural prescriptions and formulas, or preunderstandings, as a shorthand for institutions that are usually taken-for-granted and largely unquestioned, invisible, and, if attempted to be viewed as a whole, incomprehensible. In another area, however, I agree with a major implication of Fligstein's definition; institutions are both a structural and cultural context for economic and technical questions, issues, actions, theories, etc.

Networks and Relationships

In his famous article, "Economic Action and Social Structure: The Problem of Embeddedness" Mark Granovet-

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ter makes the argument that human actions and institutions are embedded in but not fully determined by ongoing social relations. Such relations are one of the primary reasons that most transactions by corporations are not carried out "in the market" but rather are subsumed within the hierarchy of social relations that make up the corporation. In other words, the embeddedness of corporate actions within the corporation's network of social relations is a primary factor in shaping these actions, often in contradiction to so-called "market principles." This is not an aberration and cannot be changed by more business seminars or the hiring of more MBAs. In these social (often personal and quite intimate) relations the design of corporate actions are worked out. Such relations do not assure honest, legal, coherent, or beneficial actions by corporations. Nor do these social relations always benefit the corporation. In fact social networks within a corporation sometimes benefit subgroups within the corporation at the expense of the corporation. This is not the point here. Rather the point is to strongly note the actual manner in which corporate decisions are made and actions taken. Transaction costs, share price, profit, and many of the other factors identified in economics texts enter into the process but they are all filtered through and interpreted via concrete networks of social relations. This cannot be otherwise, because it is the way humans have always and will always function.

A revealing example of the impact of concrete social relations on economic actions and decisions is found in the formation of the electric industry in the US (Granvotter and McGuire, 1998). Here Samuel Insull and his circle in the first thirty years of the 20th century literally established the structure of the "for profit" electricity sector in the US, a structure that remains largely intact today. This circle opposed Thomas Edison and others. One of the more interesting aspects of what Insull's circle created is that in many instances the structure put in place was neither efficient nor rational (from a neoclassical perspective). In fact, the circle locked in technical, organizational, and/or economic inefficiencies and was overwhelmingly reactive and defensive in the structure created. Locked in a battle with Edison, public power advocates, and politicians opposed to for profit electricity, the circle first sought to protect the "growth and profit" dynamic they were attempting to set up. In the words of Granovetter and McGuire, "They were backing into the future as much as or more than striding into it (1998)." From the perspective of the social network that made up Insull's circle, however, most of these actions were clearly rational. But this rationality does not fit the mold for rational action set forth by neoclassical economic theory. In fact, very little rational human action fits this mold, or ever could.

Political Power

Political power is one of those concepts that everyone believes they know and understand. But that is not the case. It was Max Weber who gave us our clearest understanding of politics and political power in the modern age. In his *Politics as a Vocation*, Weber unveils the definition of the state that has become so pivotal to Western social thought: the state is that entity which possesses a monopoly on the legitimate use of physical force, which it may nonetheless elect to delegate as it sees fit. Politics is to be understood as any activity in which the state might engage itself in order to influence the relative distribution of force. Politics thus comes to be understood as deriving from power. Thus a politician must not be a man of the "true Christian ethic", understood by Weber as being the ethic of the Sermon on the Mount, that is to say, the injunction to turn the other cheek. An adherent of such an ethic ought rather to be understood to be a saint, for it is only saints, according to Weber, that can appropriately follow it. The political realm is no realm for saints. Generally, a politician marries the ethic of ultimate ends and the ethic of responsibility, and must possess both a passion for the avocation of politics and the capacity to distance her/himself from the subject of her/his exertions (the governed).

Reduced to its most basic essentials, Weber defines power as, the "chance of a man or a number of men to realize their own will in a social action even against the resistance of others who are participating in the action (Weber, 1947/1964)." Weber makes clear that power is not economically or resource based, but rather is culturally based. That is, who has and does not have power and how that power may be exercised is part of a community's shared understandings and beliefs, which are represented in objects and practices such as economics, politics, and religion. But ultimately only one institution legitimately may exercise physical force, the state. For this reason, if for no other, each different group within a community may seek to co-opt the state to support and defend it.

Before moving on to the heart of the argument, let me put one additional potential question about this paper and its intent to rest. Is this paper just another attack on capitalism and neoclassical free market economics? The answer is no. The answer is no because capitalism and free market economics are altogether irrelevant. They are irrelevant because they are logically incoherent and, perhaps, more important from the perspective of this paper they do not and have never actually worked as advertised. Some adherents to the "cause" assert that free market economics is "the end of history." That is, they claim it is the penultimate form for economic decisions and actions. The problem is that since free market economics has never worked and there is no non-ideological evidence that it could ever work, making this claim is ridiculous on its face. One need look no further than the abundant evidence showing that those actually involved in "free markets" do not follow the principles of free market economics to put to rest the notion that such economics is penultimate. Many factors underlie the behavior of those involved in "markets," almost none of which are addressed in neoclassical economic's theory of markets. At a somewhat more profound and perhaps less pragmatic level, free market economics and the capitalist theory upon which it is based are chocked full of logical contradictions. I will not go into the contradictions in this short paper, but if you have an interest in understanding some of the more important of these I

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recommend you read *The Essential John Nash* edited by Kuhn and Nasar (2002) The editors include several papers by Nash (the Nobel laureate mathematician) on the logical inconsistencies of free market economic theory. Overall the best one can say about so called "free markets economics" and its adherents is that it's an obsession with little empirical evidence to support either its theory or its claims. At the extreme this obsession easily falls into sociopathic and psychopathic actions as described in the Diagnostic and Statistical Manual of Mental Disorders (DSM IV) used by psychiatrists and psychologists to diagnose and treat mental difficulties (1994). In a July 18, 2005 New York Times editorial William Greider made this point by saying, "Much like Soviet leaders, the American establishment is enthralled by utopian convictions - the market orthodoxy of free trade globalization."

Energy Corporations

The Blindness

In the words of Laski, "The whole ethos of capitalism, in a word, is its effort to free the owner of the instruments of production from the need to obey rules which inhibit his full exploitation of them. The rise of liberalism is the rise of a doctrine which seeks to justify the operation of that ethos (1936)." Clearly capitalism sprang from the desires of an identified group that "made up" a way of life to support what it wanted to do and what most benefited it. This way of life, this set of actions and beliefs has been given many names -- capitalism, the market economy, liberalism, etc. Again, to quote Laski, this way of life is "historically connected, in an inescapable way, with the ownership of property. The ends it serves are always the ends of men in this position. Outside that narrow circle, the individual for whose rights it has been zealous has always been an abstraction upon whom its benefits could not, in fact, be fully conferred. Because its purposes were shaped by owners of property, the margins between its claims and its performance have always been wide (Laski, 1936)."

But none of this is evil or unusual. Humans always create their world as they go along. They define the meaning of the world and themselves in it and establish the institutions (technology, economic arrangements, laws, etc.) and power structures to support what they have created. And secondly they tend to forget they have created this world and treat it as "taken-for-granted." Some groups in some societies generally have the role of reminding us of how and why the world was created and to show us why it cannot be taken-for-granted (e.g., Historians, sociologists, anthropologists). But, let us be honest here, most persons in such roles always run the risk of being persecuted and/or ostracized if they go too far in this work, so caution in what one writes and says is often necessary. And how many of the CEOs, CFOs, Board Members, etc. of large and medium sized energy companies regularly read the works of such persons? One way these persons suggest of addressing this normal blindness of humans is through something called "reflexivity." This is the continual examination and re-examination of one's basic understandings and beliefs to assess their origins and impacts on one's daily decision making. This is noble goal but not one that most of us, even the best scholars, can achieve on a regular basis. So it is not surprising that energy company executives and managers generally fail to be reflexive.

On the other hand there certainly are powerful pressures on energy company executives and mangers not to be reflexive. They, like the scholars who write about the origins of our ways of life and beliefs, could face persecution and/or being ostracized. Also, these executives and managers are involved in many social networks of persons who accept and daily act on a set of shared beliefs and understandings. This kind of "peer" pressure is difficult to oppose. And why should energy company folks oppose it? After all, they share the beliefs and understandings. In addition, if they question them too forthrightly and openly their well being and that of their families could be threaten through loss of employment. And forceful questioning could even lead to legal sanctions under existing laws. At a more intimate level such questioning is uncomfortable and is not generally supported by the institutions and networks in which the energy executives and managers are embedded, e.g., family, church, social clubs, government.

While all of the above mitigate against reflexivity and questioning, the energy problems currently facing the world, along with the ecological, biological, political, economic, and community issues which these problems involve force us to require that reflexivity and questioning become the "taken-for-granted" course at this juncture in history. So "business as usual" simply will not do at this point in time or for the foreseeable future for energy issues. The question we must now address is whether the existing energy companies, who generally control how energy is produced (including resource maintenance), distributed, and consumed in the world are up to task set for them here. Can these companies really "think beyond the box" in the most comprehensive and expansive meaning of that phrase?

Narrowness of Focus – It's the Market, Stupid!

Most energy companies and national policy makers in the US, UK, Europe, and Canada, where most large and medium sized energy companies are based see and promote two types of solutions to energy issues. First, increase supply. Second, improve technological efficiency so that more energy can be produced with less. And, to be fair, some of these companies have suggested expanding energy end-use efficiency and the use of non-fossil energy sources (e.g., wind, solar, biomass, and even hydrogen). The latter is suggested, it appears, only to forestall the impact of higher energy prices on overall economic growth, which is generally harmful to these companies.

The heart of the narrowness of these companies' views of energy and its future is seen, however, in the means they propose to achieve these goals, even the goal of expanding end-use efficiency and the use of alternative energy sources. The companies offer one answer and one answer only to this question – markets. And the companies actively and aggressively oppose alternative answers, especially those that involve

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The Energy Crises *(continued from page 13)*

community or government co-control of or even significant direct influence on energy decisions, when they are offered. This lack of flexibility and narrowness of focus alone would, it seems, disqualify these companies from leading any effort to address the future of energy production (including resource maintenance), distribution, and consumption in the world.

