AEE Energy orum ENERGY ECONOMICS Third Quarter 2010

International Association for Energy Economics

President's Message

NTERNATIONAL ASSOCIATION fo

> he first IAEE International Conference to be held in South America after more than twenty years took place in Rio de Janeiro, 6 – 9 June. It was a highly successful and memorable conference event. In a considerable number of plenary, dual plenary and even triple plenary sessions during three full days, more than 500 delegates discussed a broad range of energy and environmental economics and policy issues, and some 300 papers were presented and discussed in concurrent sessions. My sincere thanks go to the Rio Conference organizing team, headed by José Scaramucci and Edmar de Almeida, for their hard work and effort in arranging and running the conference so competently and efficiently, and for making the stay in Rio such a wonderful experience.

> I hope that the Rio Conference will contribute positively to our ambition and efforts of building a strong and sustainable IAEE platform and presence in Latin America, in terms both of establishing IAEE affiliates there and cooperating with energy economists to initiate meetings, seminars and other professional activities on contemporary energy economics and policy issues in this region. In fact, The Third Latin American Meeting on Energy Economics will be held in Buenos Aires, Argentina, in April next year, in close cooperation with the IAEE, following up on the successful Santiago Second Meeting last year. Hopefully, these meetings will establish a platform for an IAEE Regional Conference in Latin America and thus add another such conference to those we already have in North America, Europe and Asia, respectively

> The Rio Conference theme was The future of energy: global challenges, diverse solutions. I think that this is quite an appropriate title when discussing energy futures. Many of the challenges facing us are global in nature, but in our approaches to analyzing and handling them, we should keep avenues open for a diversity of potential solutions and then searching for the best option or model among them, depending on the structural, historical, institutional and political circumstances at hand in a specific case. If we try to force one model or way of thinking upon the case, without taking those circumstances properly into account, we typically end up with imperfect or unworkable solutions.

> This may sound obvious and even banal, but when we look at the experiences and lessons learned over the years, e.g., with energy market and regulatory reforms, we soon discover that there often have been large discrepancies between the model "map" of market and regulatory policy design on the one hand and the reform environment or "terrain" which it is supposed to reflect and be imposed upon on the other. In some cases this has led the reform process quite astray, with irreparable, or at least long-lasting, adverse consequences.

> The ruling approach to energy (electricity) market reforms in the western, industrialized world has been the popularly called "textbook" model of regulatory reform, first applied in countries like Great Britain, Norway and New Zealand in the early 1990s. This model has generally performed rather well, when structured and applied properly, and it has been developed and refined as experience with the reform process has accumulated over time across countries and regions.

> A different approach or modeling concept is the so called "dual model" of energy market reform, to take account of the special circumstances and reform conditions that one often is met with in developing countries. This model was originally developed by David Victor and Thomas Heller at Stanford in their book The Political Economy of Power Sector Reform: The Experiences of Five Major Developing Countries (2007), where they





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PRESIDENT'S MESSAGE (continued from page 1)

try to combine some features of the "textbook" model with powerful residues of state monopolies and other specific structural and institutional conditions, traditionally observed in the electricity industry in developing countries. Other modeling concepts have also been proposed.

IAEE conferences are an excellent forum for presenting and discussing energy market and regulatory policy design issues and exchanging experiences pertaining to energy sector reforms around the world. Thus we can contribute to a better understanding of those issues and finding diverse solutions to them in our common effort toward the same overall objective: to improve the economic performance of the energy system, broadly defined. In the dual plenary session on the future of energy regulation, which I had the pleasure of chairing at the Rio conference, we had, for example, an interesting presentation by Jerson Kelman, CEO of the Rio electricity distribution company Light and a former Brazilian energy regulator, of the regulatory problem of how best to handle the rather serious issue of theft of electricity from the power system in the poor *favelas* in Rio and other big cities in Brazil. The "textbook" model would be rather silent on how best to handling such an issue, I presume.

The next conference opportunity to meet will be at the 11th European IAEE Conference in Vilnius, Lithuania, 26 – 28 August. This is the first time a European IAEE conference will take place in a Baltic country. A competent and dedicated conference organizing team, under the leadership of Jürgis Vilemas, has done an excellent preparatory job and I think we will have a very interesting conference there on the theme: *Energy Economy, Policies and Supply Security: Surviving the Global Economic Crisis.* I look forward to seeing many of you in Vilnius.

