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INTERNATIONAL ASSOCIATION for ENERGY ECONOMICS

IAEE Energy Forum

First Quarter 2010 International Association for Energy Economics

President's Message

It would be tempting to begin by commenting on the outcome of the Copenhagen Climate Conference last December, or rather the lack of outcome: the failure of the negotiators to reach a binding international agreement on Greenhouse Gas (GHG) emissions and related issues, the likely consequences for climate change and the production and use of energy of not reaching an agreement, and the work that needs to be done to prepare for a successful outcome of the next climate meeting in Mexico. Another important issue that could be worth commenting on from an energy economics perspective is the global financial crisis and the effects it has had and still is likely to have on the international energy scene.

However, tempting as this could be, I would rather like to devote my first President's Message to more specific IAEE issues, opportunities and challenges that lie ahead for us as an international Association, as I see them, and a concerted effort that will be needed of us to bring the IAEE forward according to stated principles, goals and plans. The IAEE Council has, in fact, reached a unanimous "agreement" on the way forward for the Association, by deciding on a Strategic Plan for the IAEE for the period 2009-2012, at the Council meeting in San Francisco in connection with the International Conference there last June. Let me comment on some aspects of this Strategic Plan (SP).

The Vision of the SP states that the IAEE is the leading professional association in energy economics and related disciplines, without indicating, however, which those "related disciplines" specifically are. I think it is becoming more and more evident by recent developments that it is almost impossible, or unduly restrictive, to discuss energy issues without taking their environmental effects and implications into consideration. Thus, environmental sciences in general and environmental economics in particular, obviously fall within the "related disciplines" category and need to be integrated with energy economics. Other close candidates are technological and political sciences. As energy economists we should therefore adopt a multidisciplinary approach to better analyze and understand the complex issues arising in the interface between energy economics and related disciplines. Energy economics should still be, of course, at the center of the stage for us and we should never unduly compromise with our professional competence, standards and integrity as energy economists under such a multidisciplinary approach, and the specific contributions that sound economic analysis can bring to a deeper understanding and knowledge-based debate of contemporary energy issues and energy policy formation for a sustainable future.

Priority has been given in the SP 2009-12 to membership development – new membership growth as well as retention of existing members. The reason is obvious: a large and diversified, representative membership base is a most valuable asset for an association, and the association should continuously strive to evaluate and develop its products and services in accordance with the preferences and needs of its members. (A listing of the present portfolio of IAEE products and services has recently been posted on our website; http://www.iaee.org/documents/IAEEProductsServices.pdf). Membership growth should be particularly directed towards membership groups that are underrepresented in the composition of our membership, at present primarily from government, broadly defined, and the energy industries, and towards countries or regions of the world where IAEE is weakly represented or not represented at all, to make it a truly global organization. The multidisciplinary aspect referred to above also implies that we should reach out to potential members from professions and disciplines closely related to energy economics.

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Editor: David L. Williams

PRESIDENT'S MESSAGE *(continued from page 1)*

Several measures have already been implemented to grow membership, e.g., the Member-get-a-member campaign launched last year towards direct membership and the campaign to increase institutional membership. We are also in a dialog with the approximately 30 IAEE affiliates about a common strategic effort to grow affiliate membership, and we are constantly considering the possibility of establishing new, sustainable affiliates in countries and regions where the IAEE is not yet present. These measures have already begun to pay off handsomely. Membership development is, however, not only a priority and task for the IAEE Council and Administration, but should also be considered a responsibility for the affiliates and for each individual member in order to have the desired impact. I hope you will join actively with us on this common effort to grow IAEE membership.

IAEE conferences form an important part of our products and services, with the annual International Conferences as a "flagship". In addition, three Regional Conferences are now firmly established on an annual or biannual basis, i.e., the North-American, the European, and the Asian RCs, and we are actively cooperating with energy economists and affiliates in Latin America with the intention of establishing a Latin American conference. IAEE conference initiatives are also being actively pursued in Africa and the Middle East. And not to forget the many local conferences, seminars and workshops organized by the IAEE affiliates around the world. It will be a major task to maintain and further develop this conference portfolio in accordance with the content, quality and "branding" aspired for IAEE conferences, and to reach out to our diversified membership with interesting, relevant and useful conference products, so as to make conference attendance an attractive prospect for all members. We should, in particular, try to improve our conference concept to make it more relevant for members from industry and government, in a dialog with representatives from academic and research institutions, consulting, as well as students.

On the communications side an interesting new product has been launched, i.e., the IAEE Energy Blog (http://blog.iaee.org/) - a modern communications device inviting IAEE members to actively participate in a discussion of common energy issues, interests, and concerns. A blog is so to speak by definition only what its members by participation make it to be. A lively discussion is already taking place on the IAEE Blog, but I would like to invite all of you to contribute with ideas, views and opinions on contemporary energy economics and policy issues to make the blog a truly active and stimulating discussion forum.

We can be proud of the fact the IAEE *Energy Journal* is generally recognized as the leading international journal in energy economics. A recent membership survey conducted by the IAEE has indicated, however, that the EJ is mainly read by members in the academic and research communities and does not seem to reach out to industry and government to the same extent. There also seems to be a growing interest for studies of policy oriented issues and issues in the interface between energy and environmental economics, as mentioned above. The IAEE Council has therefore decided to establish a Working Group to look into the possibility of launching a new IAEE publication covering this area, with a preliminary working title, the Journal of Energy and Environmental Policy (JEEP). The WG is supposed to report to Council at the meeting in June in connection with the Rio International Conference.

Finally, I would like to take this opportunity to thank those Council members who left Council at the end of their term last year for their valuable contributions and services to the Association. Special thanks go to the Immediate Past President, Professor Georg Erdmann, for his constructive and dedicated leadership through 2009 and to our Executive Director, David Williams, and IAEE Headquarters for their excellent, continuous services to the Association.

I look forward to seeing you at the IAEE International Conference in Rio de Janeiro 6 – 9 June. The Rio Conference local organizers under the leadership of José A. Scaramucci are doing a great job of organizing an interesting and attractive Conference, and then Rio, of course, is an attraction in itself. Otherwise, you can always reach me to share views on IAEE matters at einar.hope@nhh.no, and I would like to invite you to do so.

Einar Hope

IAEE Mission Statement

The International Association for Energy Economics is an independent, non-profit, global membership organisation for business, government, academic and other professionals concerned with energy and related issues in the international community. We advance the knowledge, 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

Editor's Note

This issue of the Forum looks at the far east, particularly China and India. We have six articles that look at multiple facets of energy economics in that area and will contine with this focus in the second quarter issue.

Varun Rai and David G. Victor offer a framework for identifying viable and credible climate change mitigation actions in developing countries. The framework is applied to the case of India to suggest that a large number of options to control warming gases are in India's own self-interest, and that leverage on emissions from each of these options could amount to several hundred million tons of CO_2 annually over the next decade and an even larger quantity by 2030.

Anas Alhajji discusses the rhetoric of energy security in India and China and suggests that there are many policy contradictions in each country. He points some of these out and asks whether these are due to ignorance, political posturing or both.

Bhupendra Kumar Singh notes that both India and China are net importers of energy resources. Although both are competitors, they recognized the high cost of uneconomic competition. This is the fundamental reason behind the India-China energy cooperation which he discusses. Bilateral cooperation will increase bargaining power of both countries while acquiring overseas energy assets.

Mamdouh Salameh discusses China's global oil diplomacy and argues that China's robust economic growth and its aspiration to become a superpower would falter without oil. China's global oil diplomacy is, therefore, geared towards ensuring this never happens. However, he warns that China's global oil diplomacy could bring it into conflict with the United States unless both countries find a constructive accommodation that allows them to do business. Our prosperity and even global peace depend on this.

Ross McCracken notes that based on refinery throughput and crude import data, Chinese oil demand appears to be rising, while new car sales are at record levels -- the beginnings perhaps of a new oil supply crunch. However, other data paints a very different picture; falling consumption and large rises in inventory levels. China is stockpiling not consuming, a process that should act as a medium-term stabilizing factor on the oil market.

Philip Walsh explores the nature of energy derivatives and examines derivative regulation and the potential for creating domestic derivatives trading for the main energy commodities in China.

DLW

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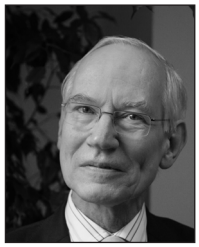

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Endowed Chair and Faculty Positions in Next Generation Energy Systems

Michigan Technological University announces a Strategic Faculty Hiring Initiative (SFHI) that will add up to 10 tenure-track positions, open in rank, during the 2009-10 and 2010-11 academic years. SFHI is an ongoing commitment to substantially expand Michigan Tech's faculty resources in targeted strategic areas of multidisciplinary research and inquiry. This initiative follows two previous hiring initiatives in the areas of Sustainability and Computational Discovery and Innovation.

Michigan Tech seeks to attract exceptional candidates whose interests and capabilities match the following areas with the goal of strategically bridging existing strengths and enabling expanded research:

- Smart transmission and distribution systems, cyber-security
- Generation and integration of renewables including wind and solar
- Improved combustion and conversion technologies with CO2 capture and sequestration including biomass and waste streams
- Development of distributed power generation with co-generation and energy systems for buildings
- Energy harvesting in multi-scale systems including waste thermal, mechanical, and chemical energies
- Advanced materials for photovoltaic and battery technologies
- Distributed energy storage systems, management, and interconnection, including micro-grids and plug-in hybrid electric vehicles
- Biomimetic systems for energy conversion, including photo-biological processes
- Regulatory, policy, legal, social, environmental, and economic aspects of energy generation, transmission, and consumption

Included in this initiative is the Richard and Elizabeth Henes Chair in Mechanical Engineering with an emphasis in Energy Systems, with the potential for additional endowed positions. Faculty selected for the Henes Chair will be a leader in their field with national and international reputations. Michigan Tech seeks a diverse applicant pool from a wide range of disciplines *including engineering and sciences* in this strategic initiative; a PhD degree is required and post-graduate experience is strongly preferred. For full consideration, applications should be received by December 15, 2009; review will continue until all positions are filled. Attractive salary, benefit and start-up packages will be provided for successful applicants.

Details about Michigan Tech's *Next Generation Energy Systems* SFHI are available at www.mtu.edu/sfhi. Applicants should prepare their materials as a single PDF document, and send it as an e-mail attachment to provost-energy@mtu.edu. More general information on Michigan Technological University is available at www.mtu.edu.

Michigan Tech is an internationally renowned doctoral research university located in Michigan's scenic Upper Peninsula, on the south shore of Lake Superior. Houghton provides a unique setting where natural beauty, culture, education, and a diversity of residents from around the world come together to share a superb living and learning experience.

Michigan Tech is an ADVANCE institution, one of a limited number of universities in receipt of NSF funds in support of our commitment to increase diversity and the participation and advancement of women in STEM.

Michigan Technological University is an equal opportunity, affirmative action employer/educational institution. Applications from women and minorities are encouraged.

Dear Energy Professional

We kindly invite you to the wonderful city of Rio de Janeiro, Brazil, to attend the **33rd IAEE International Conference**, entitled *"The Future of Energy: Global Challenges, Diverse Solutions"*, which will be held at the Intercontinental Rio Hotel, on **06-09 June 2010**.

Rio de Janeiro – considered by many the energy capital of Brazil – will be the perfect setting for professionals from academia, business and government to debate solutions to the common global challenges in a highly uncertain energy future. The focus of the conference will be to discuss possible changes in energy policies, technologies and markets, taking a careful look of the diversity of solutions currently available.

Suggestions of coordinated concurrent sessions or roundtable discussion sessions are very welcome. Proposals should be sent to the concurrent session chair at rio2010@ab3e.org.br, no later than **01 February**. You must provide four or five possible speakers who have submitted abstracts to the conference covering complementary issues of the concurrent session topic. The accepted abstracts will be then scheduled for presentation in an organized session you may preside. (Please recall abstract should be submitted up to **15 January**.)

We invite you to visit our conference website where you will find all the latest information on the conference including accommodation and travel details.

Please contact us at rio2010@ab3e.org.br in case you need any assistance.

We are looking forward to welcoming you for an unforgettable conference in Rio de Janeiro, the stage for the 2014 FIFA's World Cup final and the site for the 2016 Olympic Games.

REGISTRATION

Registrations are currently being accepted through **01 May** (speakers) and **01 June** (others).

Registration fees are payable in advance.

Submit the registration form online here. Alternatively, you can download the conference registration form – just follow the instructions contained there. Conference registration fees may be paid by credit card; other payment options will be offered to you if you register online. Hotel and related travel costs are not included in registration fees. Registration fees include: registration materials, online conference proceedings, opening reception, gala dinner, off-site cultural event at the Sugar Loaf, three lunches and coffee breaks. Students: submit a letter stating that you are a full-time student and are not employed full-time; the letter should provide the name and contact information for your main faculty supervisor or your department chair and a copy of your student identification card – AB3E reserves the right to verify student status.