This narrowness and inflexibility is not malicious, however. The companies, based on my many years of dealing with them, are not deliberately misleading the public in this answer. There is no grand conspiracy, sealed by ruthless businessmen (I use this term only because most in this position are still men today) behind closed doors to foist on the public the BIG lie that markets are the best and only way to successfully solve energy problems. No, the men and women who manage and work within these companies almost to the person believe this answer is accurate and correct. The answer is part of the basic culture of these companies, supported by networks of persons in similar positions who believe in and support the answer, embodied in institutions of every form from banking and finance to regulatory and technological, and embedded in the laws that are passed and enforced. It is also an answer that is largely taken-for-granted in both company culture and the wider national cultures in which the companies are embedded. It has opponents, of course, both within the national cultures and certainly in many non-western cultures around the world (for the answer is generally a western one). But support for the answer is overwhelming in places such as the US, UK, Canada, and Europe. Each national culture has in own particular nuisance in its understanding of what the answer means but all generally support it as the correct answer.[3]

The question we must address then boils down to this,

1. How can we fairly and comprehensively evaluate the options available now and in the future to meet the world's energy needs;
2. How do we determine what these needs really are;
3. What means are available to organize the production (including resource maintenance), distribution, and consumption of energy by world citizens and how do we choose among these; and
4. What role, if any, should existing energy companies, government, the public at-large, interest groups, etc. play in 1, 2, and 3?

Bases of the Answer(s)

In answering the compound question I've proposed, our fundamental approach must be to examine the bases for each particular possible answer. Above all in answering the question we must avoid designing a system that can only fail. That is primarily why the existing arrangements cannot be the answer. They are failing now and will continue to fail in the future, with catastrophic results for humans and the Earth. There is no "right" or "wrong" answer in the sense of absolute, universal principles. Each possible answer is crafted by humans based on the beliefs and understanding they share about "life, the universe, and everything" (to quote from the *Hitchhiker's Guide to the Galaxy*). The answer can but reflect this shared culture. So we must question each answer. What is its basis and is that the basis that best serves the long-term future of humankind and the Earth? This is not a game for the squeamish either, because we're likely to get it wrong more often than we get it right. But as Babe Ruth said, "Every strike brings me closer to the next home run."

While accepting there is no absolute answer or set of answers to this question, still it seems clear there are several basic features the answer(s) must possess. These are, in summary,

1. The answer(s) cannot assume a need for continuing and continual growth in the economy and the use of energy;
2. The answer(s) must support and promote the public welfare above all else – specifically, it must support social cohesiveness and orderliness, human "fellow feeling" and sense of community, trust, and the balancing of the needs of all stakeholders in conjunction with a realistic understanding of the Earth's carrying capacity.
3. The answer(s) must promote a re-examination of the answer(s) on a regular basis as a part of and necessary for the public welfare and community;
4. The answer(s) must not only allow for but also encourage active and broad debate among all stakeholders in choosing an answer and periodically re-examining the answer chosen. And this participation must be democratic – in other words, the final decisions cannot be made only by those who have invested or control capital invested in the "business;"
5. It must promote and expect public (in the broadest sense) participation in putting the answer into practice; and
6. Finally, and perhaps most importantly, the answer(s) must not corrupt or undermine and certainly must not be placed above the totality of cultural values it is expected to serve.

These basic features of the answer(s) are drawn from the basic features of democracy, as found in the earliest declarations of democracy in the modern world (e.g., Declaration of Independence (US), Declaration of the Rights of Man and Citizen (France)). At their core these declarations state that persons should be and are free, equal, and must be treated justly. They also declare that the public welfare, the welfare of the many, must be placed above the welfare of the individual but also that no individual should be persecuted in the name of the public welfare. Finally, they declare that the natural state of humans is democracy and that other forms of relationship are thus unnatural.

And in answering the questions borrowing from other cultures and particularly non-western and historical cultures can be beneficial and should be incorporated into the search for answers. Like much of what I say here, this in quite normal for humans. It has been done thousands of times over the course of human history. So what is there available to

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borrow that might be beneficial and help us answer the question posed? For example, many Native American cultures in the North and South American areas provide radically different notions of how economic decisions should be made. Native American economics is frequently referred to by the term "gift" and considerations of the consequences of current decisions for the 7th generation beyond today are a common element in Native American decision making. The annual per capita energy consumption in Japan, the United Kingdom, France, and Germany is about 170 MMBtus and Italy's consumption is about 140 MMBtus, compared to about 340 MMBtus for the US. What lessons can be learned from these differences? Also, while it is not possible and certainly not advisable to attempt a return to pre-industrial cultural forms, still many lessons can be learned from hunter-gatherer and other forms of such cultures.

But the issue at the heart of this paper is this -- do/can existing large and medium size energy companies provide answers to the energy concerns that face the world now and in the future that are consistent with the six features listed above and that examine and borrow alternatives that work from other cultures? I submit to you the answer is NO. Now let me explain why I believe the answer is NO.

Energy Corporations Require Growth and Profit

If we view humans for what they are, often confused, short sighted, and limited in their understandings, and always emotional and judging creatures, and add to this a set of cultural edicts supported by a host of institutional arrangements that give preeminence to power and wealth we have summarized the modern energy corporation. Energy corporations supposedly focus on two objectives and two objectives only – profits and power for the corporation. Now there is often some disagreement among corporation managers, shareholders, the public at large, government bodies, etc. about how the profits and power should be divided and utilized, but that does not change the focus of the corporation to obtain these twin objectives. So, I put it to you, how can any group of people so focused fit into that scheme an honest, comprehensive, and critical review of energy questions and their possible resolution? I submit they cannot.

Certainly there are sub-cultures within the energy corporation that seek to bring up concerns about innovation, public welfare, and democratic decision making but these sub-cultures fight a continuing up hill battle against the corporation's dominant culture. And if they are heard at all it is only when they frame their message in terms of increasing the profit and/or power of the corporation. But even this has a destructive edge for the corporation's handling of large energy questions. Forcing members of these sub-cultures to frame their messages in terms of corporate profit and power hampers any comprehensive or in-depth review of what they say, since their proposals only has to pass the one test – does it have the potential to add to corporate profit and/or power.

A parallel aspect to the "growth as ideology" of energy corporations is that it inhibits any consideration of the "other" impacts of energy decisions. These include impacts on the Earth, the fairness of the distribution of wealth, and the very absurdity of the notion that growth can be or should be endless. It also hampers or forces into another compartment any consideration of the moral aspects of energy decisions and actions.

Energy Corporations Corrupt and Undermine the Civic Moral Foundation Underlying Their Functioning

Culture and its realization through concrete social networks is the cornerstone of human life. But energy corporations corrupt and undermine this cornerstone by their unhealthy emphasis on only certain aspects of this culture (profits and political power) and willingness to sacrifice and/or deform the other aspects in the effort to achieve and expand profits, power, and endless growth. For example, US cities, towns, and states have no value to these corporations except as tools to find more profit and/or power. The relationship of the corporations to US cities, towns, and states is wholly viewed as utilitarian. To the extent a city or town or state helps the corporation improve profit or power then the desires of the city, town, or state may be considered in locating power stations, refineries, pipelines, etc. That is, however, the full extent of the corporation's obligation.

Corporate advertising is another example of how energy corporations corrupt and undermine their own civic and moral foundations. Energy corporations have used everything from marriage and religion to family commitments and personal integrity to promote purchase of energy products. And, of course, today, like most corporations, energy advertising is frequently focused on sex and sexual performance. It is little wonder that such advertising confuses and undermines the civic and moral foundations of the culture. After all how could one expect anything else when the performance of an automobile is set on the same plane as sexual performance?

But energy corporations go even further in undermining their own cultural foundations. Such corporations depend on many things they cannot create for themselves. These include an educated work force, physical infrastructure such as roads, airports, water systems, etc, natural resources, and a supportive ecosystem. Yet in pursuing their twin goals of profit and power, energy corporation actions undermine these resources. The corporations seek to minimize their tax burden, thus adding to funding problems for schools, road construction, airports, etc. The corporations seek to minimize the cost of waste disposal, thus often endangering the ecosystem. The corporations seek an endless supply of resources at the lowest possible cost, frequently leading to quick resource depletion and little effort to conserve or find substitutes, until its too late.

Finally, energy corporations cannot, absolutely cannot, function without social orderliness and trust, in short a sense of community (culture) that allows people to interact without extensive concern for or time spent on protecting themselves from those with whom they are interacting. Otherwise interactions descend into "relentless mutual suspicion," or into what Olof Palme called a "society of sharp elbows." Any

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The Energy Crises *(continued from page 15)*

hope of pleasurable and trusting commerce would disappear, and doing business without protracted negotiations and literally dozens of lawyers negotiating each line of every contract would be forlorn. I put it to you, doesn't this sound like the energy industry today. But it is obvious from the actions of energy corporations that them spending time, money, and resources to support and defend social orderliness and trust is simply not on their agendas.

Energy Corporations Corrupt and Undermine the Public (Political) Sphere

Political self-determination and democracy depend on the existence of robust public sphere. This sphere is where continual debate occurs on the form and direction of community decisions and actions. This sphere can function only if the debates are open and based on reason and examination of data, as opposed to domination by appeals to status, power, or money. But this sphere has been corrupted by unequal access based on money and/or political power. Money and power are now prerequisites to having any voice, let alone an effective voice, in this sphere. Unless you have one or the other or both of the "keys for entry" your opportunity to participate or influence the debates is virtually nil. And energy corporations have both keys, and take every opportunity to sway the debates in ways that increase their profits and/or power.