Einar Hope

IAEE Email Policy

At the Rio council meeting the IAEE Council discussed the use of IAEE's email facilities and agreed to the following policy:

The IAEE will only send emails to its members on matters pertaining to IAEE business or that of IAEE Affiliates (e.g., Affiliate directly sponsored events). No emails will be sent on behalf of third parties (persons or organizations, including universities). IAEE does not release its email address list.

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 begins a focus on Russia and the former Soviet Union. More will follow in the Fall and probably Winter issues.

Sophie Nappert looks at current EU-Russia relations in the energy field from the standpoint of international law and considers whether international law and more specifically the Energy Charter Treaty can continue to offer avenues towards facilitating these relations. She questions whether Russia's stepping way from this agreement really serves Russia's purpose.

Ben Schlesinger posits that shale gas is proving to be the low-cost option; lower than gas from conventional sources and that the downward price effects are already being felt in Western European spot gas markets. He further notes that by mid-decade shale gas development will proceed in Europe and China and there will be more it in the U.S. and Canada. However, growth will be stifled without gas demand recovery and policies that encourage incremental gas markets.

Mamdouh Salameh suggests that that new oil balances are developing which will shape the oil market and change its geopolitics. He argues that a two-forked global oil market is emerging: oil supplies from the Middle East gravitating to the Asia-Pacific region, while supplies to the Atlantic region projected to come mainly from Russia and Central Asia. He concludes that this shift will have significant strategic geopolitical and commercial consequences globally.

Leonard Coburn examines the long term Russian oil situation. He notes that four questions must be answered in order to determine if Russia can meet its 2030 energy goal of production of 11 million barrels per day; namely, How much money is needed? Where will this money come from? How much oil does Russia have to meet its future goals? and Where is the oil located?

Nathan Reich notes that in 2008 the Kazakh government forced the consortium of international oil companies developing its Kashagan field to renegotiate the terms of their project sharing agreement. He finds that Kazakhstan's behavior toward international oil companies and foreign investors should be understood as a case of *constrained resource nationalization*. If Kazakhstan obtains the overall capacity to explore, develop, and produce its own oil and gas resources, it will likely nationalize them.

Diego Villalobos Alberú looks at the questions: Does the international gas market possess characteristics that are conducive to the formation of a cartel of gas exporting countries? And what are the prospects for such a cartel presently and in the future, given the current and foreseen policy and market developments?

DLW

Get Your IAEE Logo Merchandise!

Want to show you are a member of IAEE? IAEE has several merchandise items that carry our logo. You'll find polo shirts and button down no-iron shirts for both men and women featuring the IAEE logo. The logo is also available on a baseball style cap, bumper sticker, ties, computer mouse pad, window cling and key chain. Visit <u>http://www. iaee.org/en/inside/merch.aspx</u> and view our new online store!

Newsletter Disclaimer

IAEE is a 501(c)(6) corporation and neither takes any position on any political issue nor endorses any candidates, parties, or public policy proposals. IAEE officers, staff, and members may not represent that any policy position is supported by the IAEE nor claim to represent the IAEE in advocating any political objective. However, issues involving energy policy inherently involve questions of energy economics. Economic analysis of energy topics provides critical input to energy policy decisions. IAEE encourages its members to consider and explore the policy implications of their work as a means of maximizing the value of their work. IAEE is therefore pleased to offer its members a neutral and wholly non-partisan forum in its conferences and web-sites for its members to analyze such policy implications and to engage in dialogue about them, including advocacy by members of certain policies or positions, provided that such members do so with full respect of IAEE's need to maintain its own strict political neutrality. Any policy endorsed or advocated in any IAEE conference, document, publication, or web-site posting should therefore be understood to be the position of its individual author or authors, and not that of the IAEE nor its members as a group. Authors are requested to include in an speech or writing advocating a policy position a statement that it represents the author's own views and not necessarily those of the IAEE or any other members. Any member who willfully violates IAEE's political neutrality may be censured or removed from membership

IAEE INTERNATIONAL ASSOCIATION for ENERGY ECONOM

29th USAEE/IAEE NORTH AMERICAN CONFERENCE

Energy and the Environment: Conventional and Unconventional Solutions

CONFERENCE OVERVIEW

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?

This conference will bring together key players in the North American energy sector to address these questions and many others in plenary and concurrent sessions.

Those interested in organizing sessions should propose a topic and possible speakers to Pierre-Olivier Pineau, Concurrent Session Chair (p) +1 514-340-6922, (e) pierre-olivier.pineau@hec.ca

This conference will also provide networking opportunities through workshops, public outreach and student recruitment.