REGISTRATION FEES

	Early registration (up to **01 May**)	**Late registration** (after **01 May**)
Speakers	R$ 1,155	R$ 1,350
IAEE/AB3E/IBP members	R$ 1,350	R$ 1,540
Non-members	R$ 1,540	R$ 1,830
Students	R$ 685	R$ 875
Accompanying persons	R$ 770	R$ 865
Voluntary contribution to student fund	R$ 195	R$ 195

(R$ (real) is the Brazilian currency – in January 2010, R$ 1 is worth approximately US$ 0.58 or € 0.40)

CONFERENCE VENUE AND ACCOMMODATIONS

The conference venue is InterContinental Rio hotel, conveniently located at the heart of the city within short walking distance to wonderful shopping, eating, entertainment and cultural sites, including a golf course and a hang-gliding facility. We encourage early reservations as hotel rooms are likely to sell out.

Special room block at the following group rate is available: single/double room at US$ 155.00 per night (exclusive of 15% taxes). Please note that you MUST make your reservations prior to 17 May 17 to receive these special rates.

For reservations please fax the reservation form to **+55 21 3323-2295** or send it to the following email address: grupos@inter-rio.com.br. Identify yourself as being with IAEE's Rio 2010 International Conference.

TECHNICAL TOURS

- **05 June** – ethanol distillery in Ribeirão Preto, state of São Paulo, world's sugarcane capital
- **05 June** – oil platform shipbuilding yard in Ilha da Conceição, Niteroi (across the Bay of Guanabara from Rio de Janeiro)

PRELIMINARY PROGRAM

June 07	08:30–09:00	Opening
	09:00–09:30	Inaugural plenary session José Goldemberg
	09:30–11:00	Special plenary session ***The future of energy: new energy policies and technologies*** (Joseph M. Dukert) How energy policies should deal with the advance of new energy technologies?
	11:00–11:15	Coffee break
	11:15–12:45	Concurrent sessions 01–11
	12:45–14:15	Lunch
	14:15–16:15	Concurrent sessions 12–22
	16:15–16:30	Coffee break
	16:30–18:15	Dual plenary session ***OPEC's 50 years and the future of oil industry*** (Sadek Boussena) A new role for OPEC countries in a world with less fossil fuels?
		Dual plenary session ***The challenges of energy regulation in the future*** (Einar Hope) Retail competition: yes or no?
June 08	08:30–10:30	Concurrent sessions 23–33
	10:30–10:45	Coffee break
	10:45–12:30	Dual plenary session ***Bioethanol: production, use and trade*** (Roberto Rodrigues) 35 years since Proalcool – what are the main barriers to increase fuel ethanol supply and demand?
		Dual plenary session ***Energy efficiency, electricity demand and smart grids*** (Luiz A. Horta Nogueira) What will be the role of smart grids in increasing energy efficiency in the next decade?
	12:30–14:00	Lunch
	14:00–15:00	Special plenary session ***Sub-salt oil in Brazil*** (Edmar L. F. de Almeida) Big oil in a new exploration frontier: what are the technological and economic challenges?
	15:00–16:30	Dual plenary session ***The future of energy demand in transport*** Electricity in road transport: a real technological and energy change towards a new car?
		Dual plenary session ***The future of energy contracts and trade*** (Mine K. Yücel) Are there evidences of market speculation?
	16:30–16:45	Coffee break
	16:45–18:15	Concurrent sessions 34–44
June 09	08:30–10:15	Concurrent sessions 45–55
	10:15–10:30	Coffee break
	10:30–12:30	Dual plenary session ***Geopolitics of natural gas*** (Jean-Marie Chevalier) Should we worry about natural gas prices and imports?
		Dual plenary session ***Energy development and poverty: key issues for energy access*** (Georg Erdmann) Social tariffs and the need for investments
	12:30–14:00	Lunch
	14:00–15:00	Special plenary session ***Innovation and the economics of nuclear industry*** (José Rubens Maiorino) Trade-offs between nuclear energy technologies and costs
	15:00–16:30	Concurrent sessions 56–66
	16:15–16:30	Coffee break
	16:30–18:15	Closing plenary session ***Energy and environment: what will come after Kyoto?*** (Reinhard Haas) What are the remaining barriers and economic mechanisms to cut emissions in the next decade?

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Working Paper Series

— CALL FOR ENERGY RESEARCH PAPERS —

The USAEE and IAEE have combined efforts to created a working paper series that gives you (and all USAEE/IAEE members) a chance to increase the circulation, visibility, and impact of your research. If you have an unpublished research paper that addresses any aspect of energy economics or energy policy, we would like to feature your paper in this new series. There is no cost to you, only benefits:

- Place your work where it can be seen and used on a daily basis.
- Gain timely feedback from other researchers working on related topics.
- Create a permanent and searchable archive of your research output within the largest available Electronic Paper Collection serving the social sciences.
- Provide unlimited, hassle-free, public downloads of your work on demand.
- Raise your research profile, and that of the USAEE/IAEE, by joining with fellow members to establish a new energy research *trademark* that is unparalleled in terms of its breadth and depth of focus.

The *USAEE/IAEE Working Paper Series* is a new component of the Social Science Research Network (SSRN) *Research Paper Series*. SSRN is the leading online source of full-text research papers in the social sciences, and is accessible at the following link: http://www.ssrn.com/. SSRN is indexed by Google and all other major online search engines, ensuring that anyone who does a keyword search in your area of research will be directed to your paper, including free downloads, and provided with your contact information. SSRN tabulates the number of abstract and full-text downloads of each paper in the series and publishes various "top-ten" lists to indicate which papers are most highly demanded within individual subject areas.

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The *USAEE/IAEE Working Paper Series* includes only papers that present original, scholarly research related to energy economics and policy. Editorials, marketing tracts, and promotional material will not be accepted. Other than this initial screening, the working papers will be unrefereed and authors are solely responsible for their content. Authors will retain all rights to their work, including the right to submit their working papers (or subsequent versions thereof) for publication elsewhere. Neither USAEE/IAEE nor SSRN will assume or usurp any copyright privileges with respect to papers included in the series.

Each working paper included in the *USAEE/IAEE Working Paper Series* must be authored or co-authored by a member in good standing of the USAEE/IAEE, and be submitted by that member. All papers will be assigned a USAEE/IAEE Working Paper number and fitted with a distinctive cover page that identifies it as part of the USAEE/IAEE series.

To include your research paper (or papers) in the *USAEE/IAEE Working Paper Series*, please email a copy of the work (in MS Word format), including a brief abstract, to the addresses given below.

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Identifying Viable Options in Developing Countries for Climate Change Mitigation: The Case of India

By Varun Rai and David G. Victor*

One of the most contentious issues in diplomatic efforts to cut global emissions of warming gases is the effort expected of developing countries. The "Bali Roadmap," which set the agenda for the Copenhagen climate summit, envisioned that that developing countries must make efforts to control growth in their emissions.[1] Yet those countries have many other priorities, and schemes such as the Clean Development Mechanism (CDM) that help them pay the cost of warming policies have proved cumbersome and often ineffective. Yet pressure for some kind of action is growing, and the major developing countries—such as Brazil, China, India, Indonesia and South Africa—are all responding by offering various proposals that would lower growth in these emissions. In this paper we focus on India and we develop a general framework for assessing whether the policies offered are credible.

India has crafted a national action plan on climate change (NAPCC), which provides the roadmap for India's climate-change policy. Specifically, it lays out eight national missions as the way forward:[2] national missions for solar energy, energy efficiency, sustainable habitat (public transport; building codes), water, Himalayan ecosystem, Green India (aforestation), sustainable agriculture, and strategic knowledge for climate change. The NAPCC is a positive first step in India's efforts to combat global climate change. The NAPCC is comprehensive in ambition—the agenda it sets for the eight national missions is wide-ranging. These missions span actions that are cost-effective and ready for implementation to those that are difficult to see achieved in practice. But the real opportunity each of the mission areas provide as a viable and a valuable response varies. In the eyes of India's foreign-policy partners, it is hard to assess the real leverage that the NAPCC will have on the country's GHG emissions.

While these proposals have been welcomed by climate change diplomats, the more fundamental questions remain unanswered? Are such proposals credible, and what can the rest of the world—including the western countries most worried about global warming and willing to compensate developing countries for the cost of extra effort—do to encourage the policies at a greater scale? Here we lay out a framework that allows answers. We also highlight an array of Indian policy options that are not only materially relevant to climate change but are also feasible to attain.

Framework for India's Engagement: Interests, Capabilities, and Leverage

We suggest that the only serious and viable approach for India's engagement in global efforts to tame global warming is one that aligns with India's own core interests. Those interests are complex, but at their core are the goals of economic development and energy security.

All domestic and international strategies involving India must realize these core interests (shown on the horizontal axis in Figure 1) as boundary constraints on what India is willing to offer as part of its contribution to climate change. The vertical axis in Figure 1 shows the potential for CO_2 reductions. At the bottom of the chart (Boxes III and IV) are options with small or negative CO_2 reductions (i.e., large emissions)—these options offer no leverage in international climate-change negotiations. At the bottom left of the chart (Box III) are options that do not interest India—they are irrelevant to the discussion in this paper. The options at the bottom right (Box IV), where India's interests are high, may be irrelevant; or they may be potentially harmful for climate change (for example, coal-to-liquids projects pursued under the umbrella of energy security). At the left side of the chart (Boxes I and III) are options that fail the condition that they be seen in India's interest. The interesting box is the upper right (Box II)—also known in global-warming policy parlance as "co-benefits."

Thus India's search for a strategy must begin with Box II. But not all options in Box II are equal. Some options exist in theory but will be difficult to implement; those options will be viewed as much less credible (and thus less effective as part of India's strategy to engage with the world). As other countries look at India's choices, there is much discussion about effectiveness, efficiency, and equity of climate-change policies,[3] but real progress in forging successful alliances for concrete action is often crippled by doubts about what parts of the strategy can be successfully implemented in the Indian context.[4] Irrespective of what India promises, only those promises will be valuable bargaining chips where the central government (the negotiator) *is seen* by outsiders to have real influence.

Figure 2 unpacks Box II and explores two major dimensions to the credibility

* Varun Rai is a Research Fellow, Program on Energy and Sustainable Development, Stanford University. He may be reached at raivarun@gmail.com David G. Victor is Professor and Director of the Laboratory on International Law and Regulation (ILAR), School of International Relations & Pacific Studies, University of California San Diego, CA.
See footnotes at end of text.

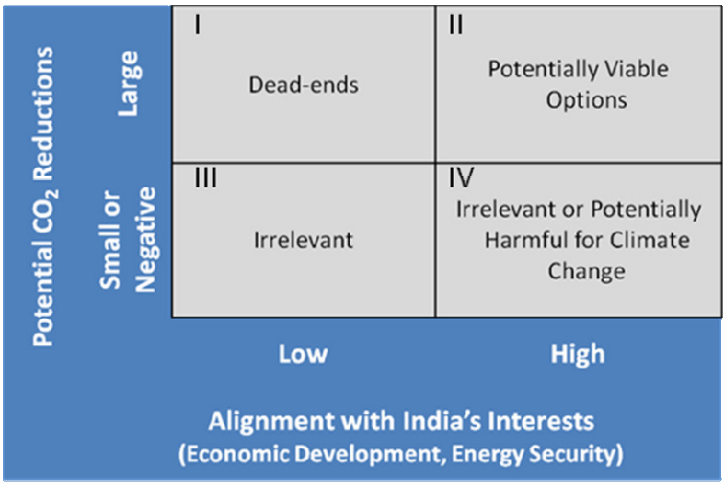

Figure 1: Framework for evaluating the viability of India's energy options as a credible response to climate change. The potentially viable options are in the upper right corner (Box II). The structure of Box II is further unpacked in Figure 2.