As the corruption of the public sphere continues, democracy and universal participation in making energy decisions is denied. And this is consistent with the welfare of energy corporations, which generally believe that the "public" is neither sufficiently informed nor intelligent enough to have a voice in the very complex decisions about energy resources, production, and consumption. These corporations generally hold a similar view of politicians who, in the view of corporation insiders must be "convinced" to endorse the decisions and actions of the corporations. If energy corporations help destroy democracy, they help re-shape the political landscape of the world, with unpredictable, perhaps globally devastating, consequences. The corporations have trouble seeing this only because their actions that threaten democracy also increase profits and power for the corporations.

Energy Corporations Base Decisions on a View of Humans that is Ridiculous

The oft described view of the person from neoclassical economics is that of "homo *economicus*." *Homo economicus* is, as I hope everyone recognizes, a ludicrous fantasy. In the realm of social science it is a simplifying assumption to make theorizing and research manageable that simply has gotten out of control. *Homo economicus* is always rational (whatever that means), always consistent in its choices, always has perfect information about goods and prices, and always acts to maximize personal satisfaction. And personal satisfaction is achieved solely by buying and owning things. *Homo economicus* cares nothing about politics or democracy, ecology or the environment, and has no concern for future generations or even her/his own immediate family. *Homo economicus* has no emotional attachments, doesn't feel envy, anger or revenge, and has no knowledge of honorable vs. dishonorable action. Need I say more to show just how absurd this view is.

Energy corporations pretend to understand and align themselves with *Homo economicus*, to the extent it is possible to do so with such an absurd view. For the corporations this is merely public cover for a much different view of people and society that underlies their actions. For these corporations, people and society are mere "externalities" that must be managed and controlled so they do not interfere with each corporation's pursuit of power and wealth. This is a pragmatic view wholly in line with the pragmatic and liberal (business) cultural base in the US that energy corporations have helped export around the world. And one need only listen to the speeches of any energy corporation CEO to see how this view is compartmentalized so that it can be held together with views altogether inconsistent with it (e.g., democracy, equality, justice). But then again it is not unusual for humans to hold and espouse totally contradictory views of the world, society, and individuals. And again, reflexivity is important here to uncover what's going on, a reflexivity that energy corporations simply do not demonstrate.

John Stuart Mill was one of if not the primary founder of the image of humans as rational, self-interested individuals, and of the image of economic theorizing as a deductive enterprise. But Mill rightly warned that any application of this narrow model without reference to other disciplines or to experience could lead to absurdity. Energy corporations got part of Mill's message, but missed the really important lesson he's attempting to convey: In short, human behavior is more complex than can ever be captured in Mill's model and certainly in any Corporation's derivative model. In the words of Mill,

But such is the nature of the human understanding, that the very fact of attending with intensity to one part of a thing, has a tendency to withdraw the attention from the other parts...And if we are in this predicament, the more accurate our deductions and the more certain our conclusions in the abstract…the less we are likely to suspect that we are in error: for no one can have looked closely into the sources of fallacious thinking without being deeply conscious that the coherence, and neat concatenation of our philosophical systems, is more apt than we are commonly aware to pass with us as evidence of their truth.

In Summary

In summary then how do the large energy corporations stack up in terms of the fundamental features of the answer(s) to major energy questions facing us today and that will face us in the future?

1. *The answer(s) cannot assume a need for continuing and continual growth in the economy and the use of energy*. But the corporations clearly violate this principle. They cannot do otherwise if corporate profits and power are to continue to expand. And unlike neoclassical theory energy corporations do not take money to be merely a medium

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of exchange. They clearly see it primarily as a source of social and political power. Yet this view leads to a fundamentally incorrect view of economic élan vital, totally consistent with neoclassical theory. Like the neoclassical economist energy corporations see economic activity as a function of infinite "money creation," rather than a function of finite "energy stocks" and finite "energy flows." In fact, the economy is 100% dependent on available energy – it always has been, and it always will be. Of all the "market" participants who should recognize the fallaciousness of this view, you might think energy corporations would lead the list. After all, they deal with energy everyday.

2. *The answer(s) must support and promote the public welfare above all else – specifically, it must support social cohesiveness and orderliness, human "fellow feeling" and sense of community, trust, and the balancing of the needs of all stakeholders in conjunction with a realistic understanding of the Earth's carrying capacity.* The energy corporations commit two interrelated errors here. Together the errors constitute a fundamentally inverted worldview. First, the corporations see the environment as a subsystem of the economy, rather than the other way around. In other words, the corporations have been "trained" to believe and act on the belief that natural resources come from "markets" rather than the "environment." The corollary is that "human-made capital" can substitute for "natural capital." But the First Law of thermodynamics tells us there is no "creation" or "destruction" of matter, only changes in its form. Thus, there is no such thing as "human-made capital." Thus, *ALL* capital is "natural capital," and the economy is 100% dependent on the "environment" for everything. The second part of the error of corporations here is to see culture/community as a subsystem of the economy, rather than the other way around. There is absolutely no uncertainty that whatever economic arrangements people make must and does derive from their shared understandings about the world and the representations of those in objects and practices. This is so even when one of those representations is the notion the economy precedes community. This is so even when community values (culture) deny the existence of any type of action except those of isolated individuals. Here energy corporations take the parts of rational choice and neoclassical economic theory that are most absurd (although philosophical elegant and neat) and turn them on the communities/culture in which they are embedded as a means to blunt opposition and subvert the broader culture in the pursuit of corporate profits and power. From a scientific perspective these theories provide virtually no explanatory power with respect to human actions. Yet because of their widespread penetration into the general culture as "rules of thumb," these theories are very effective tools to impede or stop the search for answers to energy questions that do not assume the correctness of the theories as a starting point.
3. *The answer(s) must promote a re-examination of the answer(s) on a regular basis as a part of and necessary for the public welfare and community.* See No. 4 and discussion above.
4. *The answer(s) must not only allow for but encourage active and broad debate among all stakeholders in choosing an answer and periodically re-examining the answer_chosen. And this participation must be democratic – in other words, the final decisions cannot be made only by those who have invested or control capital invested in the "business."* The model for decision making found with the energy corporation is clearly not democratic. Neither is the way in which these corporations approach influencing the general political decision making process at trans-national, national, and sub-national levels. It would be very surprising then if the corporations entered into let alone promoted democratic approaches to selecting and re-examining the answers to the major energy questions for the peoples of the world.
5. *It must promote and expect public (in the broadest sense) participation in putting the answer into practice*. See No. 4 and discussion above.
6. *Finally, and perhaps most importantly, the answer(s) must not corrupt or undermine and certainly must not be placed above the totality of cultural values it is expected to serve*. That energy corporations place their welfare above that of the communities of the world is clear. First, these corporations do not and have never acted out of a felt need to serve the values of these communities, except as those values reflected the rights of corporations to protect their power and profits and treat the world and its peoples merely as resources. Second, at every opportunity the corporations seek to shift the risks of their activities to communities in which they operate. Whether this is through subsidies from government, special legislation to protect profits, or the promotion of a bidding war among cities for the "jobs" the corporation controls is really irrelevant. The message in all these instances in the same. Corporations have the right and even obligation to undermine communities if such serves the end of increasing corporate profits or power. But an even more disturbing message is apparent in the actions of these corporations. They not only seek favors and benefits at the expense of the community but actively work to corrupt and undermine cultural values at odds with the corporation's objectives. This is done through advertising, through self-interested legislation, and through attempts to disrupt and/or terminate public debate of questions that threaten the corporation.

Energy corporations are a genuine child of the "business philosophy" (liberalism) that arose in the period between the Reformation and the French Revolution, as described above in the quotes from Laski. The practical intent of liberalism was to legitimize wealth and the pursuit of wealth, and to protect those who pursued and accumulated wealth, as already noted above, in the words of Laski.

Let me close by providing just three examples out of literally hundreds of energy corporations making decisions for the wrong reasons and thereby creating or adding to a later crisis.

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The Energy Crises *(continued from page 17)*

1. Independent power producers (IPP) made decisions in the 1990s and early part of the 21st century to construct gas-fired power plants almost exclusively. This was done with the full knowledge that gas supplies were diminishing and gas peak would be reached sometime between 2010 and 2015. Why were these plants constructed? First, they offered the perceived opportunity for high profits in the expected "deregulated" electric sales markets. Second, they could be constructed quickly (in comparison with coal-fired plants). It was also perceived that these plants were lower risk investments for the energy companies involved.
2. According to the New York Times, countries such as Bolivia, Algeria, Russia, Venezuela, etc. are seeking to renegotiate or simply "tear up" existing long-term contracts for natural gas and/or oil. They are among the countries that are tightening the terms - sending a message that has reverberated in the energy industry at a time when supplies are tight. Some industry representatives call the new terms a chokehold that will slow investments, just as consuming nations need more oil to reduce prices. How does it make sense that investment should slow when these countries are seeking a larger share of the income from natural gas and oil sales, unless the decision is driven by a metric that constantly seeks the highest return no matter the implications for addressing real world energy problems. A single minded focus on higher profits cannot serve as the means to address shortfalls in supply of natural gas and oil for importing nations. A much broader and more comprehensive view than this is necessary and essential.
3. To dispel the "fallacy" that energy corporations are anything more than elaborate and expensive sets for gambling with all the emotions associated there with I offer the following from a press release by Cinergy Corporation. Cinergy Corporation said that its wholesale gas trading operation "just got chopped up" during the first half of this year because it had the wrong market bias -- it was **betting** that prices would fall or remain flat but instead they rose sharply. That led to a commercial gas division loss of 13 cents per share which contributed to a 14% drop in Cinergy's second quarter net income to $51 million, or $0.25 per share, compared with net income of $59 million, or $0.32 per share, in 2Q2004. (emphasis added) The same lesson is found in the actions and statements of energy traders at Enron, Dynegy, etc. made public over the last several years. I do not suggest these as typical of energy corporations, however, not because they are unusual or extreme but because they demonstrate a level of public greed that energy corporations have always sought to avoid because of its negative impact on corporate profits and power.