WITH SUPPORT FROM:







TOPICS TO BE ADDRESSED INCLUDE:

Conventional Oil and Gas Issues

- Reserves and access to reserves
- Production and drilling activity
- Fiscal issues: incentive taxation and royalty regimes
- Enhanced recovery with CO₂ injection
- Estimating and forecasting project costs

Unconventional Oil and Gas Issues

- Reserves, resources and possible recovery
- Oil sands production costs
- · Heavy oil prospects
- Coalbed methane and shale gas production
- Environmental footprint

Infrastructure Investments

- New pipelines
- LNG terminals, import/export
- Refining and moving 21st century liquid fuels
- Financing after the credit crisis

Carbon Capture and Sequestration

- Experiences to date
- Links with enhanced oil & gas recovery
- Potential to limit GHG
- Cost and the role of subsidies in CCS

Electricity Generation

- Supply adequacy
- New nuclear developments
- State/provincial regulation and economic distortions
- Ownership and cost of hydropower

Electricity Networks

- Market integration and reforms
- Transmission upgrades and pricing
- Distributed generation
- Smart grids and smart metering innovations

Energy Efficiency

- Measurement and verification
- Link to energy pricing
- Information and other market failures

Climate Change

- GHG emission reduction targets and costs
- Impacts of a cap-and-trade system or a carbon tax
- Developments in carbon-mitigation technologies
- International agreements post-Kyoto
- Cost effectiveness: reduction, sequestration or adaptation

Biofuels

- Regulatory incentives
- Life-cycle energy and economic assessments
- Linkages and competition with the food chain

Renewables in Electricity

- Renewable Portfolio Standards and regulatory approaches
- Wind development: growth and challenges
- Hydropower contribution
- Solar and geothermal technology updates

Energy and Transportation

- Transportation policy and efficiency
- Impact of the automobile crisis on energy demand
- Fuel efficiency standards

Geopolitics

- North American energy interdependence
- The future of OPEC
- Natural gas politics
- Persian Gulf security
- Renewable energy and energy security

Energy Poverty

- Access to modern energy services
- Energy prospects for developing countries









PLENARY SESSIONS & SPEAKERS

The 29th USAEE/IAEE North American Conference will attract noteworthy energy professionals that will address a wide variety of energy topics. Plenary sessions include the following:

- North American Energy Interdependence
- Energy Industry Outlook
- Understanding Oil and Gas Market Volatility
- Climate Change Policy -Consequences and Implementation Issues
- Electricity Markets and Reform: Structure and Organization
- Water and the Energy Industry
- Energy Efficiency and Standards
- Renewable Energy Supplies and Pricing: Promise and Realities
- · Energy Directions from a Local Perspective

SPEAKERS INCLUDE:

Francisco Barnés, Commissioner, Energy Regulatory Commission

Carl Calantone, Senior Vice President, TransCanada Energy Corporation and Professor of Finance

Patrick D. Daniel, President and CEO, Enbridge

Joe Dion, President & CEO, Frog Lake Energy Resources, Ltd.

Joseph M. Doucet, Profesor, University of Alberta

Joseph M. Dukert, Energy Analyst

R. Dean Foreman, Chief Economist, Talisman Energy

Mary Griffiths, Senior Associate, Green Planet Communications Inc.

Mark K. Jaccard, Professor, Simon Fraser University

David H. Knapp, Senior Editor, Energy Intelligence Group

Lester Lave, Professor of Economics, Carnegie Mellon University Honourable Ron Liepert, Alberta Minister of Energy (invited)

Mark Lively, Consultant, Utility Economic Engineers

Randy Mikula, Team Leader, Extraction and Tailings, CanmetENERGY Laboratory

Michal C. Moore, Senior Fellow, Institute for Sustainable Energy, Environment and Economy, University of Calgary

Adele C. Morris, Fellow and Policy Director for Climate and Energy Economics, The Brookings Institution

Andrew Nikiforuk, Author, Tar Sands: Dirty Oil and the Future of a Continent, Independent Journalist

Carlos Federico Petersen, Secretaria de Energia, CRE Mexico

Pierre Olivier Pineau, Associate Professor, HEC Montreal

Gordon Pitts, Business Reporter, The Globe and Mail

Paul R. Portney, Dean, Eller College of Management, University of Arizona

Marilyn Radler, Senior Editor Economics, Oil & Gas Journal

Mitchell P. Rothman, Managing Consultant, Power Advisory LLC

Francisco Salazar, Past President of Mexican National Energy Regulatory Commission and Undersecretary for Energy Policy, CRE Mexico

Benjamin Schlesinger, President, Benjamin Schlesinger & Assoc LLC

Christopher R. Seasons, President, Devon Canada

Fereidoon P. Sioshansi, President, Menlo Energy Economics

Harrie Vreedenburg, Suncor Energy Chair, Haskayne School of Business, University of Calgary

Leonard Waverman, Professor, Dean of the Haskayne School of Business, University of Calgary

Bill Whitelaw, President and Chief Executive Officer, JuneWarren-Nickle's Energy Group

Of special interest will be a Technical Training Session on Oil Sands that will be held the morning before the conference officially starts.