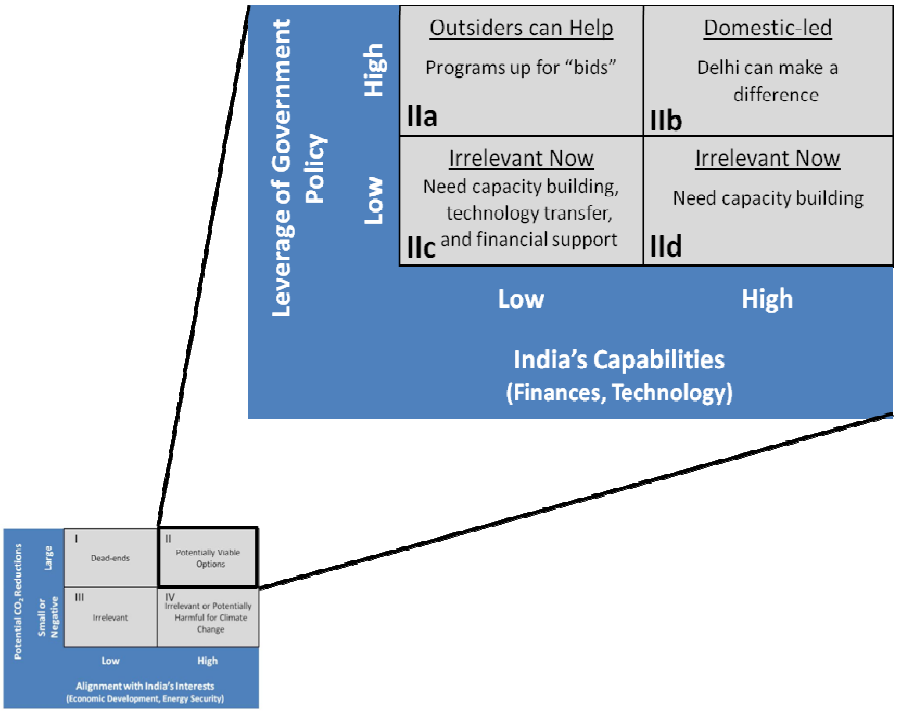

Figure 2: Exploring Box II of Figure 1 in more depth: Leverage inside and outside India

of the options that India can choose. On the vertical axis is the government of India's (GoI) ability to administer policy. Across many areas of policy, GoI is unable to have much influence over what really happens in India—those areas of policy include topics for which competence is given to India's states through its federal system as well as areas where the central government does not have the administrative capacity to have much impact on outcomes. The options at the bottom of Figure 2, though they become viable options over time as the leverage of GoI's policy increases, are irrelevant now. The viable options for India's engagement, then, are those where the ability of GoI to make promises that it can actually deliver is high. Those are shown in Boxes IIa and IIb. Of those options, one more level of unpacking is needed. For some issues the government, state firms and the private sector have all the capability needed. For example, with technology already available to Indian firms it would be possible and cost-effective to make fuller use of natural gas or to shift to more efficient technology for new coal plants. These options are shown on the upper right side (Box IIb). For other options, outsiders may need to help—by providing technology or finance to make viable options that are not otherwise available (Box IIa).

This framework, then, transforms the debate about what India can and should do to mitigate emissions. India, working alone, can make credible offers to the international community in Box IIb. And the international community, working with India, can make options in Box IIa viable.

Making Boxes IIa and IIb Real: Some Concrete Suggestions for Action

Contrary to the view maintained that costs of mitigation will be very high for India (thus violating India's growth plans) we argue that there are several options available in India for large-scale CO_2-emissions reductions that satisfy the viability conditions discussed above. Among other opportunities in India, power-sector reforms and efficiency of coal-fired power plants are ripe candidates for immediate action. These are discussed below.

Power-Sector Reforms

India has struggled to provide reliable electricity supply to its population. Hundreds of millions in India still have no electricity, and those with electricity have unreliable access, usually only for a few hours per day. A major issue is the widespread theft of electricity by end-users. Every year about a third of the net electricity produced in India goes unaccounted—that is, the power is generated by there is no revenue generated. A large fraction of that is theft, along with poor technical management of the power supply system. Although India has initiated programs to improve the electricity situation, the progress

has been slow and limited to very few areas. For example, in Delhi, the use of advanced technology in power delivery and metering, as well as commercial incentives to power distributors has brought down the losses in the low-voltage electricity distribution from nearly 50% to 20% of the net supply in just five years.[5] A completely unintended, nevertheless quite relevant to the climate change discussion, consequence of the Delhi reforms have been a significant reduction in growth rate of electricity demand, and hence, in CO_2 emissions. Rationalization of tariffs and stricter compliant mechanisms mean that the end users are now exposed to the true cost of power greater than ever. As electricity distributors have used innovative technologies to crack down on theft, electricity demand in Delhi has grown much slower in the last 5 years (i.e., post reforms) than in the pre-2003 state-of-affairs (Figure 3), despite a much stronger economic growth in Delhi post-2003.

Our calculations indicate that power-sector reforms similar to Delhi, if replicated across India could lower India's CO_2 emissions between 200 and 250 Mt CO_2/yr by 2017. This is equivalent to nearly 50% of India's total power-sector emissions in 2007 (520 Mt of CO_2)[6] and about 6% of Europe's total emissions in 2006.[7] Clearly, power-sector reforms will have a significant developmental impact in India by improving the access and reliability of the electricity system. From a climate-change perspective, an Indian electricity system with system losses at par with the developed world allows for an accurate accounting of baseline emissions from India's power sector. Outsiders could help by co-funding efficiency improvement programs on a large scale across India. India could also be engaged early on in international efforts on advanced local-grid management systems that could enable further technical efficiency gains in India, under its "electricity for all by 2012" program.

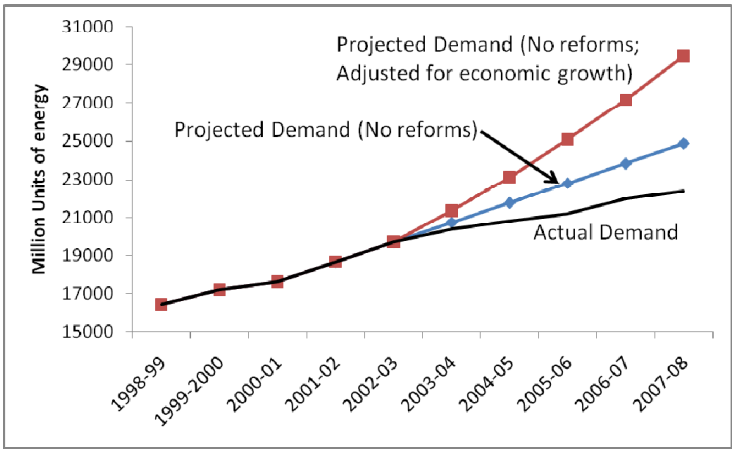

Figure 3: Impact of power-sector reforms on electricity demand in Delhi.

Efficiency of Coal-based Power Generation: The Indian Coal-Efficiency Program

India's coal-based power generation fleet is also a very conducive candidate for policies that align India's national interest with the global interest of reducing the growth in CO_2 pollution. As in the past, cheap and abundant coal remains India's fuel of choice for expanding its energy supply to fuel continued economic growth. But commercial inefficiencies (price distortions) and infrastructure bottlenecks (poor technology, freight problems, environmental clearance) in coal production have accentuated the cracks in India's coal supply chain.[8] Consequently, India's coal imports have risen significantly in the last few years, and India will likely import large quantities of coal by 2030 (Figure 4).[9] India recognizes its precarious coal situation, and there is a strong interest in India for using coal more efficiently. Search for those improvements must start in India's coal-based power generation, which accounts for over two-thirds of India's coal consumption. India has initiated programs to induct more efficient, supercritical coal units, but technology has been a major roadblock. While the best coal plants in the world now approach 50% efficiency, India's first supercritical coal unit with an efficiency of about 40% will start operations only later this year. Although supercritical coal plants have been in use in the developed world since the 1960s, India is just starting its coal-efficiency efforts, and is years away from developing the technology cost-effectively at home. In the context of the framework presented above, India could propose an India coal-efficiency program to deploy coal-fired power plants with advanced supercritical units. The specific goal of the program could be to lift India's average coal-combustion efficiency from 30% to perhaps 40% over two decades. Developed countries will be a critical part of such a program both to support India with the necessary technology and with financial help where necessary. The specifics of the technology and financial support package can be part of a bi- or multi-national international deal. The benefits of such a program for coal demand and installed power-generation capacity—issues close to India's core interests—are staggering: compared with the business-as-usual scenario, in the proposed program coal demand will be lower by about 250 Mt/yr and the required installed capacity will be lower by about 90 GW by 2030. (For comparison, India currently consumes about 500 Mt of coal per year, 10% of which is imported; and India's total installed power-generation capacity is about 170 GW.) Looking to 2030, such a program could reduce India's emissions by about 400 Mt CO_2/yr below the business-as-usual emissions. Further, the program could also emphasize the early deployment of ultra-supercritical plants—the

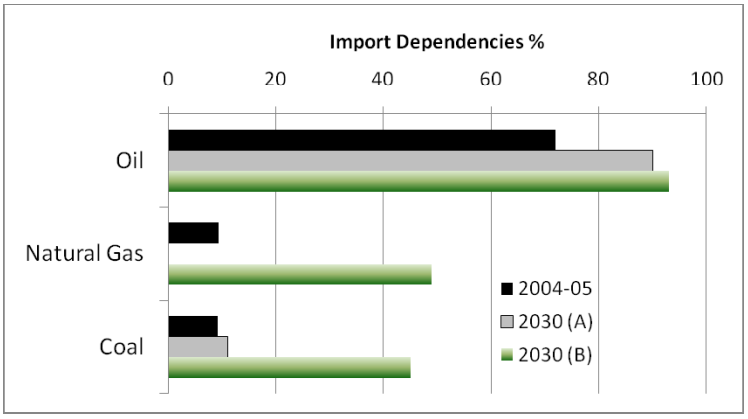

Figure 4: Import Dependencies. Scenario A: Minimum requirement, maximum domestic production. Scenario B: Maximum requirement, minimum domestic production. Source: Integrated Energy Policy, Government of India, April 2006.

most efficient commercially available coal plants—to create learning and expertise with this technology, which will build the platform for further emissions reductions in future. Achieving these higher efficiencies, especially for new plants, then, offer a tremendous win-win opportunity for India's developmental goals and for helping the creation of a transparent global climate-change regime.

Beyond Boxes IIa and IIb: Building Capability and Credibility

When planning international engagement strategies the key questions always hinge on credibility and enforcement—problems that are much more readily solved when the contributions of each country are broadly seen in that country's self interest. India's decision about what is in its interest depends on and varies with India's technological and administrative capabilities. India and outsiders can, together, shift that equation so that, in time, options that are "irrelevant now" (Figure 2) are transformed into viable options (Box IIa and IIb, Figure 2). That matters because it creates a greater potential for leverage on the climate problem and because it makes more of that leverage directly in India's interest. A couple of possibilities are outlined below.

Advanced Technologies and R&D

Cutting-edge technologies like carbon capture and storage, fuel cells, solar photovoltaic (PV), which are also very expensive, will not make a significant difference in developing countries from a climate-change viewpoint in the next two to three decades. India must facilitate demonstration projects at home and participate in international research efforts. But that should be part of a long-term innovation strategy (supported with domestic institutional continuity), and not a medium-term strategy as a viable response by India. New technologies will lead the warfront against climate change. EU, Japan, and U.S. recognize this well, and have been most aggressive in incentivizing inventions in green technologies since 1991. Historically too, just a handful of countries have led most of world's R&D efforts: only ten countries spend more than 90% of global R&D expenditure (Figure 5).[10] Success in technological inventions requires more than mere spending. It requires a robust national system of innovation with a long-term vision that closely integrates and coordinates basic R&D expenditure (mostly by the government) with commercial R&D through favorable policies to pull these technologies in the marketplace. In India, except matters related to national-defense (aerospace, military, nuclear energy), such vision and coordination has been lacking and the system of innovation has not kept pace with global advancements in science and technology. Indian policymakers recognize this lacuna, and there is increasing emphasis to resurrect technological innovation in India. But even if India fires all R&D cylinders and gets its act together in the next few years, the benefits will not be felt for years to come. Yet, a successful R&D program will be enabling for India to spearhead its own technology-based mitigation response in future.

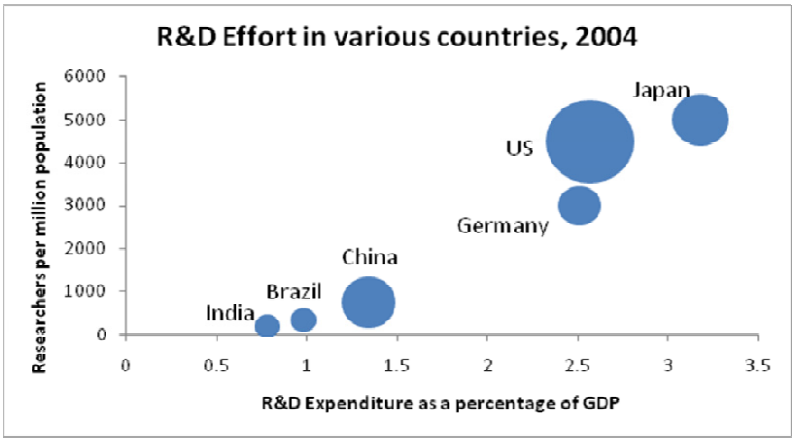

Figure 5: 2004 R&D expenditure of India and some other major countries. Source: EIA, World Bank.

Creating a National Information Administration for Energy

Besides research in energy technologies, economic modeling and forecasting are also important in the planning and negotiation process. So far energy-related data in India are quite dispersed, incoherent,

and often contradictory. This not only hinders serious research on energy economics in India, but also hurts transparency (and hence credibility) of India's planning process in the climate-change arena. Accordingly, we urge the creation of a National Information Administration for Energy (NIAE) that would serve as the central repository of all energy-related data in India.