Footnotes

[1] e.g., Gary Becker, John Keynes, John Kenneth Galbraith, Paul Samuelson.

[2] Pp. 4-5.

[3] We must be careful in making this claim, however. Although claiming "markets" as a central part of their cultures, many energy companies still do not and, if given the opportunity, would not accept the definition of a market offered by such neoclassical icons as Samuelson and Friedman. The companies' definition is closer to this: markets are what keeps government out and provides easy capital access to build up the company.

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Wolf

By Douglas B. Reynolds*

I was living in Kazakstan just after the fall of the Soviet Union. The economy was in recession with many unemployed workers, I had to wear a parka while teaching class because the city heating system didn't provide any heat, and a number of cities were on rolling black *ons*—where you were given only two hours a day of electricity. Admittedly it was a desperate time and a desperate place. Yet when you consider what they had there before the fall and how much they lost, it was astonishing. Now, the world is in the same boat. The high costs of energy will cause a similar fall in the world's standard of living as we face the biggest oil and energy crisis yet. The Wolf is here.

In my book, *Scarcity and Growth Considering Oil and Energy* (Reynolds 2002), I predicted that 2005 would be the year when the world reaches its oil production capacity limit—the precipice of the production plateau—even assuming that the USGS (2004) estimate of total world conventional ultimately recoverable reserves (URR) of oil is correct at 3 trillion barrels. If the world's oil production is compared to a manufacturing plant, then once production reaches 95% of its stated capacity it is difficult to sustain that level of production. Indeed being at 95% of capacity is the very most a factory can hope to produce at in the short run. Katrina notwithstanding, the world is suddenly wondering whether Saudi Arabia can produce its reserve capacity of 2 million barrels a day, and since consumption is at 84 million barrels per day, then the world's oil production capacity is right at that 95% threshold of the absolute limit. Cheap oil is gone. No matter how much long run investment there is, it can't change the fact that there isn't any more easy oil to find or that only costly substitutes remain. The higher prices for oil even before Katrina show this.

The world's oil production plateau is not just an economic limit, but a physical limit. It not only has to do with the Hubbert curve—which is the maximum supply potential of a given region—but it also has to do with how monopoly national oil companies take risks and decide to invest in new upstream exploration and development. For example, Saudi Arabia may indeed have 265 billion barrels of proven reserves of oil—the old estimate EIA (2005)—or it may have 500 billion barrels of proven reserves—the new estimate Shah(2005)—it doesn't matter. All that oil is under one company and so subject to risk aversion that reduces what the physical potential of their production is. Soon Russia too may put all of its oil and gas production under a monopoly national oil company as it slowly re-nationalizes oil and gas. Then it will become more risk averse, limiting upstream investment and production. Plus seeing as the last four years of world production growth has come mostly from Russia (which averaged 0.75 million barrels a day (mbd) of new capacity) and Saudi Arabia (which averaged 0.45 mbd of new capacity) without actually having to find that oil, then the future does not look bright should these sources falter.

The end result is not so much a bell shaped curve with The Big Rollover (Magoonist 2000) or peak oil as the Hubbert geologists are so fond of, but a plateau—albeit a plateau that will soon have or already does have a decline to it. What is happening now is that the world's demand for oil is being constrained by that plateau and so just like being subdued by a wrestler, the more the world tries to grapple free of the plateau, the more pain it will endure in terms of higher prices. And yet attempting to keep consumption flat for years to come in the face of normal economic growth is tantamount to the worst energy crisis yet faced by human kind.

Unfortunately, as Katrina has shown, there may be dips in the plateau due to temporary emergencies or other factors. In fact the biggest dip may be yet to come if the Hotelling (1931) principle manifests itself. Recall that the correct market response is for individual mineral owners to hold back production if they believe that prices in the future and rent in particular will increase. As large oil producers start wondering whether indeed oil sands and heavy oil are not the panaceas that everyone claims, they may suddenly realize that future rents will be high and that current rents are too low. They may eventually decide to restructure their outputs by reducing current production and save their valuable resources for the future. In fact Qatar has recently placed a moratorium on new LNG facilities which could be the beginning of exactly this adjustment (Weissman, 2005). Right now most energy experts and the ministries within oil production countries believe that high oil prices will induce a rapid change in technology and the desire to use less energy and thus reduce the long run demand for oil. They are waiting for the faster development of oil alternatives like solar energy and hydrogen cars. Yet after 50 years of solar energy and hydrogen research, there is still no viable solar or hydrogen alternative to oil. Eventually the fear of alternatives will be replaced with the jihad of short run economic profits and production will be slowed.

However, rather than trying to pressure Saudi Arabia and Russia to increase short run production, the U.S. and Europe should applaud their efforts to reduce output. After all, is not this what we teach and learn in economics, that higher profits for producers automatically helps the world's economy. Isn't this the idea behind the Hotelling principle, and Adam Smith, that my self interest helps your self interest. If oil production is slowed, and prices rise, then the oil resources are conserved for the future. Technology could however change the future value of oil, and reduce the backstop price. But a careful analysis of technology over the last thousand years shows that technology has really only helped to develop the inherently valuable energy resources, not the inherently non-valuable ones. Consider how weak alternatives are.

Look at oil sands. Oil sands production is constrained by labor, capital, water, and environmental limits. It took Alber-

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ta more than ten years to get up to its first million barrels of oil a day of capacity, and it will take many more years before the province matches even an average OPEC producer. Yet suddenly oil sands are considered to be the most important potential new technology since crude oil itself. The true nature of oil sands though is that it is not a liquid, but a solid. We basically have to mine the resource, or bake it in place to extract the oil, rather than just using a straw to suck it out as it is possible to do with oil. Given this very different characteristic, it is not at all surprising that oil production from oil sands cannot increase the way Russia's oil production has done over the past few years. The lack of capacity of oil sands should cause large oil producers such as Russia, Saudi Arabia, or even Iran to take heed that this is not a very good substitute. The result is that these producers will soon decide to reduce their conventional oil supplies in order to maximize their revenue as Hotelling would expect.

A more fundamental problem though with oil sands, and all oil alternatives in general is that energy alternatives are, to use Gordon's (2005) terminology, very "heterogeneous." That heterogeneity belies the fact that they have different entropic values, which depend on physics. The subtle point is energy sources are interdependent such that it takes energy to make energy—creating an entropy subsidy. The entropy subsidy effect causes the price of an alternative to increase as the price of the low cost energy—invariably oil—increases. Any assumption of a backstop price of energy without accounting for the entropy subsidy effect—the loss of the low cost energy input—cannot correctly model the real world. This is why in 1971 researchers predicted that oil from oil shale could be produced for about $3.00 per barrel (Katell and Wellman 1971) when oil was nominally priced at $1.50, but by 1983 the expected cost of shale oil was $60 per barrel (Graham 1983) when oil was nominally at $30 per barrel, a six fold increase in real terms. What the original engineering estimate failed to account for was the cost of the indirect oil inputs for labor, capital, and other factors. The latest technologies for oil shale may indeed cut those costs more, but these technologies also depend on an energy input of electricity, which will cost more as oil costs more.

With all due respect to Simon (1998) scarcity is eventually more powerful than technology as a history of the world shows, Diamond (2004). We have been fooled into thinking that technology was the only cause of our increasing production of natural resources (Barnett and Morse 1963), when in fact it was merely due to a temporarily dominating information effect (Norgaard 1990). Now that depletion will dominate, oil production will soon decline and prices will rise for a long time. In the long run we will adapt and reduce our standard of living, but for now we must battle the wolves.

Unfortunately oil is not the only problem we have. North America has also reached its capacity limits for natural gas production. (See Ruters.com 2005 for Exxon's comment.) Even if Alaska and the Mackenzie Delta can come on line within ten years there will still be a need for many tons of imported LNG to the United States. That means the U.S. and Europe will be competing for LNG supplies forcing Europe to pay as much for natural gas as America does. Given that U.S. supplies will soon decline quickly, there won't be enough new LNG supplies to keep pace with the demand, which will force natural gas prices to rise along side oil prices. The idea that LNG is plentiful around the world, just like in the 1970s when everyone thought that oil supplies were plentiful around the world, has also run into the problem of risk aversion. The lack of risk taking by natural gas monopoly owners will inhibit LNG supplies.

Therefore, both oil and gas prices are set to go into further shocks upward which will certainly prove ruinous to our economies. Possibly coal use can help, but because of the Kyoto Protocol there may be a reluctance to burn more. Since nuclear power is still unpopular and has the disadvantage that it is a very time consuming energy source to permit, then it may not be online soon enough to help. Although even nuclear power is subject to the entropy subsidy problem—as the price of oil increases, the costs associated with building, maintaining, and supplying fuel to nuclear facilities will increase.

As energy prices continue to rise, even if oil supplies manage to increase some before they peak, it will still wreak havoc with our economies. Either the central bank will have to increase interest rates to stop inflation from spreading beyond the energy sector, or inflation will rise. If interest rates rise, housing prices will finally fall—and consumer confidence with it. If inflation rises, the dollar will fall. In both cases the U.S. economy will go into recession and easily bring the rest of the world with it. The developing world could look just like Kazakstan did ten years ago.

At some point then, we need to start warning the world that we are in dire straights and to this end we can applaud the efforts of the peak oil geologists who at least have given the world some warning. Nevertheless, radical solutions will be needed such as coal fired heating for houses, peak power pricing to reduce peak demand, and smaller cars or in the case of Europe, even smaller cars. The alternative is wearing heavy coats inside, rolling blackouts, and massive layoffs as the economy is forced to transition. I myself ride my bike to work in 40 below zero weather. The solutions wont be easy or quick, but at least if people are told what to expect (that prices are high but will only go higher—rather than that there is no problem and everyone is just crying wolf) then maybe the market will start adjusting, including having Russia and Saudi Arabia reduce their supplies now to create a longer plateau of world production.