STUDENTS

Students may submit a paper for consideration in the USAEE Student Paper Award Competition (cash prizes plus waiver of conference registration fees). The paper submission has different requirements and a different deadline. The deadline for submitting a paper for the Student Paper Awards is July 8, 2010.

Visit www.usaee.org/USAEE2010/ paperawards.html for full details. Students may also inquire about our scholarships for conference attendance. Visit www.usaee.org/ USAEE2010/students.html for full details.

TRAVEL DOCUMENTS

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.

Note: U.S. citizens attending the 29th USAEE/ IAEE North American Conference will need to present a passport upon entry to Canada.

34th IAEE International Conference Stockholm June 19-23, 2011

CALL FOR PAPERS

Institutions, Efficiency and Evolving Energy Technologies





Energimarknads inspektionen



Söderenergi INDUSTRIAL ECONOMICS





WELCOME TO STOCKHOLM

The world is facing a strong need for a major transformation of the global energy supply system. One obvious reason for this is the threat of climate change caused by carbon dioxide emissions. Another is the continuing concern for the impact on the environment and human health caused by the use of conventional energy sources. A third factor is the concern for the geopolitical aspects of energy supply. At the same time there is a continuing need for a safe supply of energy, in suitable forms, at a reasonable cost.



The 34th IAEE International Conference with the theme Institutions, Efficiency and Evolving Technologies will be held at the Stockholm School of Economics in the very center of Stockholm, Sweden. The conference will bring together a wide spectrum of energy economists, policy makers, and professionals from all parts of the energy sector and representatives of governments and other public institutions. The aim is to address and thoroughly elucidate key issues related to the challenges outlined above.

On behalf of the organizing committee I wish you all a very warm welcome to Stockholm and an exciting conference.

Lan Bergua

Lars Bergman General Conference Chair

CONFERENCE TOPICS

As usual at IAEE conferences all the major fields of energy economics and policy will be addressed. In addition there will be a special focus on the following topics, in plenary sessions and in a number of specialized concurrent sessions:

- The organization of energy related innovation and technological development
- Evolving technologies and energy use in the transport sector
- The political economy of energy markets
- Energy security
- The design, integration and regulation of energy markets
- · Energy demand and energy efficiency

ABSTRACT SUBMISSION DEADLINE: JAN 17, 2011

Abstracts must be submitted electronically, by January 17, as word documents at the conference website:

www.hhs.se/iaee-2011

Abstracts, of a maximum two pages in length, should comprise: Presentation of research topic, brief overview of related research, methods, results and conclusions. The lead author must provide complete contact details, i.e. mailing address, e-mail address and phone number. At least one author for each accepted paper must pay the registration fee and attend the conference. Authors will be notified by March 1 of their paper's status. Authors whose abstracts are accepted will have to submit their full-length papers (up to 12 pages) by April 18.

The papers will then be made available at the conference website are welcome, the abstract selection process will seek to ensure as broad participation as possible. If multiple submissions are accepted, then a different co-author will be required to pay the speaker registration fee and present the paper.

CONFERENCE VENUE

The conference will be held at the Stockholm School of Economics in the center of Stockholm (street address Sveavägen 65). The school's main building has recently been entirely renovated and is now well suited for international conferences such as the 2011 IAEE International Conference.

The Gala Dinner and Awards Ceremony on June 20th will be held at the Wasa museum, Sweden' most visited museum, while the reception on June 21st will be at the Stockholm City Hall where the Nobel banquet is held on December 10th every year.

The climate in Stockholm in June is usually pleasant, with temperatures ranging between 20 and 25 C. However, it might be much warmer, or cool and rainy. Evenings are very light, with sunset after 10 p.m.



IAEE STUDENT PROGRAM

As part of the IAEE International Conference Student Program, the IAEE offers the IAEE Student Paper Award and IAEE International Conference Student Scholarships. Detailed information about these options for students is available at: www.hhs.se/iaee-2011

CANCELLATION/REFUND POLICY

A refund (less \notin 100 administration fee) is available until May 19. After that date no refunds will be given, but a delegate from the same institution, or a co-author of an accepted abstract, may be substituted.