Conclusion

We have argued that in the Indian context the costs of engagement at the margins are not as high as many think and that the apparent dichotomy between economic growth versus de-carbonization of energy sources is not nearly as serious. Of a number of seemingly interesting options for significant emissions reductions, only those offer real leverage in the climate-change arena that align with India's core interests (economic development and energy security) while also aligning with what the Indian government can implement given its administrative, political, and technological resources. Successful design of such policies will help boost India's credibility and make still deeper cooperation possible in the future. This, we have suggested, is the framework through which all available options should be evaluated.

An important issue not discussed in this paper is the institutional aspect of how these self-interested "offers" (boxes IIa and IIb) could be crafted into international commitments/deals. In our view, key developing countries could make offers of what they would do on their own (IIb) and what they would like to have help for (IIa) and then negotiations would craft deals of those two elements plus outside support. As IIa would be contingent on that support, the program would be largely self-enforcing. A good model is WTO.[11]

Footnotes

[1] Bali Action Plan, Decision -/CP.13, UNFCCC, 2007. Particularly see item 1b, p.1: "Enhanced national/international action on mitigation of climate change", http://unfccc.int/files/meetings/cop_13/application/pdf/cp_bali_action.pdf

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[7] World Energy Outlook 2008, IEA.

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FIRST ANNOUNCEMENT AND CALL FOR PAPERS

Dramatic events of last few years: very fast energy demand growth in developing countries, artificially stimulated economics in developed countries and related with that banking crisis, the largest energy price shock in modern history and following global recession, growing evidence of global warming and looming difficulties in production of primary energy resources presents a unique environment for activities and businesses of energy economists and policy makers. All of that creates a vast medium of thoughts for researchers active in energy economics and great challenges for politicians responsible for energy policies.

The 11th IAEE European Conference "Energy Economy, Policies and Supply Security: Surviving the Global Economic Crisis" will provide excellent opportunity to present and discuss the results of newest studies preformed in such exceptional circumstances. The conference will bring together wide spectrum of scientists, policy makers, professionals from all energy sectors, governmental and public institutions. This conference for the first time will take place in Vilnius - the capital of Lithuania, at the year when Lithuania will celebrate 20th anniversary of regained independence.

That opens good opportunity for participants of the conference to learn more about the specifics and problems of energy sector's development in the Baltic States and the wider region around them. The problems of the integration of that region to the future PanEuropean energy market should be one of most important topics of Vilnius conference.

We are looking forward seeing you in Vilnius.

Prof. Jurgis Vilemas
General Conference Chair

Conference topics

- ☐ Energy supply security (political, economical and technical)
- ☐ Sustainability of energy systems, mitigation of global warming
- ☐ Role of renewable energy sources and biofules
- ☐ Energy demand forecasting
- ☐ Energy sector analysis and modeling
- ☐ Energy policy
- ☐ Geopolitics of energy supply (gas, oil, nuclear and etc.). Price of security
- ☐ Road map for energy efficiency
- ☐ Market integration and liberalization
- ☐ Energy sector risk analysis
- ☐ Specific energy sector problems of CEE countries
- ☐ Nuclear energy: hopes and realities
- ☐ Environment

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Please submit abstracts of maximum two pages in length, comprising: overview, methods, results, conclusions. Please attach a short CV. The lead author submitting the abstract must provide complete contact details: mailing address, phone, fax, e-mail etc. Accepted abstracts will be published in the printed abstract volume. At least one author for each accepted paper must pay a registration fee and attend the conference.

Authors will be notified by 9 May 2010 of their paper status. Authors, whose abstracts are accepted, will have to submit their full-length papers (up to 10-12 pages limit suggested) by 9 July 2010 for publication in CDROM conference proceedings. While multiple submissions by individual or groups of authors are welcome, the abstract selection process will seek to ensure as broad participation as possible: each speaker delivers only one presentation in the conference. If multiple submissions are accepted, then a different co-author will be required to pay the speaker registration fee and present the paper.

Abstracts must be submitted electronically as a text document (doc; NO pdf) via the following link:

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Conference Venue

Vilnius is the capital of Lithuania since 1323. About 554 000 people of various nationalities and different religions are living there. Despite wars, occupations and destruction, the architectural ensemble of Vilnius remains unique. It is the largest Baroque city in North-East Europe. Nearly all styles of European architecture from Gothic to Classicism are present in Vilnius. Contemporary Vilnius is a modern, forward looking and dynamic city, which attracts people and charms them.

For long ages the picturesque Old Town and National Museum of Lithuania could tell a lot about honorable past of this city and the whole country, which in 2009 celebrates solid 1000 years anniversary of being for the first time mentioned in historical annals. Because of its unique and openness the Old Tow of Vilnius is enrolled into the list of UNESCO World's Cultural Heritage.

The conference venue is Reval Hotel Lietuva, Konstitucijos av. 20, located at the administrative center of the city within walking distance to Old Town, major museums, other cultural sights, restaurants and many hotels.

Registration fees

Participants	Early registration, EUR	Late registration, EUR
Speakers/Chairpersons	450	475
IAEE members	500	550
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Students	250	275
Accompanying persons	225	250

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Organizing by:

India, China, and the Rhetoric of "Energy Security"

By Anas F Alhajji*

Energy security "fever" has reached China, India, and Japan. Unfortunately, it seems that those "eastern" countries do not know the meaning of this imported "western" concept. The importation of this one-size-fits-all concept has led to contradictions among policies on one hand and between policies and their objectives on the other. These contradictions have in turn led to policy failures, rendered the concept of energy security hollow, and jeopardized world energy security in the process.

Energy demand in Asia, especially in China and India, has increased substantially in the last decade. Although India and China are oil producers, their domestic production has not been able to keep up with the growing demand. The result is a growing gap that has to be covered by imports of oil, natural gas, and LNG. Since oil has dominated energy imports in recent years, oil dependence dominates the "energy security" debate in those countries.

To enhance energy security, Asian countries have concentrated mainly on "filling the energy gap" by securing upstream oil contracts around the world, encouraging domestic exploration for oil and gas, exploring the possibility of transporting natural gas via pipelines from Iran, the Caspian, Russia, and Myanmar, and securing long-term LNG contracts with Qatar, Iran, and Algeria. At the same time, government officials in several Asian countries have started talking about the "energy security" of their nations. Some Indian officials' statements go so far as to call for elimination of energy dependence.

Policy Contradictions

If the officials of those Asian countries are truly worried about "energy dependency" and "energy security", then they have to answer the following question:

- Why do they make such dependency legal and binding by signing exploration and production contracts with some oil producing countries?
- Why do they sign contracts with the least secure countries in the world?
- How does investment in the upstream sector of some unstable oil producing countries that are as far away as Venezuela enhance the energy security of these Asian countries?
- How does the security of oil supplies differ from the security of the investments of Chinese, Indian, and Japanese oil companies in the oil producing countries, some of which are known for their political instability?
- Why was the visit of the Saudi monarch to China and India termed historic by the same officials who are worried about "energy dependency"?

Ignorance, Political Posturing Or Both?

The contradictions between calls for "energy independence" of some Chinese, Indian, and Japanese government officials and the actions of their government-owned oil companies indicate that most politicians do not know what energy security is, which smacks of political posturing. Even if they are aware of its meaning, these countries lack the measures needed to assess and measure energy security. In most cases, they lack the timely data required to build such measures.

If it was not "ignorance" or "political posturing," can officials explain why they are worried about "dependence" on oil supplies from the Middle East? Can Indian officials, in particular, explain why dependence on their historic and geographic partners in the Gulf is "dangerous"? Can they explain why, for example, the impact of 30% dependence on oil imports is different from 60%? Those in China and India who are worried about the increasing dependence on oil imports must answer the following questions:

- How can they explain the economic miracles of Japan and Germany despite their 100% dependence on foreign oil?
- How can they explain the impressive high rates of economic growth in their countries in recent years despite record-high oil prices?
- How can they explain this impressive economic performance despite record dependence on oil imports?
- And one more question: should the Saudis lead the way in eliminating "dependence" on Chinese, Indian, and Japanese products?

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Energy Security and India-China Cooperation

By Bhupendra Kumar Singh*

Energy security is a holistic concept which varies from country to country according to need. For the exporting country it implies continuous access of market for the selling of energy sources, whereas, for the importing country, it essentially implies "ensuring uninterrupted supplies of energy to support the economic and commercial activities necessary for the sustained growth of the economy" (Willrich, 1975). The critical relevance of this concept for India and China emanates from a growing imbalance between the demand for energy and its supply from indigenous sources, implying, therefore, growing import dependence for each nation.

Energy Profiles of India and China

Energy has an impact on the economy and in turn is affected by it. Energy consumption is both a necessary condition for growth and a consequence of it (World Energy Council, 1993). The growth of the Indian economy (8-8.5%) and China (10-11%) has led to an increase in an energy dependent lifestyle resulting in a high demand for energy sources. In 2007, China produced only 186.7 million tonnes of crude oil while its consumption was 368.0 million tonnes (Table 1) making it the world's second largest oil importer after the United States of America (Tanaka,2008).

As far as India is concerned it produced 37.3 million tonnes of crude oil in 2007 but consumption was 128.5 million tonnes. India is already importing about 75 percent of its crude oil needs. Even if its domestic production increases to 50 million tonnes in two decades from the existing 37.3 million tonnes, its import dependence will rise to 87 percent due to its high economic growth rate. On the contrary, China is consuming about three hundred percent more oil than India and it is predicted that its consumption will double in the next 25 years. While China needs to import 60 percent of its needs in 2020, India will require importing 87 percent of its total needs (World Energy Outlook, 2007). Hence, the level of dependence of both India and China is going to increase and competition for scare oil assets will continue.

Country	Proved Reserves	Production	Consumption
India	5.5 thousand million barrels	37.3 million tonnes/day	128.5 million tonnes/day
China	15.5 thousand million barrels	186.7 million tonnes/day	368.0 million tonnes/day

Source: BP Statistical Review of World Energy 2008

Table 1
Crude oil Profile of India and China in 2007-08

While China seems comfortable with respect to natural gas, India is a net importer. China produced about 2.4 percent of the total world production of natural gas and consumed about 2.3 percent of total consumption. India's share of the world's natural gas production is only 1.0 percent at the same time it accounts for about 1.4 percent of total natural gas consumption. But due to increasing use of the environmentally friendly fuel it is expected that the demand for natural gas will rise in both the countries making China, too, a net importer.

Country	Proved Reserves	Production	Consumption
India	1.06 Trillion cubic metres	27.2 million tonnes oil equivalent	36.2 million tonnes oil equivalent
China	1.88 Trillion cubic metres	62.4 million tonnes oil equivalent	60.6 million tonnes oil equivalent

Source: BP Statistical Review of World Energy 2008

Table 2
Natural Gas Profile of India and China in 2007-08

Though China has ample coal reserves, its consumption is more than production. While China produces about 41.1 percent of the total world coal production, it consumes about 41.3 percent of total world output. More than 90 percent of Chinese coal resources are located in inland provinces, but the biggest increase in demand is expected to occur in the coastal regions. This adds to the pressure on internal coal transport and makes imports into coastal provinces more competitive. China became a net coal importer in the first half of 2007. As far as India is concerned, it produces only 5.8 percent of total world output and consumes about 6.3 percent of total world demand. Thus both India and China are net coal importers.

Country	Proved Reserves	Production	Consumption
India	56498 million tonnes	181.0 million tonnes oil equivalent	208.0 million tonnes oil equivalent
China	114500 million tonnes	1289.6 million tonnes oil equivalent	1311.4 million tonnes oil equivalent

Table 3
Coal Profile of India and China in 2007-08

* Bhupendra Kumar Singh is a consultant on energy security to the Ministry of External Affairs, India.

Most of mainland China's electricity is produced from fossil fuels (about 80%, mainly coal) and hydro power (about 18%). Nuclear power has an important role, especially in the coastal areas remote from the coalfields and where the economy is developing rapidly. In 2007 it provided 62.86 billion kWh - 2.3% of total, and there is now 8.6 GWe (net) installed (World Nuclear Association, 2008). India's electricity generation consists of about 58 percent from coal, 26 percent from hydro power and around 2 percent from nuclear (India Year Book, 2007). In both countries the use of renewables is underdeveloped. Hence, the dependence of both India and China is going to increase and competition for scare oil assets will continue. But there are certain factors due to which India-China cooperation for energy security is warranted.

Factors for India-China Cooperation

High economic growth rate : Both India and China are not only the most populous countries but also they experience high economic growth rates, as discussed earlier, resulting in an increase in energy consuming life styles and hence a persistent rise in energy demand.

Surging imports of crude oil: Since India's indigenous oil production seems unlikely to change significantly, its dependence on foreign oil will be more than China's. India's level of urgency is more on supply side whereas that of China is on consumption side, as its consumption of oil is nearly 300% more than India's and is projected to remain the same in the next 25 years (Shen Qinu and Lei Wu, 2006). While China's indigenous production level is expected to grow marginally, during the same period its consumption will more than double. Thus both countries have to depend on crude oil imports.