At this point I don't see a lot of movement to adjust our lifestyles or the way we do business, and so I expect oil prices to reach $300 per barrel and natural gas to reach $200 per barrel of oil equivalent. Coal may be in short supply also for some years as energy use switches and mines need to ramp up. Coal could then reach $50 per barrel of oil equivalent for a short while. Solar energy will remain free but difficult and costly to use due to entropy problems. The result will be a

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long lasting energy problem with troubling macroeconomic effects. Wolf!

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Hong Kong Association for Energy Economics Launched

The Hong Kong Energy Studies Centre, under the leadership of Prof Larry C. Chow, spearheaded the formation of the Hong Kong Association for Energy Economics (HKAEE), the Hong Kong Affiliate of the IAEE. The launching ceremony was held on Dec 19th, 2005 at Hong Kong Baptist University, with Prof Tony Owen, past president of IAEE and Prof C.F. Ng, President of the University, officiating.

A lot of hot issues are facing the energy sector of Hong Kong and China. The SAR Government is in the process of working out the market structure of the electricity industry for the post-2008 years (when the current Scheme of Control governing the sector expires); the government is also studying the structure of the Hong Kong oil market to see if there is "fair" competition among the oil companies. The energy problems of China are grabbing world headlines these days, ranging from skyrocketing oil consumption and its pressure on world oil prices, energy security, and horrible fatalities in the Chinese coal mines to the squabbles between China and Japan in relation to the exploitation of the hydrocarbon resources in the East China Sea. Definitely, energy is "hot" and vital to the economy and well being of Hong Kong and China. Consequently, it is extremely timely and useful to inaugurate an association to advance energy studies in Hong Kong and China.

The HKAEE is starting from a relatively small base, with twenty-something members, consisting of executives and staff of the local energy firms, academics from the universities, members of environmental groups, government officials etc. Energy specialists from the Mainland and Macau are welcome to join the Association, with certain individuals from the Mainland committing to become members. It is anticipated that membership will definitely grow in the future.

The HKAEE is the fourth Asian Affiliate of the IAEE, the other three being located in Japan, Taiwan and South Korea. For the first term, Prof Larry Chow serves as the president, Mr S.K. Sung of Hong Kong Electric Co Ltd. serves as vice-president, Mr Stelphen Lau of CLP Power HK Ltd serves as honorary treasurer, and Mr. Ebbe Chow of Hong Kong & China Gas serves as honorary secretary.

During the launching ceremony, Prof Owen presented a public lecture entitled "Fuel Cells and Hydrogen with an Emphasis on the Transportation Sector" and Mr P.W. Lam, Chief Engineer of the Electrical & Mechanical Services Dept of the SAR Government, also gave a lecture entitled "Latest Developments of Energy Efficiency and Renewable Energy in Hong Kong." The lectures were well attended.

Ribbon Cutting at the Hong Kong Affiliate Launch Meeting
From left to right: Mr. Ebbe Chow (Hon. Secretary); Prof. Anthony Owen (IAEE, Past President); Prof. Larry Chow (President); Mr. S. K. Sung (Vice-president) and Mr. Stephen Lau (Hon. Treasurer)

Econometric Study On An Energy Strategy for Malaysia to the Year 2030– Focusing on the Impacts of Renewable Energy-based Power Generation

*PeckYean Gan**

Abstract

We developed an integrated econometric model to forecast and analyze energy demand of Malaysia up to 2030. This is compared with an alternative scenario – Renewable Energy (RE) Case – developed in accordance with the government of Malaysia's *Fifth Fuel Diversification Strategy*, which expressed quantitatively the impacts of RE inclusion into Malaysia's future power generation mix. A comparison analysis indicates that RE could alleviate fossil fuel dependency. However, this development is currently behind target despite all efforts. Field studies found that lack of stable and persistent government support, and disputes over the buy-back rate of RE-based electricity are the key obstacles, which requires careful countermeasures to sustain subsequent similar exercises.

Introduction

With rapid economic growth since early 1990s following successful implementation of the Industrialization Plan in 1985, Malaysia, today, appears to be one of the most developed among ASEAN countries. Average GDP growth has been above 8% annually since 1990 and total primary energy consumption almost trebled in the last 10 years. The economic structure has achieved a gradual transformation from an agriculture-oriented to a more industrial and service based structure. While the government has successfully induced a shift from oil consumption to natural gas for power generation in order to reduce the country's reliance on oil, overall fossil fuel dependency remains at over 95% since the 1980s. Even with rapid exploration and production, fossil fuel exports, coupled with a growing local energy demand have consumed resources at a faster rate than the discoveries of new reserves. In 2003, oil reserves stood at 4.5 billion barrels while natural gas was at 89 tscf, the remaining production years (R/P ratio) for oil and natural gas was 18 and 35 years, respectively, compared to <10 years and >70 years in 2001[PETRONAS, 2004]. The government predicted that the country would be a net oil importer by 2008 [M.Zamzam J., *et.al*., 2001].

Long-term energy security could be at stake particularly in oil, considering a consequent rise in future energy demand from the government's ambitious target of achieving the status of a developed country by 2020 as declared in *Vision 2020* [Jomo K.S., 2003]. Motorization, industrialization and improved living standards suggest larger future energy demand. Though this could be tackled through outsourcing, which is a high possibility in view of current conditions, a change from a current net oil exporter to a net importer in the future could affect the country's economy significantly.

This study aims to analyze the economy, energy and environment impacts of RE-based power generation on the long-term energy demand of Malaysia using econometric methods. The work performed can be divided into two main sections, namely, developing an integrated econometric model comprised of a macroeconomic sub-model, an energy sub-model and an environment sub-model for simulation analysis; and field study and discussions with involved parties to determine the actual progress of small RE-based power plant development in Malaysia.

This paper is organized as follows: The next section provides a brief description of the integrated econometric model, key variables and assumptions, as well as the analysis and discussions of simulation results obtained for both reference and comparative scenarios. In the following section, findings on RE-based power plant development in Malaysia are discussed and suggestions are given. The final section gives the overall conclusion for this study.

Integrated Econometric Model

Model Structure

An integrated econometric model consisting of a macroeconomic sub-model, an energy sub-model and an environment sub-model was constructed under this study [Li., 2003]. The macroeconomic sub-model is designed to provide indicators influencing energy supply and demand and related pollutant emissions. The energy-environment sub-model is designed to determine energy flows in stages and related pollutant emissions with consideration to related economic and price indicators obtained in the macroeconomic sub-model. It starts with final energy demand by sector and by fuel, followed by power generation to determine the required input for electricity generation, and finally total primary energy consumption computed from the sum of final energy demand and power generation activities. CO_2 emissions by fuel are calculated according to stages of energy flows in the energy sub-model using the emission coefficient by IEA. *Partial test, Total test* and *Final test* were conducted in order to examine overall model's conformity.

Simulation

Cases and Assumptions

One simulation case – the Business As Usual/Reference case (BAU) was developed for macroeconomic simulation, while two cases – BAU and RE cases were developed for energy-environment related simulations to facilitate comparative analysis and evaluation. The assumptions for macroeconomic and energy-environment simulations are shown in Tables 1 and 2, respectively. A simulation period of up to 2030 was maintained throughout this study.

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Table 1 Common Assumptions for Macroeconomic Simulation

Variables (growth rate)	1980-2000	2000-2010	2010-2020	2020-2030
Population	2.7%	2.3%	2.0%	1.8%
Government Consumption	6.5%	7.4%	5.5%	5.5%
Government Investment	8.1%	6.7%	4.2%	4.2%
World Trade	5.7%	3.5%	4.5%	4.5%
Variables (level)	**2000**	**2010**	**2020**	**2030**
Exchange Rate (RM/$)	RM3.8	RM3.8	RM3.8	RM3.8
Crude Oil Price ($/BBL)	$28.2	$30.0	$40.0	$53.2

Table 2 Common Assumptions for Energy-environment Simulations

Variables	2000	2030
Thermal efficiency in power generation (%)		
Oil-fired	45	45
Natural gas-fired	43	47
Coal-fired	39	45
Electricity generated from Renewable energy-based power plants (TWh)		
BAU Case	0	10.8
RE Case	0	63.5

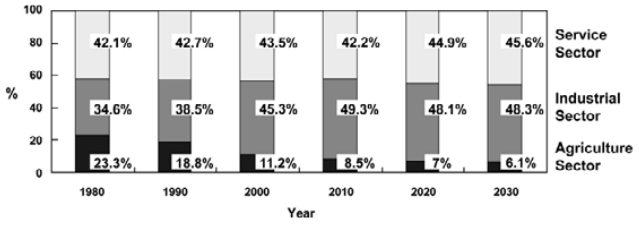
Simulation Results

BAU Case

Macroeconomic Performance

Under the BAU case, GDP growth is expected to average 5% annually from 2000 to 2030. The GDP level in real terms is expected to reach US$314.7 Million in 2030 compared to US$73.6 Million in 2000. Accordingly, per capita GDP in real terms increases to US$7,422 in 2030, in nominal terms to US$15,295 based on the exchange rate assumed under this study and amounts to US$24,487 in power purchasing parity terms. The GDP contribution by sector shows an increase from both the industrial and service sectors while that of agriculture decreases. The industrial sector's share of GDP will increase to 48.3% in 2030 compared to 45.3% in 2000, the service sector from 43.5% to 45.6%, and the agriculture sector from 11.2% to 6.1% (Figure 1). Motorization growth would be at 5.5% annually from 2000 to 2030 on average, and reach 25.8 million cars in 2030 compared with 5.2 million in 2000. The vehicles-per-100 inhabitants ratio will reach 61% in 2030 compares with 22% in 2000.