REGISTRATION

Registration is online at www.hhs.se/iaee-2011. The registration fees, in €, are the following:

	Before	Aprl8-	After
	Apr 18	May18	May18
Speakers/Chairs	500	550	600
IAEE members	650	700	750
Non-Members	800	850	900
Students	300	350	400
Accompanying persons	300	350	400

ORGANIZATION COMMITTEE

The General Conference Chair is Lars Bergman, President and Professor at the Stockholm School of Economics and Chairman of the Swedish Association for Energy Economics. Dr Thomas Tangerås, Research Institute of Industrial Economics, is responsible for the organization of concurrent sessions. The other members of the Organization Committee are:

- Lennart Billfalk, Senior Advisor, Vattenfall AB
- Olle Eklund, Managing Director, Europtima AB
- Kjell Jansson, CEO, Swedenergy AB
- Tomas Kåberger, Director General of the National Swedish Energy Administration
- · Michael Löw, President and CEO, Preem AB
- Mats Nilsson, Economist, Vattenfall AB
- David Williams, Executive Director, IAEE

PROGRAM COMMITTEE

The Program Committee is responsible for the selection of abstracts and for the program of the conference. The members of the program committee are:

- · Eirik Amundsen, University of Copenhagen
- Georg Erdmann, TU Berlin
- · Natalia Fabra, Universidad Carlos III de Madrid
- Nils-Henrik von der Fehr, University of Oslo
- Sven-Olof Fridolfsson, Research Institute of Industrial Economics, Stockholm
- Jean-Michel Glachant, European University Institute, Florence
- Richard Green, University of Birmingham
- · Reinhard Haas, Technical University of Vienna
- Pär Holmberg, Research Institute of Industrial Economics, Stockholm
- Einar Hope, Norwegian School of Economics and Business Administration, Bergen
- Christian von Hirschhausen, University of Dresden
- Lennart Hjalmarsson, University of Gothenburg
- · Wumi Iledare, LSU Center for Energy Studies
- · Akinbolaji Iwayemi, University of Ibadan
- Hoesung Lee, Keimyung University
- Chloé Le Coq, Stockholm Institute of Transition Economics
- Matti Liski, University of Helsinki
- Gunnar Lundberg, Vattenfall AB
- · Kenichi Matsui, Institute of Energy Studies
- Juan-Pablo Montero, Pontificia Universidad Cátolica de Chile
- · Karsten Neuhoff, University of Cambridge
- Mine Yucel, Federal Reserve Bank of Dallas

TRANSPORTATION

Stockholm's international airport, Arlanda, is located 35 km north of the city.

By Arlanda Express, a fast train, the trip to the Central Station in the center of Stockholm takes 20 minutes and costs around $20 \notin$ (single ticket). The Airport Bus, also to the Central Station, takes around 45 minutes and costs around 10 \notin , while a taxi would take 35 minutes (depending on traffic) and cost around 40 \notin .

Sun, June 19	IAEE Council Meeting (by invitation)	09:00-12:00
	Council lunch	12:00-13:00
	Secretariat & Registration	13:00-19:00
	IAEE Council Meeting	13:00-17:00
	Welcome reception, Stockholm School of Economics	18:30-20:00
	Council Dinner (by invitation)	20:00-23:00
Mon, June 20	Secretariat & Registration	08:00-18:00
	IAEE Affiliate Leaders Meeting	08:00-09:00
	Student Breakfast Meeting	08:00-09:00
	Opening Ceremony	09:00-09:15
	Presidential Address	09:15-09:45
	Keynote lecture	09:45-10:30
	Coffee Break	10:30-11:00
	Plenary session	11:00-12:30
	Lunch	12:30-14:00
	Concurrent sessions	14:00-15:30
	Coffee Break	15:30-16:00
	Concurrent sessions	16:00-17:30
	Gala Dinner and Awards Ceremony, Wasa Museum	19:00-22:00
Tue June 91	Secretariat	08.00-18.00
rue, June 21	European Affiliate Leaders Meeting	08:00-09:00
	ELEditors Board Meeting	08:00-09:00
	2012 Perth Planning Meeting	08:00-09:00
	Dual Plenary Sessions	09:00-10:30
	Coffee Break	10:30-11:00
	Concurrent Sessions	11:00-12:30
	Lunch	12:30-14:00
	Dual Plenary Sessions	14:00-15:30
	Coffee Break	15:30-16:00
	Concurrent Sessions	16:00-17:30
	Reception at the Stockholm City Hall and	18:30-22:00
	Boat Trip	
Wed, June 22	Secretariat	08:00-18:00
	2013 Daegu Planning Meeting	08:00-09:00
	Asian Affiliate Leaders Meeting	08:00-09:00
	Concurrent Sessions	09:00-10:30
	Coffee Break	10:30-11:00
	Concurrent Sessions	11:00-12:30
	Lunch	12:30-14:00
	Closing Plenary Session	14:00-15:00
Thu, June 23	Technical Tour 1: Södertälje CHP	09:00-12:00
, , , , .	Technical Tour 2: Arena City, Solna	09:00-12:00
	Technical Tour 3: Forsmark	09:00-18:00