Concern for energy security : One of the strategies of energy security is to acquire overseas energy assets. India-China cooperation will increase their bargaining power for oil & gas resources, the prices of which had earlier sky rocketed with the China versus India scramble. It will make investments in upstream projects in volatile economies less risky. Previously, rivalry between Indian and Chinese companies was to the disadvantage of both regardless of who eventually won the bid. It always benefited the seller as happened in Angola. Here, India had bid US $ 600 million for a 50 percent stake in Shell's Angola Block 18 field and had promised to include US $ 200 million to support Angola's ongoing railway construction project. This was outbid by China with a US $ 2 billion offer.

Area of Energy Security Cooperation

Although both India and China are competitors, they recognise the high cost of uneconomic competition. This is the fundamental reason behind the India-China energy cooperation. There are several areas in which both the countries can cooperate.

1. Joint bidding: Both the countries have little domestic energy investment in the other's energy sectors; their interaction is mainly overseas. They both have multiple state oil companies and both consider overseas investment to be a vital aspect of energy security. Increasingly they are targeting the same assets in the same host countries. Many of the areas that India and China have targeted for upstream acquisition are high risk and thus by joint bidding risk sharing is attractive (Kang Wu, Jeffrey G. Brown and Vijay Mukherji, 2008). Joint efforts by the two countries in pooling their investments and technology would yield better resource outputs. As a result India and China were able to acquire energy assets in Syria, Sudan, Colombia, Iran and Peru (Table 4). A memorandum of understanding for energy cooperation was signed by the then Petroleum Minister of India, Mani Shankar Aiyar, and China's National Development and Reforms Commission Chairman, Ma Kai, in January 2006 (Vardharajan, Sidharth,2006).

2. Clean and renewable energy: The two sides are committed to making joint efforts to divesify the global energy mix and enhance the share of clean and renewable energy, so as to meet the energy requirements of all countries.

3.International Thermonuclear Experimental Reactor: The two sides welcome the opportunity for their outstanding scientists to work together in the International Thermonuclear Experimental Reactor (ITER) project, which

Project	Country	China's Participation	India's Participation
Yadvaran Oil Field	Iran	Sinopec 51%	ONGC(OVL) 29%
Omimex De Columbia Limited Acquisition of company having oil assets)	Columbia	Sinopec 50%	ONGC(OVL) 50%
Greater Nile Oil Project	Sudan	CNPC 40%	ONGC(OVL) 25%
Buying of Petro Canada's 37% stake in Syrian oil field	Syria	Joint holding of 37% with ONGC	Joint holding of 37% with Sinopec
Exploration right of gas Block 155 of Peru	Peru	Joint bidding of CNPC with DMCC9RIL) and Pluspetrol (Argentina)	Joint bidding of DMCC(RIL) with CNPC and Pluspetrol (Argentina)

Table 4
India-China Cooperation for Energy Security

is of great potential significance in meeting the global energy challenge in an environmentally sustainable manner. As two countries with advanced scientific capabilities, the two sides pledged to promote bilateral cooperation in civil nuclear energy, consistent with their respective international commitments. This will contribute to energy security and to dealing with risks associated with climate change.

4. Down stream cooperation: Both countries have the potential for substantial over investment and massive refining capacity overhang which could possibly be moderated through the coordination of key players in India and China. If Chinese and Indian NOCs and their respective governments could work together to rationalise downstream investment, the potential savings could be substantial.
5. Transmission and city distribution of gas: GAIL has signed an agreement with China Gas Holdings Limited for a 10 percent equity stake in the Chinese company. The two companies plan to cooperate in the areas of operation and management of city gas pipeline networks, as well as the sale and distribution of natural gas (Jog, 2008).
6. Work for Global Energy Security Community: Considering how critical oil is to the functioning of global economy, the absence of information about the oil market is striking. The two sides are convinced that it is in the common interest of the international community to establish an international energy order that is fair, equitable, secure and stable and to the benefit of the entire international community. Both producers and consumers could benefit if China and India worked more closely with the global energy communities (Kang Wu, Jeffrey G. Brown and Vijay Mukherji, 2008).
7. Pipeline networking: India and China together can look at the possibilities to building a network of pipelines to tap the Russian, Central Asian and the West Asian energy sources. This could also help the other Asia-Pacific countries for energy supply.

Conclusion

Both India and China are net importers of energy sources. According to Daniel Yergin "Global economies have become more interdependent, even though the underlying objective is to become self reliant" (Luttwak. Edward N, 2001). Real energy security requires setting aside the pipe dream of energy independence and embracing interdependence, which is the mantra which both regimes are understood to have inculcated in their revisionist approach to each other. Countries have to work for mutual benefit. China is pursuing a highly leveraged policy of energy security. Bilateral cooperation will increase the bargaining power of both countries in acquiring overseas energy assets. Also, developing domestic sources of gas and oil is a priority for both the countries. Therefore, equal emphasis should be laid on collaborative efforts in the field of exploration, exploitation and enhanced oil recovery. Both India and China must be ready to extend cooperation in upstream exploration and production as well as downstream activities such as refining and petrochemicals, marketing of petro products, transmission and city distribution of gas, and laying down of national and transnational energy pipelines.

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China's Global Oil Diplomacy: Benign or Hostile?

By Mamdouh G. Salameh*

Introduction

Deng Xiaoping was the inspirational architect of contemporary China, and is thus among the pole figures of the twentieth century.

Deng's advice after Tiananmen was that China should "observe developments soberly, maintain our position, meet challenges calmly, hide our capabilities and bide our time, remain free of ambition, never claim leadership. China should not attempt to be a hegemon, it should never practice power politics and it should never pose a threat to its neighbours or to world peace". These are mantras that Chinese officials continue to repeat. China's foreign policy is designed first and foremost to serve economic development, following Deng's injunction. Moreover, its rise is to be peaceful. **1** But China's peaceful rise could be marred by its huge thirst for oil and energy and having to compete with other major consumers around the world for the fast-depleting resources.

China's economy at $4.22 trillion in 2008 is the third largest in the world after the United States and Japan. **2** If current trends continue, it is set to become the second largest economy within a decade. **3** However, based on a purchasing power parity (PPP) used by the World Bank and the International Monetary Fund (IMF) as a measuring stick, China is now unambiguously the world's second-largest economy – worth $7.3 trillion compared with the U.S.'s $14.5 trillion and Japan's $5.18 trillion. **4**

In 2008, China's current account registered a $400 bn surplus, 9% of GDP. By the end of 2008 it had more than $2 trillion of foreign-exchange reserves. China is the world's second largest user of oil after the United States and also the third-largest importer of oil after the United States and Japan. Before 2010 it will be the world's largest exporter of goods. It is comfortably the world's second-largest military power.

However, China's robust economic growth and its aspiration to a superpower status would falter without oil, particularly from the Middle East. China's global oil diplomacy is, therefore, geared towards ensuring that this never happens.

China's Oil Fundamentals

China's spectacular economic growth has significantly altered its position in the global oil market. In 2008, China accounted for 9% of global oil consumption compared to 5% in 1996, whilst its share of global production only amounted to 4.6%. **5**

Against a background of dwindling proven oil reserves, China's domestic consumption has been rising at an annual rate of 9% between 1998 and 2008, while production has risen by 1.8% annually during the same period (see Table 1).

	1998	2006	2007	2008	2010	2020	2030	1998-2030
Production	3.21	3.68	3.74	3.80	3.14	2.88	2.44	- 24%
Consumption	4.23	7.45	7.74	8.00	9.49	13.18	16.60	+ 292%
Net imports	1.02	3.77	4.00	4.20	6.35	10.30	14.16	+1266%
Imports as % of demand	24	51	52	53	67	78	85	

Sources: BP Statistical Review of World Energy, June 2009 / International Energy Agency (IEA), World Energy Outlook, 2008 / Author's projections.

Table 1
China's Oil Production, Consumption & Net Imports, % change, (mbd) 1998-2030

The rise in consumption and in oil imports is the result of several factors, including rapid GDP growth of about 9%-10% a year over the past two decades, urbanization, improving standard of living and a sharp increase in the number of vehicles on the country's roads projected to rise from 20 million in 2004 to 60 million in 2010 and 130 million in 2020. **6** Another factor is the building of strategic oil reserves with the projected stockpiling of 35 days' imports or 153 million barrels (mb) by 2008, 50 days' imports or 445 mb by 2015 and 90 days' imports or 1017 mb by 2020. **7**

Chinese Energy Security: a Serious Concern

The growing dependence on oil imports has created an increasing sense of 'energy insecurity' among Chinese leaders. There is even concern that eventual supply shortages or sharp rises in crude oil prices could endanger economic expansion, job creation and social cohesion. Chinese leaders tend to believe that

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dependence on imported oil leads to great 'strategic vulnerability'. Moreover, the U.S. invasion of Iraq in 2003 has endangered Chinese investments in the oil sector in that country. The war on Iraq and growing U.S. hegemony in the Middle East, have made it even more urgent for China to reduce its dependence on the Arab Gulf. 8

Twenty million barrels of Gulf oil pass every day through the Strait of Hormuz between the Gulf of Oman and the Arabian Gulf).

The strait is twenty-one mile wide at its narrowest point, and the Iranian-occupied island of Abu Musa is near its entrance – manned by Iranian Revolutionary Guards reportedly equipped with Silkworm anti-ship missiles. 9 By 2020 Iran, or any committed terrorist group, would be in an even stronger position. The threat is live.

Chinese military leaders argue that China's energy problem needs to be taken 'seriously and dealt with strategically'. **10** That means less reliance on the Middle East, less transportation of oil via sea lanes policed by the U.S. navy, more capability for the Chinese navy to protect Chinese tankers and more oil brought overland by pipeline from central Asia. The American build-up of its naval base at Changi in Singapore, allowing it to patrol the Strait of Malacca between Malaysia and Indonesia, through which 80% of China's imported oil moves, is regarded with particular suspicion. The channel is 625 miles long, and less than two miles wide at its narrowest point. With India modrnizing its military facilities on the Andaman and Nicobar Islands at the northern end of the strait, China feels sandwiched in and strategically vulnerable. The president of China, Hu Jintao, has referred a number of times to what he describes as the 'Malacca dilemma'. 'Certain powers, 'he has declared, 'have all along encroached on and tried to control the navigation through the strait'. **11** There is no mistaking whom he means.

China's Oil Deplomacy

For decades the doctrine of peaceful rise has meant that China has tried to secure energy and raw materials without confronting the United States and the West. China's long-standing willingness to deal with states that the West regards pariahs is in part a practical and ideological refusal to make judgments about other countries' domestic policy. It is also in part a recognition that dealing with Sudan, Angola, Iran or Uzbekistan allows China to avoid direct confrontation with Western interests. However, the larger China has become, the sheer scale of its energy needs has forced it more and more to intrude into areas that the United States regards as its own sphere of influence. The relationship with the United States and the West in general is, therefore, becoming steadily tenser.

Examples abound. Consider China's courtship of Canada. The Chinese oil company, Sinopec, has acquired a 40% stake in Synenco Energy's $4.5 bn Northerm Lights Oil Sands project, which is expected to yield 100,000 b/d by 2010, while CNOOC has acquired 16.9% stake in MEG Energy Corporation, which operates the Christina Lake project, near McMurray. Yet only six years earlier Dick Cheney, the former US vice-president, had declared that Canada's tar sands were part of the United States' energy security.

The Chinese oil companies have also followed an aggressive investment policy in the western hemisphere – especially Venezuela, where in 2005, they committed $450 million to the development of 15 oilfields and one gas project in exchange for 100,000 b/d of oil, 3 mn t/y of fuel oil and 1.8 mn t/y of orimulsion (an alternative boiler fuel). CNPC has also been given significant oil and gas development opportunities in the country including the fields at Zumano in eastern Venezuela, which hold an estimated 400 million barrels of oil. **12**

Saudi Arabia, holder of the world's largest proven oil reserves, supplies 16% of China's oil imports and is an object of assiduous Chinese courtship – again, a direct challenge to the United States' traditional sphere of influence. For the moment Saudi Arabia knows that its long-term security and its defence interests lie with the United States but it might one day make sense for the Saudis to align themselves with a rising power like China. This reality has already begun to mean that China has diplomatic opportunities to confront the United States which were not available even five years ago.

China is now Iran's number one oil and gas importer. China's state-owned corporation, Zhuhai Zhenrong, has an agreement to import 110 million tonnes of LNG over 25 years in a deal worth $20 bn, while Sinopec has agreed to a 25-year deal worth $100 bn for 250 million tonnes of LNG as well as a 50% stake in the massive Yadavaran oilfield from which China will get 150,000 b/d for 25 years. **13**

In Sudan, China is now Sudan's largest investor with total stakes estimated at $8 bn. The state-owned CNPC owns the largest share (40%) in Sudan's biggest oil venture, the Greater Nile Petroleum Operating Company. CNPC's equity oil from the project is around 150,000 b/d. With proven reserves of 1.61 billion barrels (bb), the project is among the largest China has undertaken overseas. CNPC has been a

partner in a consortium developing oil production in Sudan since the mid-1990s, and has helped build the 930-mile pipeline to the Red Sea as well as building an oil refinery close to Khartoum. It is at present constructing a $215-million export tanker terminal at Port Sudan as well as a pipeline from the oilfields to the port. **14**

Chinese activity in Africa is increasing at an exponential rate. In 1999 the value of China's trade with Africa was $2 bn; by 2005 this has grown to $40 bn and is now projected by the Chinese Ministry of Commerce to top the $100 bn mark by the end of the decade. **15**

However, it is largely the issues surrounding China's oil quest – in Africa and elsewhere – that are provoking particular concern in Western capitals. The value of some of the more recent oil contracts signed between China and Africa amounts to $13 bn and give a flavour of the extent to which Chinese oil diplomacy is picking up speed in Africa.