Figure 1 GDP Contribution by Sector



Energy-environment Performance

Energy demand is expected to increase steadily following a positive outlook for GDP growth during the simulation period. Total primary energy consumption is expected to grow by 5.4% annually from 2000 to 2030 compared with 7.7% from 1980 to 2000. Total primary energy consumption in 2030 will reach 220.7 Mtoe, 4.7 times larger than that of 2000. Energy-GDP intensity is expected to increase by 13.5% from 2000 to 2030. This indicates the possible existence of an inefficient and wasteful energy consumption pattern in the Malaysian economy. Thus, energy efficiency improvement measures could be necessary as a countermeasure.

In the electricity generation sector, total electricity generated will reach 403.2 TWh in 2030 with an average growth rate of 6.1% annually for 2000 to 2030. In terms of the power generation mix, a transition from natural gas and oil to coal is seen during the simulation period. The share of natural gas and oil will drop to 49.4% and 0.9%, respectively in 2030 compared to 78.5% and 8.8% in 2000 while that of coal will increase to 43.9% in 2030 compared to a mere 2.6% in 2000. Generally, the government's fuel switching and replacing strategies adopted in 1981 account for this transition.

The Malaysian government expects an investment of $9.7 billion will be required through 2010 in the power generation sector [EC-ASEAN, 2003]. Much of it will be on coal-fired power plants, as the government is promoting a shift from natural gas to coal and no new oil power plants are planned in the Seventh Malaysia Plan 1996-2000 and re-affirmed in Eight Malaysia Plan 2001-2005, with the intention of ensuring power generation security and reliability [EPU, 1995 & 2000]. Presently, there are 1700 MW of coal-fired power plants in operation consuming about 4.3 million tons of coal annually. On top of this, the government has planned an additional 5600 MW of new coal-fired power plants due for commissioning before 2010. With this, annual coal consumption could total up to 19.5 million tons per annum [M.Zainal, 2002].

There are two points that need to be considerd regarding intensifying the use of coal in power generation activities. Firstly, coal supply: currently, the bulk of coal requirements are imported from Australia (60%), Indonesia (30%), China (5%) and South Africa (5%) [M.Zainal, 2002; John T., 2000]. In 2002, total coal imports were 5.6 million tons [ADB, 2003], costing RM224 million based on a purchase price of US$40 CIF. Though approximately 1.5 billion tons of coal reserves are available in the country as of 2002, these reserves are not actively explored due to being low-grade, and in a remote and inaccessible location. Therefore, larger coal imports are foreseen following this shift.

Secondly, regarding pollutants emission: total CO_2 emissions from power generation activity was 8.2 million t-c in 2000, with 5.3% of it attributed to coal-fired power plants. Though the current per capita CO_2 emissions are still relatively low compared to those of developed countries, future total emissions from power generation and those contributed by coal-firings could be significant and should be monitored closely.

In terms of final energy demand by sector, both the industrial and transport sectors will remain as the largest consumers constituting approximately 82% of total final energy de-

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Econometric Study *(continued from page 23)*

mand in 2030 though the shares are decreasing gradually over the simulation period. Final energy demand by fuel shows a modest increment in natural gas and electricity consumption replacing oil. Nevertheless, oil will remain in a dominate position due to the huge petroleum product demand by the transport sector. With present available fossil fuel reserves, future petroleum product demand could be under-supplied with local reserves. While the increment in electricity consumption can be mainly attributed to an expected improvement in living standards and electrification, the increase in natural gas utilization by the non-power sectors is largely due to the Peninsular Gas Utilization (PGU) project commenced in 1984, which processes and transmits natural gas from a gas field offshore Peninsular Malaysia to consumers in the power, industrial and commercial sectors. Developed through 3 phases, today its network spans over 1,700km, comprising gas transmission and supply pipelines, and 6 gas-processing plants with a combined capacity of 2,000 mmscfd [PETRONASa].

Total CO_2 emissions from power generation is expected to reach approximately 60.6 million t-c in 2030, 7.4 times larger than those of 2000, with an average growth rate of 6.9% for 2000 to 2030. Of this, 60.2% will be from coal-fired power plants in 2030.

Deteriorating energy-GDP intensity, larger coal imports to support increased coal consumption by the power generation sector, huge petroleum product demand from the transport sector, and limited local fossil fuel reserves, all suggest that the BAU case is unlikely to be a sustainable option and substantial policy changes should be considered.

Table 3 Comparisons of Energy-environment Performance for BAU and RE Case at 2030

	BAU Case		RE-case	
	Level	Share (%)	Level	Share (%)
Total Primary Energy Supply (Mtoe)	220.7	100.0	214.2	100.0
Fossil fuels	218.7	99.1	207.7	97.0
Coal	41.8	19.0	35.2	16.5
Oil	107.7	48.8	107.7	50.3
Natural Gas	69.2	31.4	64.8	30.2
Hydropower	1.0	0.5	1.0	0.5
Renewable Energy	0.9	0.4	5.5	2.6
Electricity Generated (TWh)	403.2	100.0	40.2	100.0
Coal	177.1	43.9	146.2	36.3
Oil	3.8	0.9	3.8	0.9
Natural Gas	199.3	49.4	177.7	44.1
Hydropower	12.0	3.0	11.8	2.9
Renewable Energy	10.8	2.7	63.5	15.8
Total CO2 emissions (million t-c)	60.6	100.0	51.7	100.0
Coal	36.5	60.2	30.1	58.3
Oil	0.6	1.0	0.6	1.2
Natural Gas	23.5	38.8	20.9	40.5

Renewable Energy Case

As shown in Table 3, under the RE case, RE-based electricity will contribute 15.8% or 63.5 TWh to total electricity generated in 2030. Consequently, a reduction in the share of both coal and natural gas are observed. The share of coal is reduced from 43.9% in the BAU case to 36.3% under the RE case, while that of natural gas drops from 49.4% to 44.1%. In terms of environmental performance, total CO_2 emissions are approximately 15% lower than those of the BAU case, with coal remaining the main CO_2 emitter. Based on the carbon price of 19 euro per ton recorded in late May 2005 under the European Union greenhouse gas Emission Trading Scheme [Financial Times, 2005], this amount of CO_2 emissions avoided is worth approximately US$205 million.

The above results suggest that inclusion of RE into the future power generation mix has a high potential for reducing both coal and natural gas consumption as well as CO_2 emissions from power generation activities. While it is possible to reduce coal imports on one hand, the country's natural gas export ability could also be prolonged thus reducing overall fossil fuel dependency and the threat from insecure supply. On top of that, RE-for-electricity provides a practical option to utilize excessive local agriculture waste profitably. The trading of CO_2 in the international market, a mechanism which recognizes the intangible benefits of RE also indicates that RE development could be profitable in the long-term. This suggests the RE case could be a more feasible option than the BAU case, taking into account consequential economy, energy and environment impacts.

Small RE-based Power Plant Development in Malaysia

Background

The small RE-based Power Plant Project (SREP) was officially launched in 11 May 2001 following the announcement of the Fifth Fuel Diversification Strategy in 1999, which recognizes RE sources as the "fifth fuel" for the country besides oil, natural gas, coal and hydropower. SREP aims to promote the development of *grid-connected* small RE-based power plants utilizing all types of RE - biomass, biogas, municipal waste, solar, mini-hydro and wind to reduce oil dependency and greenhouse gas emissions from fossil fuel combustion. In conjunction with this, the government also announced an ambitious "non-binding" target of a 5% contribution to total electricity generated from grid-connected RE-based power plants by 2005, which will subsequently increase to 10% by 2010.

SREP applications are governed by a Special Committee on RE (SCORE) set up under the Ministry of Energy, Water and Communication (MEWC). A "SREP Center", which functions as a One Stop Shop for SREP, has also been set up at the Energy Commission to facilitate private sector participation. Limited by jurisdictional power, SREP is implemented in Peninsular Malaysia and Sabah only, as the federal government has no jurisdiction over the electricity industry

Table 4 SREP Project Status. [EC, 2004]

Status		No of Projects
Applications Approved by SCORE		65
a. License issued	*6*	
b. In the process of issuing license	*1*	
c. Pending	*53*	
d. Cancelled	*3*	
e. Pull-back	*2*	
New Application		1
Application Rejected		49
TOTAL		**115**

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Econometric Study *(continued from page 24)*

in Sarawak. Nevertheless, it is likely that Sarawak will similarly promote the development of RE.

Progress

As of December 2004, 115 SREP applications were received of which 65 projects were approved as shown in Table 4. Of this, only 6 projects have successfully been licensed and signed an electricity-selling contract with a utility company [EC, 2004].

Project and capacity breakdown by RE source of the 65 approved projects are as shown in Table 5. Identified as the largest share of RE potential of the country under the DANCED study, palm oil biomass-based power projects accounted for the largest share of the 65 approved projects with 175.6MW of generating capacity to be connected to the grid. There are no wind and solar power project applications. While wind has an unfavorable potential, for solar, it is very likely due to the cost factor. Overall capacity that will be exported to the grid amounted to 325.80 MW, equivalent to 1.75% of the total installed capacity in Malaysia in 2003. Nevertheless, coming into its forth year of implementation, today, only a 2MW landfill gas-based project has actually connected to the grid. Compared wth annual RE resources available as reported in the DANCED Project, 1999 at 36.1 Mtoe, worth Malaysia Ringgit 26.13 billion, (based on the equivalent average price of RM95 per barrel of oil), progress is slow and the prospect of achieving the 5% target by 2005 is rather pessimistic.

Table 5 Breakdown of Approved SREP Project by RE Sources. [EC, 2004]

Types of RE	No of Projects	Total Capacity (MW)	Capacity Connected to Grid (MW)	Share (%)
Biomass				
Palm waste	27	214.7	175.6	53.9
Wood waste	1	6.6	6.6	2.0
Rice husk	2	12.0	12.0	3.7
Municipal solid waste	1	5.0	5.0	1.5
Mixed	3	19.2	19.2	5.9
Landfill Gas	5	10.2	10.0	3.1
Mini Hydro	26	101.2	97.4	29.9
Wind & Solar	0	0.0	0.0	0.0
TOTAL	**65**	**368.9**	**325.8**	**100.0**

Issues Inhibiting SREP Implementation

Through field study and discussions, it was found that the key obstacles retarding SREP development are (1) lack of stable and persistant government support and, (2) disputes over the buy-back rate of RE-based electricity. As a consequences, other inter-related issues – financing, developer's participation, palm oil miller's participation, palm biomass supply contracts, RE-based electricity purchase contracts, and so on arise.