TECHNICAL TOURS

TIME

1.The combined heat and power plant in Södertälje

This is a half-day tour to Södertälje around 35 km south of Stockholm. The plant was commissioned in 2009 and is the biggest heat and power process based on bio-fuels in the Nordic countries. It supplies heat to the interconnected district heating systems in the southern parts of the Stockholm area. The host of the tour is Söderenergi AB, the owner of the plant.

2.The Arena City in Solna

This is a half-day tour to the new Arena City in Solna, around 5 km north of Stockholm. The Arena City complex will contain Sweden's new national soccer arena, hotels, restaurants and stores, and it will use the best available technologies for energy conservation. At the time of the conference the complex will be half complete. The tour is hosted by the owners of the Arena City.

3.The Forsmark village

This is a full-day tour to Forsmark, a village around 150 km north of Stockholm dating back to the beginning of the seventeenth century. Forsmark village was originally a community built around ironworks, in a style that was typical for its time and with several counterparts in the area. Today the village is more like a museum, and Forsmark is currently best known for the nuclear power plant located just outside the village. In addition to tours of Forsmark village and the nuclear power plant, the plans for a final repository for used nuclear fuel will be demonstrated. The tour is hosted by Vattenfall.



WWW.IAEE.ORG

SWEDISH ASSOCIATION OF ENERGY ECONOMICS International Association *for* Energy Economics

EU-Russia Relations in the Energy Field: The Continuing Role of International Law

By Sophie Nappert*

"[A]ll European countries are interested in good relations with the Russian Federation, [and] the Russian Federation is interested in good partnership relations with the European Union and specific countries in Europe. These relations are not opportunistic and should not depend on any political events. And we definitely should not look at the signing of the partnership agreement with the European Union as some kind of prize that Russia gets for its good behaviour (...)."¹

Introduction

The energy policies of the Russian Federation ('Russia'), as well as the role they are made to play in its international relations, are the subject of worldwide publicity, comment and speculation. Russia's gas pricing disputes with the Ukraine, and legislation on foreign investment in strategic industries,² provide recent examples.

Up until mid-2009, Russia had embarked upon an increasingly vigorous expression of its readiness to cast aside the Energy Charter Treaty ('ECT') as a frame of reference for EU-Russia energy relations. Prime Minister Putin, in his speech at the 2009 World Economic Forum in Davos, stated: "Unfortunately, the existing Energy Charter has failed to become a working instrument able to regulate emerging problems. I propose we start laying down a new international legal framework for energy security."³

President Medvedev took up the same theme in his March 2009 interview with the Spanish press: "I have come up with an idea, which I first voiced at the Moscow summit during this gas conflict [with Ukraine] – let's draw up a new Energy Charter or a new version of the Energy Charter. But what should it be like? It should not benefit just the consumers. Yes, a consumer is a vulnerable party. But sometimes we need to think about the producers as well, and the transit countries. Otherwise we cannot come to an agreement."⁴

Indeed, on 20 April 2009, President Medvedev tabled a 'Conceptual Approach to the New Legal Framework for Energy Cooperation (Goals and Principles)', seeking to revisit the principles enshrined in the Energy Charter Treaty.⁵

Next came Russia's formal notification, on 20 August 2009, that it 'did not intend to become a Contracting Party' to the ECT. In accordance with Article 45(3)(a) ECT, this notification resulted in Russia's termination of its provisional application of the ECT after a period of sixty days from the receipt of the notification, in this case 18 October 2009.⁶

Most recently, the arbitral tribunal in the legal proceedings brought against the Russian Federation by the Yukos majority shareholders⁷ pursuant to the ECT, decided that provisional application of the ECT amounted to its fully-fledged application by Russia. The tribunal did not have to opine, and did not opine, on whether Russia's notification amounted to withdrawal.