Any analysis of China's oil diplomacy in Africa needs to be balanced and avoid the hyperbole that has characterized some accounts. In the short term, China's trade with and investment in Africa are of assistance to the development of the continent, if for no other reason than that little investment is forthcoming from other sources. China's investment in Africa's crumbling infrastructure is needed and is welcomed by most. Partly as a result of China's interest in Africa – particularly in African oil – the continent's growth rate has increased touching 4.5% in 2008. However, when one looks at the long-term trajectory, concerns mount.

If this is the state of affairs in 2008, tension with the United States and its allies is only going to rise.

Supply Chain Vulnerability

The Chinese government views the country's dependence on imported oil as a chink in its armour that must be defended, in particular against an increasingly unilateralist U.S. that has not shied away from using its military muscle to defend its oil interests.

It has sought to do so through two initiatives. One is its 'Strings of Pearls' (SOP) policy which aims to defend the shipping lanes that are vital to its oil lifeline, namely the Straits of Hormuz and Malacca. The other initiative is to reduce its oil import dependence on the Middle East and secure most of its oil needs overland by pipeline from central Asia.

The first and westernmost pearl in the string is the deepwater port of Gwadar in Pakistan, which cost $248 mn to develop and was 80% financed by China. The port is of immense strategic location and importance being just 250 miles from the Strait of Hormuz. It also provides China with a trade route to the Central Asian republics. **16**

Besides Pakistan, China has established military security ties with Bangladesh, where it helped build a port facility at Chittagong. In Myanmar, China has helped build several ports, road and rail links from the Chinese province of Yunnan to the Bay of Bengal, and a listening post on Myanmar's Coco Islands to monitor sea traffic. Myanmar is well positioned for policing the chokepoint that concerns Beijing most: the Malacca Strait.

Another solution may lie in the Isthmus of Kra, a neck of land linking Thailand's north and south. Thai and Chinese authorities have discussed building a canal across the Isthmus, which would allow oil tankers from the Middle East to bypass the Malacca Strait. This "Asian Panama Canal" carries a price tag somewhere between $20 and $28 billion, and Washington is watching its development closely. **17**

Major Flashpoints with the U.S.

There are three primary flashpoints between the United States and China: oil, trade and currency. Looming over all of them is Taiwan and the possibility that one day China will test the commitment of the United States to defend Taiwan against a Chinese invasion.

A network of Chinese-financed pipelines that will take oil away from the United States towards its challenger is appearing or planned in Canada, Venezuela, Sudan and Iran. Four-fifths of China's oil is transported through the Strait of Malacca. At one end of the Strait is an American fleet at the Changi Naval Base in Singapore. At the other end, the United States' Indian Ocean fleet operates from Diego Garcia. From Beijing's perspective, the United States has its fingers on China's windpipe; President Hu Jintao makes frequent reference to the 'Malacca problem'. China wants more oil brought in by pipeline across Asia and by tanker across the Pacific. It wants a deep-sea fleet to protect its interests. Henry Kissinger has warned of a potential great-power conflict over oil: this is it.

In recent years Africa has emerged as the arena on which the U.S. and China intend to play out their rivalry over acquisition of energy resources. At present Africa supplies 15% of the U.S. oil import needs. Within the next decade Africa's share is projected to increase to one-quarter of U.S. total imports.

Oil from West Africa's Gulf of Guinea region provides an ideal source of supply for the U.S., given the high grade of the crude and the closer geographical proximity of the mainly offshore fields than Middle East oil.

However, the most pressing issue is over trade and currency. The anti-China sentiment that has surfaced in the past five years is obvious. Some of the twenty bills introduced in this period aimed at retaliation against China or its imports would have disastrous consequences if passed. One bill would impose a 27.5% tariff on Chinese imports if China does not immediately revalue its currency, the renminbi, significantly.

Seen from Beijing, the call to revalue the renminbi or transform the Chinese economic system is a de facto act of aggression that will destabilize the government. Seen from Washington, the refusal to become a good international economic citizen is a wilful neglect of duties as a responsible stakeholder in running the world system. It is an eyeball-to-eyeball confrontation, a great-power game to see who blinks first.

Recently, the Chinese government has begun a concerted campaign of economic threats against the United States, hinting that it may liquidate its vast holding of U.S. Treasury bonds if Washington imposes tariffs on Chinese imports to force a renminbi revaluation. Chinese officials have warned that Beijing may use its $2 trillion of foreign reserves as a political weapon to counter pressure from the US Congress. Described as China's "nuclear option" in the state media, such action could trigger a dollar crash and could further exacerbate a US economy already in deep recession. **18**

The scope for miscalculation by either the United States or China is, therefore, huge. But while the conditions exist for peace and cooperation, there are also many factors in the other direction. As China grows in strength, it grows in pride and nationalist feeling. Beijing's mandarin class is convinced that the United States wishes it ill. Flashpoints like human rights, Taiwan, energy or some unforeseen incident could spiral badly in an atmosphere of mistrust and with domestic constituencies – on both sides – eager to sound tough.

There is an accident waiting to happen unless we find an accommodation over values – the precondition for cooperative action. The Writing is on the Wall.

Conclusions

China's thirst for oil and its growing dependence on oil imports has transformed the global energy market and is already impacting on the price of oil and the global energy security and is also creating energy insecurity for China itself.

The recent growth in oil consumption, combined with forecasts of increased oil imports especially from the Middle East, have led to a deep concern among Chinese leaders regarding their country's energy security. They are responding in a number of ways. In particular they are determined to increase the security and reliability of oil imports by searching for new sources of supply and defending oil transport lanes, while boosting national production at any cost. China's global oil diplomacy could bring it into conflict with the United States unless both countries find a constructive accommodation that allows them to do business.

It is a truth universally acknowledged that a great power will never voluntarily surrender pride of place to a challenger. The United States is the pre-eminent great power. China is now its potential challenger. The great questions of our time are, first, whether China can translate that potential into reality without democracy, and without genuine capitalism. And, second, whether the United States will be wise enough to keep its markets and the wider world system open as this Chinese drama plays out, and by so doing accelerate the fundamental reform that must come to China. Our prosperity and even global peace depend on the answers.

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Energy is a key driver of economic growth, something the world is desperately looking for in the current crisis. At the same time, traditional energy supply is reaching its limits. Many energy sources have to be developed to meet the 21st century environmental, social and economic challenges.

How can unconventional hydrocarbons (oil sands, shale gas and others) and carbon sequestration help bridge the gap between conventional oil, gas, coal and nuclear power and the most promising renewable energy sources – biomass, hydro, wind, geothermal, and solar? Furthermore, how can market reforms promote more energy efficiency?

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Paper abstracts, giving a concise overview of the topic to be covered and the method of analysis, should be ***one to two pages***. Abstracts should include the following brief sections: (1) overview, (2) methods, (3) results, (4) conclusions, and (5) references.

Please visit http://www.usaee.org/usaee2010/ to download a sample abstract template. NOTE: All abstracts must conform to the format structure outlined in sample abstract template. At least one author of an accepted paper must pay the registration fees and attend the conference to present the paper. The corresponding author submitting the abstract must provide complete contact details – mailing address, phone, fax, e-mail, etc. Authors will be notified by July 9, 2010 of their paper status.

Authors whose abstracts are accepted will have until September 3, 2010, to submit their full 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.

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All international delegates to the 29th USAEE/IAEE North American Conference are urged to contact their respective consulate, embassy or travel agent regarding the necessity of obtaining a visa for entry into Canada. If you need a letter of invitation to attend the conference, contact USAEE with an email request to usaee@usaee.org.

The Conference strongly suggests that you allow plenty of time for processing these documents.

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Thank you for making IAEE the great organization that it is!

Stockpiling or Consuming: China's Current Oil Demand

By Ross McCracken*

Future oil demand growth remains highly uncertain, sensitive to the speed and extent of the economic recovery, as outlined in the International Energy Agency's Medium-Term Oil report, published in June. However, what is clear is that Chinese oil demand growth is a key factor. Not only is it expected to be the largest single source of demand growth, but its sensitivity to GDP growth is larger than for OECD countries. The IEA estimates that Chinese oil demand could reach 9.6 million b/d in 2014 under a high GDP growth scenario, or 8.5 million b/d under conditions of lower growth.

As a result, oil demand in China is being closely watched. However, two different stories are emerging that reflect the Chinese authorities release of statistics and the way in which the media reports them. According to data supplied by Customs and the National Bureau of Statistics, and then interpreted by the media, Chinese oil demand is racing ahead, rising by 4.21% on the year in July to a record 34.92 million metric tons.

This is 'implied' oil demand, the word 'implied' often falling from the media headline where economy of wordage and impact are all important. The figure actually represents refinery throughput plus net imported oil products. On the same basis, implied oil demand in the January-July period rose 0.7% to 221.47 million mt, compared with the same period in 2008, the first increase since the start of 2009.

However, if implied Chinese oil demand appears to be up, consumption appears to be down. According to China's official Xinhua news agency, surveys by the China Petroleum and Chemical Industry Association show that consumption of crude oil dropped 2.9% in first-half 2009 to 190 million mt or 7.7 million b/d.

The missing link is, of course, stocks. The government releases data on imports, exports, domestic crude production and refinery throughput, but does not release official data on the country's actual oil consumption figure and oil stockpiles. Using the implied demand data, it can be seen that crude stocks in China – domestic production plus net crude imports less refinery throughput – rose by 8.53 million mt in the year to July.

Like the government, the CPCIA does not provide overall stock levels, but it does comment on changes in their levels. According to the association, oil product inventories registered large increases in July. Chinese financial news website Caijing reported that the July oil products stocks of China's giant refiners Sinopec and PetroChina were up 30% on the year, while July oil products sales were down 6%. The CPCIA reported that through end-June, China's oil products inventory was 43.5% higher than a year ago.

Oil Product Stockpiles

So while Chinese refiners have been increasing their throughput, hitting all-time highs from May through to July, and reflecting rises in regulated oil product prices, it appears that the extra output is being stockpiled rather than consumed, while crude inventories are also growing.

The increase in refinery throughput in the second quarter reflects the resumption of operations at several key refineries following maintenance, as well as the start-up of a 240,000 b/d refinery at Huizhou and a 160,000 b/d refinery expansion project in Quanzhou. China's state oil companies are expected to add nearly 1 million b/d of new refinery capacity by end-2009, and they are still announcing new plans; on September 17 Sinopec said it would invest $3.5 billion to add a further 240,000 b/d of capacity to the Quanzhou refinery as part of a second phase expansion.

It is doubtful that, in the short term, a market exists for the additional output either domestically or internationally. Floating storage of oil products globally was reported by the IEA to have risen above 60 million barrels at end-June, while preliminary data for end-August indicated some stabilization at about 60-65 million barrels, down slightly from end-July. Floating storage for crude was put at 50-55 million barrels at end-August down from about 65 million barrels at end-July.

The problem of excess oil stocks is reflected in Chinese state company plans to expand their own storage capacity. At the beginning of September, the China National Petroleum Corporation announced that it would expand its oil storage capacity to over 45 million mt in coming years, 15 million mt of which would be for commercial use. Local reports said that 66 new facilities are planned to come into operation this year. CNPC itself opened ten new storage facilities in first-half 2009.

The rush to build new storage reflects both the long-term government aim of increasing China's strategic petroleum reserve, as well as the short-term necessity of finding a parking space for the oil products being produced. According to a draft of the multi-billion-dollar stimulus package for the oil, petrochemical

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and chemical sectors released earlier this year, China hopes to have the capacity to store an additional 3 million mt of oil products by end-2009, 6 million mt by 2010 and 10 million mt by 2011.

Far from indicating a recovery in the world economy and heralding the approach of a second oil supply crunch, lacklustre domestic Chinese consumption suggests a slower recovery, while increased stock levels and storage capacity can be seen as a medium-term stabilizing factor for the oil market. The relevant question might not be about demand growth, but about what happens when China stops stockpiling.

Although it is only one month's data, preliminary indications for August, released in September by the Chinese General Administration of Customs, appear to confirm this outlook. Chinese refinery throughput fell in August from the record high of July, the first month-on-month drop this year. Crude imports and oil product imports also fell. The former remains high, 18% up on the same period last year at 18.47 million metric tons (4.38 million b/d), but the latter was down 28.87% on July and 18.86% on the year at 2.71 million metric tons. At the same time, crude and oil product exports jumped 25% and 10.65% respectively on the month.