While BioGen project (Biomass-based Power Generation and Cogeneration in Palm Oil Industry), an UNDP/Global Environment Facility (GEF) funded, US$41,177,960, two phases five years project launched in 2003 [UNDPa, UNDPb] has intended to remove barriers and facilitate expeditious development of small RE-based power plant in Malaysia, its progress and achievement have not been fruitful and are behind schedule. A number of issues critical to RE-based power plants development such as electricity buy-back rate, selling terms and conditions, financing and so on, of which its foundation framework should be developed under the BioGen project could not be performed successfully. This has indirectly affected SREP progress significantly.

Suggestions

To sustain subsequent small RE-based power plant development in the future, a strengthened future policy and regulatory framework is a must. It can be achieved through the following: (1) regulating RE-based electricity selling prices through a *pricing law* to increase RE's role in the future power generation mix of the country; (2) formulating a standardized RE Power Purchase Agreement to solve disputes over selling terms and conditions; (3) reviewing present incentives such as tax exemptions regarding its suitability and sufficiency; (4) establishing a special funds/financing scheme to support RE-based power plants and to enable easier access to capital.

RE development is just at the kick-off stage for the Malaysia market. Many factors have frustrated its development efforts. The government is believed to have a number of RE development exercises planned ahead. Among others is the Malaysia Building Integrated Photovoltaic Technology Application Project to be implemented in 2005. Therefore, lessons learned from present failures should be monitored closely and corrections made to create a climate favorable to subsequent RE development exercises.

Conclusions

Simulation results for 2000 to 2030 showed a faster growth in energy demand than those of GDP, a larger coal share - 43.9% in 2030 compared to 2.6% in 2000 in power generation mix, and higher CO_2 emissions – 7.4 times larger than those of 2000 from power generation activities in 2030 under the BAU case. A shift of power generation mix to a larger coal share will have some economic and environmental impacts that need to be considered carefully over the long-term. Under the RE case, the inclusion of 16% of RE-based electricity in the future power generation mix by 2030 will reduce both coal and natural gas shares to 36.3% and 44.1%, respectively, and reduce total CO_2 emissions by approximately 15% in 2030 on top of other positive externalities attributed solely to RE. Thus, it can be concluded that the RE case is a more effective strategy in the long-term from an economic, energy and environmental point of view.

Nevertheless, field studies and discussions with parties involved, found that RE development in Malaysia is facing various obstacles, with unfavorable selling price and lack of a supporting policy framework the major detriments. Due to this, other difficulties such as financing, palm oil miller and developer's participations, and so on arise. Substantial government intervention through *pricing law* is necessary to enhance RE-based power plant competitiveness and thus its development in the future.

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IAEE Newsletter – Articles Published in 2005

2005 was a good year for the *IAEE Newsletter*. Below please find a compilation of all the articles published in the Newsletter in 2005 as well as a web link to visit each of these issues online at our website. IAEE is pleased with the overall content of the Newsletter that strives for addressing a diverse array of energy topics.

First Quarter:

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President's Message, *Arnie Baker*
Helmut Frank: An Appreciation, *G. Campbell Watkins*
Canada – U.S. Electricity Trade and GHG Emissions Policies: The Situation in the North East, *Jean-Thomas Bernard, Frederic Clavet and Jean-Cleophas Ondo*
Ensuring the Future construction of Electricity Generation Plants: The Challenge of Maintaining Reliability in New U.S. Wholesale Electricity Markets, *A. Joseph Cavicchi and Andrew Kolesnikov*
Creating a Commercial Environment for Energy Projects – Lessons from Central and Eastern Europe, *Robert Eric Borgstrom*
About How We Keep Score on Fuel Economy and How it Impacts Greenhouse Gas Production, *David McKeagan*
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Low Inventories or Stable Price? – You Can't Have Both, *William R. Edwards*
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The Skeptics on the Global Warming Issue: The Distinguished Veterans, *Gerald T. Westbrook*
Natural Gas Supply Diversification in Europe – Role of Turkey as a Transit Country, *Erdem Catak, Omowumi O. Iledare*
Natural Gas in the Mediterranean: A Note for the Barcelona Process 10th Anniversary, *Hadi Hallouche*
Dennis O'Brien An Appreciation, *Tony Finizza*

Energy in a World of Changing Costs and Technologies

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Concurrent Session Chair: Wumi Iledare

Conference Structure

This year we have chosen plenary session themes that we believe reflect the key policy challenges and uncertainties for North America in the global energy economy. We would like the concurrent sessions to expand on these themes, and are actively soliciting papers that address the suggested bullet points. Papers on other topic ideas are, of course, welcome, and anyone interested in organizing a session should propose the topic and possible speakers to:

Wumi Iledare, Concurrent Session Chair (p) 225-578-4552 (f) 225-578-4541 (e) wumi@lsu.edu

TRANSPORTATION & FUELS

Vehicle technologies
- Diesel hybrids, fuel cells
- Integrating advanced technologies, fuels and emissions constraints

New fuels & markets
- Product market fragmentation and refining capacity
- Ethanol/oxygenate policies, markets & the environment
- Non-conventional supplies and advanced fuels
- Urban transportation restructuring
- Hydrogen distribution systems

Oil market security and reliability
- OPEC capacity and price targeting
- Strategic and commercial policy for reliability
- Emerging roles of China and India
- National Oil Company strategies
- Impact of EITI and Local Content policies

ELECTRICITY & FUELS

Generation/Transmission: competition and reliability
- Market design policy evolution in the USA
- Capacity markets? – reliability, financing
- Europe -- what do "national champions" mean for efficient competition?
- Developing markets? -- lessons of liberalization and privatization

Distributed Primary Energy Alternatives and Markets
- Demand side technologies in transportation, buildings, and processes?
- Electricity and natural gas distribution regulation restructuring
- Demand side response policies and new technologies
- Sustainability and technology timing
- Carbon capture and sequestration

Natural gas: supply and facilities
- North American markets
- Arctic natural gas
- LNG infrastructure
- Evolution of global gas markets

Energy, Economic Development & Energy Poverty
- Transition from traditional biomass to modern energy services: policies, technologies
- Urban versus rural energy poverty alleviation
- Centralized, large-scale projects versus decentralized, micro-scale, locally-owned projects
- Investment needs: development aid, project financing, micro financing, cooperatives
- Energy sector governance and building local capacity: transparency, institutions, public education and participation

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: Submit your paper for consideration of the USAEE Student Paper Awards (cash prizes plus waiver of conference registration fees). Students may also inquire about our scholarships for conference attendance. Visit http://www.usaee.org/USAEE2006/paperawards.html 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.

Visit our conference website at: http://www.usaee.org/usaee2006/

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New York City Chapter for USAEE

The USAEE has newly reconstituted the chapter in the New York City area – the Energy Forum, Inc. The Energy Forum has been in existence for a number of years affiliated with the City University of NY then New York University, but has just been reestablished as an independent organization. Longstanding IAEE members, Ed Morse, Cheryl Trench, David Knapp, David Nissen, Dermot Gately, Larry Goldstein and Shirley Neff are all involved in the leadership of the new organization.

The Energy Forum organizes four or five programs per academic semester as well as special programs and conferences as the opportunity arises. The website, www.NYEnergyForum.org, has information on Energy Forum and other events of interest to the energy community in the greater New York City area. Members of the IAEE visiting New York may wish to check the website for upcoming events and/or sign up to be on the email distribution list.

Fossil Fuels in a Low-Emission Global Energy Future

Mark Jaccard
Simon Fraser University, Vancouver, Canada

If the global community agreed on the net benefit of dramatic greenhouse gas abatement during this century, how would our major energy options fare in such an endeavor? Nuclear power, renewable energy and accelerated energy efficiency are the conventional options for lowering energy-related emissions. More recently, however, researchers, industry leaders and some politicians have noted the potential to produce electricity and hydrogen from fossil fuels while capturing carbon dioxide and other harmful byproducts for safe storage. Thus far, there has been little in the way of independent comparison of this option with the other three. In fact, futuristic assessments of the global energy system are usually produced by either advocates of one particular option, or economists who focus exclusively on the projected financial costs of each option, or international bodies who are reluctant to draw strong conclusions even if the evidence suggests that one option might have substantial advantages.

In the book, Sustainable Fossil Fuels: The Unusual Suspect in the Quest for Clean and Enduring Energy (Cambridge University Press, 2006), I offer an independent comparison of these major options for a low greenhouse gas energy system. I compare the options on the basis of expected financial costs, but also in terms of the perceived risks they pose from extreme events like oil spills and nuclear accidents, and from vulnerability to geopolitical tensions. I also consider the importance of path dependence – the relative advantage each option might have because of its cohesion with existing technologies, skills, infrastructure, institutions and societal preferences. In conclusion, I find that fossils fuels may fare much better than many people assume, even when our goal is a global energy system characterized by zero-emissions, endurance and affordability.

Because the technologies and processes involved are applied commercially today in various jurisdictions for a diversity of energy and non-energy applications, we can have some confidence in estimating that zero-emission conversion of coal, oil and natural gas into electricity and hydrogen would increase the cost of delivered energy by 25-50 percent over the next 50 years, an annual increase of less than 1 percent.

While aggressive pursuit of energy efficiency is desirable, humans will use a lot more energy by the end of the century. Perhaps 1.5 billion people today are without electricity and modern fuels, and by 2100 their offspring will equal 4 billion of a global population that hopefully peaks before reaching 10 billion. Many of these people use less than 1 gigajoule of energy per year while a typical American uses over 300. Even with dramatic energy efficiency gains in wealthier countries, a subsistence 30 gigajoules for the planet's poorer people will expand the energy system at least three-fold during this century.