This article looks at the current EU-Russia relations in the energy field through the prism of international law. It considers whether international law, and more specifically the ECT, can continue to offer avenues towards facilitating these relations. It questions whether, in a field of such importance to its economy and sovereignty, Russia's stepping away from a recent international agreement with significant currency, which it has been held provisionally to apply⁸ (at least until its August 2009 notification) and which promotes international law and international arbitration, really serves Russia's purpose: to be considered as an equal counterpart in its energy relations with the EU.

Energy and Sovereignty

Reports on recent events have encouraged a perception in Europe that Russia can behave as an unreliable, unruly Behemoth, prone to knee-jerk reactions and willing on a whim to abuse its position of

power as the holder of the world's largest deposits of natural gas. From Russia's standpoint, the EU appears to front its fragmented position on energy with the unilateral imposition of its own terms and conditions, without regard to Russia's interests.

A summary look at recent history sheds some light on how Russia frames its energy interests, and how they relate to what is a sensitive, and politicised, area of activity on both sides, and a central one to EU-Russia relations generally.

^{*} Sophie Nappert is an Arbitrator in London. She may be reached at <u>snappert@3vb.com</u>. This is an abridged, and substantively updated, version of the article published in EU-Russia Energy Relations, Legal and Political Issues, Euroconfidentiel/OGEL, 2009. See footnotes at end of text.

For at least a decade, Russia has consistently placed natural resources at the core of its sovereignty and national security. Vladimir Putin's scholarly dissertation as Candidate of Sciences ('kandidat') at the St Petersburg Mining Institute dates back to 1997, two years before his appointment as Prime Minister. Entitled 'Strategic Planning of the production of mineral-natural bases in the region under the development of market economy conditions', its message was essentially two-fold:

- Natural resources must remain under State control: it is too important a sector to be left entirely to market forces.
- Energy policy and energy security are essential to Russia's security policy.9

In the 2003 Energy Strategy of the Russian Federation to 2020,¹⁰ a similar message emerges:

- Energy policy is intimately linked with national security.
- Energy policy will be used to preserve Russian independence.
- Russia should remain a reliable trading partner.

The most recent Energy Strategy paper, mapping out Russia's energy strategy to 2030, is based on the same priorities, adding a notable message of modernisation.¹¹

Russia's underlying philosophy is that, when it comes to energy questions, the State acts in the best interests of society. There is here an undercurrent of public order, and assertion of sovereignty. The starting point about interfacing with Russia on energy matters, therefore, is that any transaction involving oil and gas is intimately linked to the very core of Russia's sovereignty.

The concept of sovereignty is central to a State's idea of itself and sense of future direction. The Permanent Court of International Justice established, in one of its early cases, that international law as a system frames the contours of a State's sovereignty, and delimits it. Thus a strongly sovereign State recognises that, whilst international obligations restrain the exercise of sovereign prerogatives, the right to assume international obligations is itself an attribute of State sovereignty.¹² In such a context, it is difficult to reconcile Russia's departure from the ECT with public interest.

Mixed messages abound, and tend to weaken Russia's position. Russia claims that it deserves an equal place at the table with its EU counterpart in the energy dialogue. Recognising the role and importance of international law in its energy policy would be a significant step towards asserting confident sovereignty and laying the foundations for the credibility which Russia claims it deserves. On the other hand, stepping away from international law would sideline Russia in the dialogue and entail a significant loss of credibility, no matter how large its natural gas reserves, or how dependent on them the European market might be. The 'new' Energy Charter proposal is too incompletely formulated at this stage to be a credible alternative to the ECT.

The sovereignty conundrum will also be familiar to EU Member States,¹³ livened up as it is by the current state of uncertainty surrounding the respective spheres of competence of the European Communities alongside the Member States in matters of foreign investment, notably under the ECT. Both sides of the EU-Russia dialogue are thus grappling with similar issues, albeit from different standpoints.

The EU's House-keeping Matters

The EU has its own internal tensions to address. Its unease in the delimitation of its sphere of competence in 'mixed agreements' alongside that of its Member States is tangible and leaves several important questions currently unresolved, particularly with respect to the ECT and foreign investment more generally.¹⁴ There are unique challenges presented to the EU as a party to international treaties alongside some of its Member States, and in its dealings with other state parties. These challenges give rise to avenues which newly-acceded EU Member States defending investor-to-State claims are starting to invoke: a BIT (Bilateral Investment Treaties) dispute settlement mechanism violates the principle of 'mutual trust' between Member States;¹⁵ the 'diversion' away from the European Court of Justice (ECJ) of the determination of questions of EC law in investor-State cases; the inconsistency between BIT protection and EU law;¹⁶ in the ECT context, claims by EU nationals against other Member States.¹⁷

A coherent message on EU competence and policy in energy matters would assist in allowing international law standards to remain the natural choice as a framework for future EU-Russia relations.