Transport Key

Chinese oil demand growth is centred on the transportation sector with gasoline and diesel demand on a rising trend and fuel oil usage declining. This trend is likely to continue as fuel oil use for power production is further reduced, and as conventional refinery capacity squeezes out China's 'teapots,' which typically use fuel oil as a feedstock to produce off-specification gasoline and diesel.

In line with rising gasoline demand, Chinese domestic car sales have increased markedly in recent months, another statistic used to reinforce the apparent recovery in Chinese oil demand. This reflects heavy government subsidization. Beijing has halved taxes on new cars and offered subsidies to the country's rural population to buy small vehicles. Even in 2008, shielded from crude's highs on international markets by regulated domestic prices, the number of cars on China's roads rose by a quarter over 2007.

How China's transportation system develops will heavily influence the country's future oil demand. The recovery in new cars sales this year follows a rise in monthly average sales from 360,794 in 2003 to 732,712 in 2007, while they still rose 6.7% in 2008, despite the economic slowdown. Yet per capita car ownership remains a fraction of that in developed countries and there is clearly pent up demand for travel, as shown by rail use statistics.

But how will China's per capita car ownership evolve? While the huge size of the population suggests an enormous market, it may also prove a self-limiting factor as population density is high and urban pollution is already an issue. In addition, the country's road infrastructure is different from that in Europe or the U.S..

Moreover, the relationship between per capita car ownership and oil demand growth is uncertain. Strong growth in car ownership in Europe since 1980 does not correlate with the region's oil demand growth. While again the comparison suffers from being a developed versus developing country one, Japanese oil demand has been falling since 1999, but per capita car ownership rose from 404 per thousand people in 1999 to 441 per thousand in 2004.

That China's oil demand will start to rise as growth recovers is certain, reflecting the country's developmental status, but, in the short-term, oil demand growth is arguably being over-stated by a reliance on data based on refinery throughput. In addition, while car ownership has a long way to rise to reach developed country levels, there are internal limitations specific to China that suggest the country will never achieve or perhaps even approach U.S. levels. Nor can demand management initiatives be ruled out by government, whether driven by environmental, security of supply or local pollution imperatives.

Member Get A Member Campaign Continues Success

Jonathan McClelland Wins Complimentary Registration to the Rio IAEE International Conference

IAEE's *Member Get a Member* campaign was a grand success in the fourth quarter with 25 new members added in that period.

Members had their membership expiration date advanced three months for each new member referred. Jonathan McClelland, with M. J. Beck Consulting in New York, referred the most new members – 3! He won a complimentary registration to the coming Rio International Meeting.

The Future of Energy Derivatives in China

By Philip R. Walsh*

In June 2009, the Global Times reported that the Shanghai Futures Exchange (SHFE) had announced that they were planning to introduce a crude oil futures trading contract with the support of the China Securities Regulatory Commission (CSRC). This energy derivative instrument would mark the second of its kind in China after the introduction in 2004 by the SHFE of a fuel oil future contract. Is this the beginning of the development of multi-product energy derivatives in China, or will regulatory controls and state-owned energy monopolies limit the success or even deter altogether the creation of futures markets in China? This article will explore the nature of energy derivatives and examine the potential for creating domestic derivatives trading for the main energy commodities in China.

Energy Derivatives

Energy derivatives are contracts related to a particular energy commodity (oil, natural gas, heating oil, coal, electricity, etc.). These financial instruments provide an opportunity to manage risk associated with the volatility in energy prices by allowing a party to secure the price of their energy in advance of the actual period of energy consumption. The variety of energy derivative instruments includes forward contracts, futures contracts, options, and swaps. The two principal futures exchanges dealing in energy products around the world are the New York Mercantile Exchange (crude oil, natural gas, heating oil, gasoline, and electricity) and London's International Petroleum Exchange (crude oil, heating oil, natural gas, and electricity).

Key to the success of energy derivatives is the deregulation of the energy marketplace. Through deregulation, an energy commodity is free from any form of price regulation and a competitive spot market can be developed where pricing is liquid and reflective of the true cost of the energy commodity at any point in time. Typically, these spot markets are related to physical delivery points or energy hubs where large numbers of buyers and sellers are available to maintain a liquid market and transparent pricing. In North America, the energy deregulation process has been successful in the creation of a number of energy trading hubs where prices can be indexed to the NYMEX futures market reference locations: West Texas Intermediate for crude oil, Henry Hub for natural gas, New York Harbor for heating oil and gasoline, PJM western hub for electricity, and Central Appalachian for coal.

Derivatives in China

In the spring of 2004 regulations on derivatives trading in China were established with the creation of the Provisional Administrative Rules Governing Derivative Activities of Financial Institutions by the China Banking Regulatory Commission ("CBRC"). These rules applied not only to banks, but also to non-banking financial institutions and foreign bank branches carrying out derivatives trading in China. Under the terms of these rules, any derivative business (financial or commodity) must be approved by the CBRC.

As fuel oil were the least regulated of all of the energy types in China, it was the most-likely choice for the creation of an energy derivative instrument, and in 2004 the SHFE began trading fuel oil futures contracts. Fuel oil futures had existed previously, but had been abolished in 1994 by regulators due to problems with speculators. Since its more recent inception, the SHFE has seen its fuel oil futures trading volumes increase to a point where, in 2008, the total value of contracts traded equaled $295.85-billion. From January through July 2009, the total lots (10 tonnes per lot) of fuel oil traded was 65,578,796 representing approximately 4.9 billion barrels of fuel oil — an increase of 390% over the same period in 2008. Putting that into perspective, the physical volume associated with the NYMEX heating oil futures contracts traded over that same period was approximately equal to 1 billion barrels. The fuel oil futures contract is the benchmark derivative for the Chinese government in determining the future success of additional energy derivatives.

In 2008, the CSRC maintained a policy of continuous improvement of a futures market, including energy futures, in terms of its infrastructure and oversight. A successful futures industry was seen to provide commodity pricing that allowed for price discovery based on a proper supply-and-demand paradigm thus encouraging optimal exploitation of resources and a more-efficient use of energy. However, the CSRC was still concerned about the need to provide a suitable derivative market framework that balanced the need for market development with the protection of domestic enterprises from market speculation and rogue trading. This balancing attempt has limited

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the progress of the creation of additional energy derivatives.

Complicating matters has been the recent global economic crisis and the initiation by the CBRC in the summer of 2009 of a more-restrictive policy toward domestic banks' derivatives operations. Citing losses due to derivatives trading activities, Chinese banks can no longer enter into complex derivatives transactions between domestic companies and overseas financial institutions.

It would appear that the government and regulators in China would prefer the development of a domestic energy derivatives market that would not only provide a mechanism for futures price discovery and energy risk management, but also be of sufficient size and scope to limit the desire of domestic enterprises to conduct energy derivative transactions outside of the institutional framework over which China's regulators have authority.

To do so the Chinese government must, as discussed previously, create a competitive energy marketplace with numerous energy hubs that provide liquid markets for energy traders, producers and consumers.

Currently, the energy marketplace in China for further energy commodity derivatives can be summarized as follows:

Crude Oil Derivatives

The choice of crude oil as the next energy futures contract to be traded on the SHFE is due in part to its strategic significance as well as its relative regulatory simplicity. A significant portion of China's energy demand is in the form of crude oil, with ever-increasing reliance on imports. Enterprises in China will be able to use the new crude oil futures contract to help mitigate the volatility of world oil prices and the creation of a domestic reference point for hedging purposes. This derivative instrument could be referenced to crude oil deliveries at Shanghai, given its prominence as one of China's largest crude oil receipt terminals. Domestic oil production pricing could then be indexed to the Shanghai reference price with basis differentials being determined by transportation costs from production areas to Shanghai.

While the upstream and downstream oil industry in China is still principally controlled by two state-controlled companies — the Chinese National Petroleum Corporation (CNPC) and the China Petroleum and Chemical Corporation ("Sinopec") — the government has allowed other Chinese companies, such as the China National Offshore Oil Corporation (CNOOC), CITIC Group and Sinochem, to become more active in the industry as competitors to the two major incumbent players. In addition, the recent move by the government to reform market pricing for petroleum products has allowed for greater symmetry between world oil prices and domestic prices and will further entice foreign investment.

Natural Gas Derivatives

Natural gas has been a less-strategic fuel than crude oil, but the government is seeking to increase the use of natural gas in order to displace the more environmentally damaging coal. Capital projects for increasing supply to meet the demand include: the expansion of the existing west-to-east natural gas transmission system that ties-in the more-prolific producing basins of western China with the populous east coast; construction of underground gas storage facilities near the west-to-east natural gas transmission system in the provinces of Jiangsu and Anhui; expanded transmission capabilities of the offshore South China Sea natural gas production onshore near Hong Kong; and the construction of liquefied natural gas ("LNG") terminals along the east coast for the receipt of imported natural gas (see figure 1). This expansion in natural gas infrastructure will result in an inter-connected natural gas network with import potential not only via LNG terminals, but also from the large natural gas reserves in countries north and west of China.

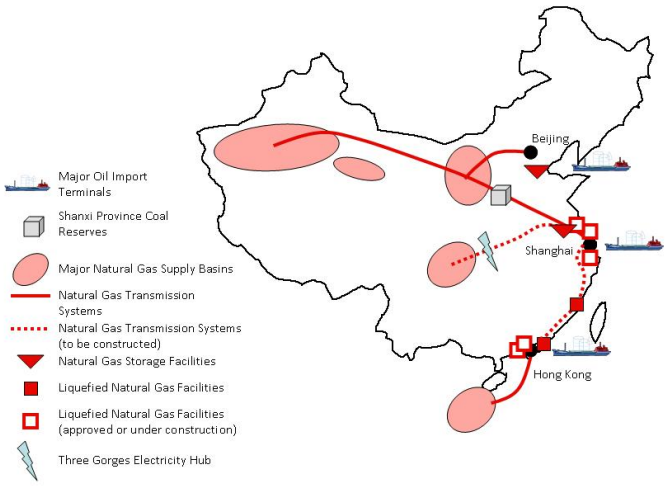
A key location for a natural gas hub for the purpose of trading would be in Jiangsu province, immediately west of the major market of Shanghai and where the west-east gas transmission system can be connected to new underground gas storage facilities. Another market hub that could develop in China is the Guangdong region (Hong Kong) with its proximity to offshore natural gas reserves and new and existing LNG facilities. The Tarim basin in the western part of China may present itself as a trading hub when gas transmission systems are built to allow for the import of natural gas from Russia, Kazakhstan, Uzbekistan, and Turkmenistan.

As with the oil industry, the natural gas industry is controlled by CNPC, Sinopec and CNOOC. However, the Chinese government is encouraging foreign participation in the natural gas market by seeking to amend their pricing policy for natural gas so that it may be priced to become more competitive with alternative fuel choices. Given the sensitivity associated with existing large-scale consumers of natural gas in China, this pricing reform is likely to take some time.

Coal Derivatives

China is the largest consumer and producer of coal in the world. The domestic coal industry (unlike other domestic hydrocarbon industries) is comprised of a large number of small- to medium-sized coal producers and is located in all regions of the country. Because of this lack of market concentration (the largest state-owned coal corporation controls 9 percent of the domestic market, with the largest three controlling less than 15 percent), there are a large number of market participants to establish a competitive market. Furthermore, the amount of regulation by the central government is less than that in other energy markets. This combination presents an opportunity to establish a coal derivative instrument. In fact, subject to approvals, the Shanxi Province — the largest coal-producing province in China (see figure 1) — announced in June 2009 the establishment of the country's first coal and coke futures exchange.

Figure 1 – Energy Hubs in China



Electricity Derivatives

The Chinese electricity industry has recently undergone reform to allow for the creation of distinct generation and transmission entities. There are now five regional transmission companies operating under the direction of the State Grid Corporation (SG) serving the north, east and west of China. The south of China is served by the China Southern Power Grid Corporation (CSG) which was formed out of a number of regional power corporations. A goal of SG is to create a hub at the Three Gorges Power Plant (see figure 1) where interconnection of the north and south grids will provide electrical transmission capability for all sources of power generation to any end-use market and thus establishing a national grid system. Approximately 500 power plants generate electricity across China, and, as part of the industry reform process, operation of these plants was assigned to various power-generation groups so as to open up more-competitive bidding for transmission access and electricity supply into the national grid.

Although the physical infrastructure of the electricity market in China appears to be further advanced in regards to the creation of regional electricity trading hubs, the potential for an electricity derivative instrument is the least likely at this stage because the focus of financial and securities regulators is currently on other energy commodities.

Conclusion

It is clear that China has a long way to go before a market structure — both from a physical and regulatory perspective — has been established that will encourage the development of energy market hubs and energy trading. This should not come as a surprise given the greater element of authority that the government has in the market place, nor given the fact that even in more business-friendly jurisdictions, such as North America and Europe, the full deregulation of energy markets has taken decades to occur, if it has occurred at all.