In this context, scale-up is the major challenge for nuclear power and renewable energy. Fossil fuels currently account for 85 per cent of the global energy system. A dramatic decline in their contribution in just one century would require a phenomenal expansion of these options. While the nuclear industry should expand, its pace is limited by challenges in siting new facilities, storing radioactive waste and preventing nuclear weapons proliferation. Most renewable energy has low energy density and variable production, which increases land-use conflicts and capital costs as it grows in importance.

There are, however, those who argue that fossil fuels, even in zero-emission form, cannot be economically competitive because we are rapidly depleting them. But while there is much anxious talk about the peaking production of "conventional" crude oil, energy experts focus on the technical and economic potential of substitutes. They note that when the price of crude oil is above $35 per barrel many fossil fuel and biomass substitutes can profitably produce oil products like gasoline and diesel. Again, these are firm costs of current production from unconventional oil (Canadian oil sands), natural gas (Qatar), coal (South Africa) and biomass (Brazilian sugar cane). Even with growing consumption, fossil fuels could last hundreds of years, given the global resources of coal and unconventional natural gas (gas deep in the earth and frozen below the oceans).

Acceptance of these resource, technical and economic realities means admitting that fossil fuels should be not be regarded as a foe, but rather humanity's best friend in its quest for a clean, enduring and affordable energy system.

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

The Politics of the Global Oil Industry An Introduction. Toyin Falola and Ann Genova, Eds. (2005). 280 pages. Price: US$44.95/paper or US$49.95 E-Book. Contact: James Lingle, Publicity Manager, Greenwood Publishing Group, 88 Post Road West, Westport, CT 06881-5007 USA. Phone: 203-226-3571. Fax: 203-222-1502. Email: james.lingle@greenwood.com URL: www.praeger.com

Arab Oil & Gas Directory 2005. 656 pages. Price: Euro 710.00. Contact: APRC, 7 avenue Ingres, 75016 Paris, France. Phone: 33-0-1-45-24-33-10. Fax: 33-0-1-45-20-16-85. Email: aprc@arab-oil-gas.com URL: www.arab-oil-gas.com

China's Energy Future – The Middle Kingdom Seeks Its Place in the Sun. Robert E. Ebel (2005). 104 pages. Price: US$16.95. Contact: The CSIS Press, Center for Strategic and International Studies, 1800 K Street, NW, Washington, DC 20006 USA. Phone: 202-775-3119. Fax: 202-775-3199. Email: books@csis.org URL: www.csisbookstore.org

The Home Energy Diet – How to Save Money by Making Your House Energy-Smart. Paul Scheckel (2005). 304 pages. Price: US$18.95 / Can$25.95. Contact: Beth Anne Sobieszczyk, New Society Publishers, PO Box 189, Gabriola Island, BC V0R 1X0 Canada. Phone: 250-247-9737. Fax: 250-247-7471. Email: bethanne@newsociety.com URL: www.newsociety.com

Plan B 2.0 – Rescuing a Planet Under Stress and a Civilization in Trouble. Lester R. Brown (2005). Price: $17.00. Contact: Earth Policy Institute, 1350 Connecticut Ave, NW Suite 403, Washington, DC 20036. Phone: 202-496-9290. Fax: 202-496-9325. Email: epi@earthpolicy.org URL: www.earthpolicy.org

Sustainable Fossil Fuels – The Unusual Suspect in the Quest for Clean and Enduring Energy. Mark Jaccard (2005). Price: US$24.99 Paperback/US$70.00 Hardback. Contact: Order Dept., Cambridge University Press, 100 Brook Hill Dr, West Nyack, NY 10994. Phone: 800-872-7423. Fax: 914-937-4712. URL: http://us.cambridge.org

Calendar

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

21-22 February 2006, Artificial Lift 2006 at The Shangri-La Hotel, Jakarta, Indonesia. Contact: Rizal Hafidz, Conference Manager, Oil & Gas IQ - A Division of IQPC Worldwide, 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-3242/web

21-22 February 2006, Production Optimization for Process Plants at The Regent Hotel, Kuala Lumpur, Malaysia. Contact: Nena Ganesan, Ms. Phone: +65 6722 9388. Fax: +65 6720 3804 Email: enquiry@iqpc.com.sg URL: http://www.iqpc.com.sg/AS-3218

22-23 February 2006, Wind VII and Renewable Energy Developments and Opportunities in the Midcontinent at Grand Forks, ND. Contact: Derek Walters, Communications Manager, EERC, University of North Dakota, 15 North 23rd St, Grand Forks, ND, 58202-9018, USA. Phone: 701-777-5000. Fax: 701-777-5181 Email: dwalters@undeerc.org URL: www.undeerc.org

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

27 February 2006 - March 3, 2006, World Fiscal Systems for Oil and Gas at Singapore. Contact: Justin Bambidge, Head of Marketing, CWC School for Energy Studies, 3 Tyers Gate, London, SE1 3HX, UK. Phone: +44 207 089 4200. Fax: +44 207 089 4201 Email: jbambridge@thecwcgroup.com URL: www.thecwcgroup.com

27-28 February 2006, Ziff Energy Gas Storage Conference at Houston,TX - Hilton Houston Post Oak Hotel. Contact: Carla D'Annibale, Conference Supervisor, Ziff Energy Group, 1117 Macleod Trail SE, Calgary, Alberta, T2G 2M8, Canada. Phone: (403) 234-4279. Fax: (403) 237-8489 Email: carla.dannibale@ziffenergy.com URL: www.ziffenergyconferences.com

27 February 2006 - March 3, 2006, Design of Low Emissions Gas Turbine Combustors at Irvine, CA. Contact: Jeff Wojciechowski, Coordinator, Gas Turbine Short Course, 19412 Sierra Calmo, Irvine, CA, 92603-3906, USA. Phone: 949-824-5950 x115. Fax: 949-854-5414 Email: jsw@uciclc.uci.edu

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

6-7 March 2006, Coaltrans India at Taj Palace Hotel, New Delhi. Contact: Jianjia Chan, Coaltrans. Phone: +44 (0) 20 7779 8895. Fax: +44 (0) 20 7779 8946 Email: jchan@euromoneyplc.com URL: http://www.coaltrans.com/default.asp?Page=11&eventid=ECK124&site=coaltrans

11-13 March 2006, The First International Conference on Energy Management & Planning at Tehran, Iran. Contact: raissifard@engmail.ut.ac.ir,m.raissifard@gmail.com, The First International Conference on Energy Management & Pllaning, Tehran,Iran, Research Institute of Energy Management & Planning, No.13, Ghods Street, Enghelab Street, Tehran, Tehran, 14178-43111, Iran. Phone: (+98-21)88967810,88966783,88967393. Fax: (+98-21)66461680 Email: info@fcemp.com URL: www.fcemp.com

13-14 March 2006, CERI 2006 Natural Gas Conference at Calgary, Alberta, Canada. Contact: Julie Staple, Canadian Energy Research Institute, 150, 3512 33rd Strreet NW, Calgary, AB, T2L 2A6, Canada. Phone: 403-220-2380. Fax: 403-289-2344 Email: jstaple@ceri.ca URL: http://www.ceri.ca/Conferences/conferences=north_american_natural_gas.asp

13-14 March 2006, Renewable Energy Finance Forum - Eastern Europe at The Hilton, Berlin. Contact: Jianjia Chan, Euromoney Energy Events. Phone: +44 (0) 20 7779 8895. Fax: +44 (0) 20 7779 8946 Email: jchan@euromoneyplc.com URL: http://www.euromoneyenergy.com/default.asp?Page=11&eventid=ECK122&site=energy

14-15 March 2006, Coal Properties & Investment at Ft. Lauderdale, Florida. Contact: Ronald Berg, Conference Manager, Platts, 24 Hartwell Avenue, Lexington, MA, 02421, USA. Phone: 781-860-6118 Email: registration@platts.com URL: www.events.platts.com

16-17 March 2006, Gioge 2006; 5th International Oil, Gas, Energy And Infrastructure Conference & Showcase at Tbilisi, Georgia. Contact: Irina Gorshkova, Russia and CIS Project Director, ITE Group Plc, 105 Salusbury Road, London, NW6 6RG, United Kingdom. Phone: +44 207 596 5016. Fax: +44 207 596 5106 Email: irina.gorshkova@ite-exhibitions.com URL: www.ite-exhibitions.com/og

20-21 March 2006, Mulitlateral Wells Middle East at Dubai, United Arab Emirates. Contact: Gareth Pearce, Oil and Gas IQ - a division of IQPC, United Arab Emirates. Phone: +971 503942765. Fax: +65 67203804 Email: enquiry@iqpc.ae URL: www.oilandgasiq.com/AS-3249

20-21 March 2006, Developing Unconventional Resources at The Millennium, Mayfair, London. Contact: Ollie Bennett-Coles, Marketing Manager, IQPC, Anchor House, 15-19 Britten Street, London, SW3 3QL, United Kingdom. Phone: 0207-368-9300 Email: ollie.bennett-coles@iqpc.co.uk URL: www.iqpc.co.uk/2632a

21-22 March 2006, Leadership & Team Management Skills for Technical Professionals at Furama City Centre, Singapore. Contact: Easwaran Kanason, Singapore. Phone: +65 6722 9388. Fax: +65 6722 93804 Email: training@iqpc.com.sg URL: www.iqpc.com.sg/AS-3270/web

21-22 March 2006, Effective E&P Data Management Strategies at Hotel Equatorial, Kuala Lumpur, Malaysia. Contact: Catherine Arendain-Talam, Singapore. Phone: +65 6722 9388. Fax: +65 6722 93804 Email: training@iqpc.com.sg URL: www.iqpc.com.sg/AS-3264

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