The key to the successful growth of energy derivatives in China will be the creation of competitive spot markets for each energy commodity where pricing is reflective of the true cost of supply and where energy hubs exist to maintain a liquid market and transparent pricing. To get there, the Chinese government will need to continue opening energy markets to competition (domestic or otherwise) and establish market regulations that provide a level playing field for all participants. If they are successful in doing so, then one can predict that the future of energy derivatives in China might look like this:

Shanghai will become the principal financial trading location for energy derivatives in China and perhaps Asia. Historically less-regulated energy products, such as crude oil, fuel oil and gasoline, will have derivative trading indexed to a Shanghai or Guangdong delivery point. Natural gas derivatives will be indexed to the Jiangsu Hub, coal derivatives to Shanxi Province and electricity derivatives to the Three Gorges Hub. When and if this will ever happen, given the size and scope of the required changes in regulatory policy, is subject to speculation — which, in a way, is somewhat ironic.

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Special IAEE Support Fund for Students from Developing Countries

IAEE is pleased to announce the continuation of a special program which offers support to students from developing countries to participate in three of the Association's conferences in 2010. The support will consist of a cash stipend of up to $1500.00 plus waiver of conference registration fees for a limited number of eligible students, who are citizens of developing countries (who can be registered as full-time students in programs of study anywhere in the world), to attend either the 33rd IAEE International Conference in Rio de Janeiro, Brazil, June 6-9, 2010, the 11th IAEE European Conference in Vilnius, Lithuania, or the 29th USAEE/IAEE North American Conference in Calgary, Alberta, Canada, October 14-16, 2010.

Application deadlines for these conferences are as follows: Rio de Janeiro Conference – application cut-off date, March 22, 2010; Vilnius Conference – application cut-off date, June 16, 2010; Calgary Conference – application cut-off date, July 29, 2010.

Please submit the following information electronically to iaee@iaee.org to have your request for support considered. Make the subject line of your email read "Application to IAEE Support Fund (mention the conference you wish to attend)."

- Full name, mailing address, phone/fax/email, country of origin and educational degree pursuing.
- A letter stating you are a full-time graduate/college student, a brief description of your coursework and energy interests, and the professional benefit you anticipate from attending the conference. The letter should also provide the name and contact information of your main faculty supervisor or your department chair, and should include a copy of your student identification card.
- A letter from your academic faculty, preferably your faculty supervisor, recommending you for this support and highlighting some of your academic research and achievements, and your academic progress.
- A cost estimate of your travel/lodging expenses to participate in one of the above conferences.

Please note that students may apply for this support at only one of the above conferences. Multiple requests will not be considered. Further note that you must be a student member of IAEE to be considered for this support. Membership information can be found by visiting https://www.iaee.org/en/membership/application.aspx

Applicants will be notified whether their application has been approved approximately 14 days past the application cut-off date above. After the applicant has received IAEE approval, it will be their responsibility to make their own travel (air/ground, etc.) and hotel accommodations, etc. to participate in the conference. Reimbursement up to $1500.00 will be made upon receipt of itemized expenses.

For further information regarding the IAEE support fund for students from developing countries to participate in our conferences in 2010, please do not hesitate to contact David Williams at 216-464-5365 or via e-mail at: iaee@iaee.org

Welcome New Members!

The following individuals joined IAEE from 10/1/09 to 12/31/09

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Nigeria

Kingsley Abdul
Global Utilities Mgt Co
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Mahdi AbuAli
Saudi Aramco
Saudi Arabia

Mehriban Afandiyeva
USA

Lawrence Agbor
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Nasser Al Kaud
Gulf Cooperation Council
Saudi Arabia

Khalid Al Khudair
Saudi Aramco
Saudi Arabia

Abdullatif Al Othman
Saudi Aramco
Saudi Arabia

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New Student Chapter in Switzerland

The Swiss Association for Energy Economics (SAEE) has a new student chapter, which was officially founded in February 2009 at the SAEE general assembly. The activities within the Swiss student chapter are coordinated by Antonis Papaemmanouil and Florian Kienzle, PhD students at the Power Systems Laboratory of ETH Zurich. When participating in IAEE conferences, they met representatives of other IAEE student chapters and took the initiative to establish a student chapter in Switzerland, too.

In September 2009 the first SAEE student chapter workshop was held in Zurich, where around 25 students from all over Switzerland participated. Ten master and PhD students presented their work covering diverse topics such as recent developments in electricity markets, new technologies for hydrogen production and market behavior of OPEC countries. A highlight of the event was the talk by Hillard Huntington from Stanford University about "Efficiency and the Shape of Future Energy Demand". The workshop was financially supported by the IAEE with a contribution of 500 $.

At the moment the SAEE student chapter is involved in the advertisement of the call for submissions of the SAEE student award 2010. This award is given every year to the author of the best master thesis at Swiss universities in the field of energy economics. This year's winner will have the opportunity to attend the 33rd IAEE International Conference in Rio de Janeiro.

Furthermore, contacts have been established with the German, Austrian and French student chapters. Besides continuing to hold a PhD day at the European IAEE conferences, it is planned to intensify the exchange among those chapters by organizing common workshops.

More information on the SAEE and its student chapter: http://www.saee.ethz.ch/

Calendar

February 15, 2010 - September 30, 2011, Excutive Master of Finance & Control for the Energy Industry at Houston / Damman / Groningen. Contact: Andrea Poelstra, Study Advisor / Account Manager, Energy Delta Institute, Netherlands. Phone: +31 50 524 8319 Email: poelstra@energydelta.nl URL: http://www.energydelta.org/nl/mainmenu/edi-programmes/executive-master-programmes/executive-master-of-finance-control-for-the-en

16-18 February 2010, Clarke Energy Institute - Introduction to RETScreen at St Michael, Barbados. Contact: Dr. Roland Clarke, CEO, Clarke Energy Institute. Phone: 246-251-0298 Email: clarkeenergy@aol.com URL: http://www.retscreen.net/ang/11_form2.php?idTraining=2746

3-25 February 2010, 11th Mediteranean Petroleum Conference and Exhibition at Tripoli, Libya. Contact: Dr. M.A.Muntasser, President, International Energy Foundation, P.O.Box 83617, -, Tripoli, -, -, Libyan Arab Jamahiriya. Phone: 218 21 3331832/3/4. Fax: 218 21 3331831 Email: training@ief.ly URL: www.ief.ly

16-17 March 2010, Turoge 2010 / Turkish International Oil & Gas Conference at Ankara Sheraton Hotel, Turkey. Contact: Vladislav Grabovsky, Senior Project Manager, ITE Group Plc., 105-109 Salusbury Road,, London, NW6 6RG, United Kingdom. Phone: +44 207 596 5008. Fax: +44 207 596 5106 Email: oilgas@ite-exhibitions.com URL: www.oilgas-events.com

29-30 March 2010, Water Resources and Renewable Energy Development in Asia at Sarawak, Malaysia. Contact: Mrs. Margaret Bourke, Conference Project Manager, Aqua-Media International Ltd., PO Box 285, Wallington, Surrey, SM6 6AN, United Kingdom. Phone: 44-20-8773-7244. Fax: 44-20-8773-7255 Email: mb@hydropower-dams.com URL: www.hydropower-dams.com

18-21 April 2010, 37th Annual International Energy and 31st International Area Conference at Boulder, CO. Contact: Dorothea H. El Mallakh, Director, IRCEED, 850 Willowbrook Road, Boulder, CO, 80302, USA. Phone: 303-442-4014. Fax: 303-442-5042 Email: iceed@colorado.edu URL: www.iceed.org

19-23 April 2010, Hydrogen + Fuel Cells at HANNOVER MESSE at Hannover fairgrounds, Hannover, Germany. Contact: Ms. Megan McCool, Project Manager, Tobias Renz FAIR, Thalkirchnerstr. 81, KH2, 330, Munich, 81371, Germany. Phone: +498972013840 Email: megan@h2fc-fair.com URL: www.h2fc-fair.com

1-2 June 2010, Caspian Oil & Gas Conference at Hyatt Regency Hotel. Contact: Vladislav Grabovsky, Senior Project Manager, ITE Group Plc., 105-109 Salusbury Road, London, NW6 6RG, United Kingdom. Phone: +44 207 596 5008. Fax: +44 207 596 5106 Email: oilgas@ite-exhibitions.com URL: www.oilgas-events.com

6-9 June 2010, 33rd IAEE International Conference: The Future of Energy: Global Challenges, Diverse Solutions at Rio de Janeiro, Brazil. Contact: IAEE Conference Secretariat, IAEE, 28790 Chagrin Blvd Ste 350, Cleveland, OH, 44122, USA. Phone: 216-464-5365. Fax: 216-464-2737 Email: iaee@iaee.org URL: www.iaee.org

22-24 June 2010, RPGC / 8 th Russian Petroleum & Gas Congress at Expocentre, Moscow. Contact: ITE Group Plc, 105-109 Salusbury Road, London, NW6 6RG, United Kingdom. Phone: +44 207 596 5000. Fax: +44 207 596 5106 Email: oilgas@ite-exhibitions.com URL: www.oilgas-events.com

23-25 June 2010, European Energy Markets Conference 2010 at Comillas University, Madrid, Spain. Contact: Julian Barquin, Prof., Comillas University, Alberto Aguilera 23, Madrid, 28015 Email: eem10madrid@gmail.com URL: www.eem10.com

June 28, 2010 - July 2, 2010, The Fourth World Congress of Environmental and Resource Economists at Montreal, Canada. Contact: Conference Secretariat, Universite du Quebec a Montreal, Canada Email: info@wcere2010.org URL: www.wcere2010.org

June 29, 2010 - July 3, 2010, 85th Annual Conference of the Western Economic Association International at Portland, Oregon. Contact: Conference Coordinator, WEAI, Executive Office, 18837 Brookhurst St Ste 304, Fountain Valley, CA, 92708, USA. Phone: 714-965-8800. Fax: 714-965-8829 Email: info@weai.org URL: www.weai.org

20-21 July 2010, Biomass '10: Renewable Power, Fuels, and Chemicals Workshop at Grand Forks, ND. Contact: Kari Gagner, Communications Associate, EERC, University of NorthDakota, 15 North 23rd St, Grand Forks, ND, 58202, USA. Phone: 701-777-5174 Email: kgagner@undeerc.org URL: www.undeerc.org

Publications

The Oxford Handbook of Economic Inequality. Wiemer Salverda, Brian Nolan and Timothy M. Smeeding, Eds. (2009). 848 pages. Price: US$120.00. Contact: Order Dept., Oxford University Press, 2001 Evans Road, Cary, NC 27513, USA. Phone: 800-451-7556. Fax: 919-677-1303. URL: www.oup.com/us

The Great Warming: Climate Change and the Rise and Fall of Civilizations. Dr. Brian Fagan (2009). Contact: Julie Mancini, Lyceum Agency, 433 NW Fourth Avenue, Portland, OR 97209, USA. Phone: 503-313-2862. Email: Julie@lyceumagency.com URL: www.lyceumagency.com

Peak Everything. Richard Heinberg (2009). Contact: Julie Mancini, Lyceum Agency, 433 NW Fourth Avenue, Portland, OR 97209, USA. Phone: 503-313-2862. Email: Julie@lyceumagency.com URL: www.lyceumagency.com

Big Coal: The Dirty Secret Behind America's Energy Future. Jeff Goodell (2009). Contact: Julie Mancini, Lyceum Agency, 433 NW Fourth Avenue, Portland, OR 97209, USA. Phone: 503-313-2862. Email: Julie@lyceumagency.com URL: www.lyceumagency.com

International Review of Applied Economics. Malcolm Sawyer, Managing Editor (2009). Price: US$406.00. Contact: Routledge Customer Services, Taylor & Francis Inc., 325 Chestnut Street, 8th Floor, Philadelphia, PA 19106, USA. Phone: 1-800-354-1420. Fax: 1-215-625-2940. Email: customerservice@taylorandfrancis.com URL: www.tandf.co.uk/journals

Annual Review of Economics, Volume 1. Kenneth J. Arrow and Timothy F. Bresnahan, Editors (2009). Price: US$54.60. Contact: Annual Reviews, 4139 El Camino Way, PO Box 10139, Palo Alto, CA 94303-0139, USA. Phone: 800-523-8635. Email: service@annualreviews.org URL: www.annualreviews.org

The Environmental Resource Handbook. (2009). 1200 pages. Price: $155.00. Contact: Jessica Moody, Vice President, Marketing, Grey House Publishing, 4919 Route 22, PO Box 56, Amenia, NY 12501-0056, USA. Phone: 1-800-562-2139 x101. Email: jmoody@greyhouse.com URL: www.greyhouse.com

Annual Review of Resource Economics. Gordon C. Rausser, Editor (2009). Price: US$54.60. Contact: Annual Reviews, 4139 El Camino Way, PO Box 10139, Palo Alto, CA 94303-0139, USA. Phone: 800-523-8635 Fax: 650-424-0910 Email: service@annualreviews.org URL: www.annualreviews.org

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