The ECJ may just have afforded an opportunity to put the EU house in order. In its decision of 3 March 2009 in the cases brought by the European Commission against Austria and Sweden respectively,¹⁸ and against Finland on 19 November 2009,¹⁹ the ECJ examined certain bilateral investment treaties ('BITs') pre-dating the accession of these countries to the EU, which contained wording conferring unrestricted freedom of transfer of capital and profits for investments covered by the BITs. Whilst free movement of capital is a fundamental principle of EU law, Articles 57, 59 and 60 EC give the Council

powers to impose exchange controls for certain limited or temporary purposes. The Council has never exercised these powers. However, if it were to do so, the unrestricted freedom of transfer clauses in the relevant BITs would make it difficult or impossible for Austria, Sweden or Finland to comply with their obligation to cooperate with the Council, and the Commission takes the view that there is a "hypothetical conflict" between the BITs and the EC Treaty.

The ECJ agreed and ordered Austria, Sweden and Finland to renegotiate the relevant BITs or to denounce them. Although these cases arose in the context of bilateral treaties, a similar freedom of transfer provision is found at Article 14 of the ECT. The prospect of the ECT's quinquennial review (Article 34(7) ECT) might afford the right forum to discuss the possible impact of the ECJ's decision.

Avenues in International Law

Contractual Provisions

International contracts may contain several types of provisions to protect a foreign party wishing to do business in Russia. However, recent amendments to existing Russian legislation appear to cast doubt on how viable these protections can be in Russian territory.

One of the most widely-recognised, and universally sought-after, protections is that provided by an arbitration clause, whereby all disputes arising in an agreement are submitted to a private arbitral tribunal, often seated in a third country for purposes of neutrality, rather than to a State's judicial courts. This is especially valuable where investors are dealing directly with a State or State entity (as is the case in the natural resources sector) and do not want to submit to that State's courts, whilst the State would not submit to the courts of another State. Moreover, arbitration awards can be enforced in a number of foreign countries via an international instrument called the 1958 New York Convention on the Recognition and Enforcement of Foreign Arbitral Awards. The New York Convention works by setting out a list of restricted, mandatory grounds on which a State court may refuse to recognise and enforce an award rendered in another country. Russia has ratified the New York Convention, as have 143 other States: international arbitration therefore carries important buy-in, can be a powerful tool, and is undisputedly the premier system of dispute resolution in international business.

The 2008 Amendment to the 2005 Russian Law "On Concession Agreements" (widely used in the natural resources sector) blurs the picture. Whereas the original wording of the 2005 law allowed disputes between a grantor (the State) and a concessionaire to be resolved via international arbitration, wherever located, the amended wording appears to subject it to a Russian seat. Article 17 provides that these disputes may be heard "in accordance with the legislation of the Russian Federation in courts, arbitrarah courts, arbitral tribunals of the Russian Federation."²⁰ If that interpretation is right, awards would from now on be liable to review by the Russian courts, and be removed from the 'restricted review' protection of the New York Convention, as they would no longer be foreign awards. This appears to be the interpretation placed on the new wording of Article 17, which requires that disputes may not be heard by way of institutional or ad hoc arbitration outside the boundaries of the Russian Federation.

Placing such a condition on an essential prerequisite to foreign investment portrays an image hardly consistent with that of a host country welcoming foreign investment, as championed in Mr Medvedev's statements in the Spanish press. It does not accord with international business practice, breeds unpredictability, and achieves the opposite effect of that which Russia wishes to portray: that it has the hallmarks of a sophisticated, international partner instilling confidence in international business and in other States.

Treaties and Public International Law

Given the uncertain treatment of contractual recourse to international arbitration in Russia, investors may wish to look to public international law for protection. As a matter of international law, investors, notwithstanding any contractual rights they may have, may benefit from a direct recourse against States pursuant to any bilateral or multilateral investment treaties to which both the home State of the investor and the host State where the investment is located are parties. These treaties provide internationallyrecognised standards for the protection of investments, and a direct right of action is granted to investors to enforce these protections by taking States directly before an arbitral tribunal.

This recourse is also found in the investment chapter of some multilateral treaties. Of particular interest here is the Energy Charter Treaty (ECT), the first multilateral instrument aimed at promoting and protecting investment, security of supply and transit in the energy sector. Fifty-two States, including the EU and its Member States, have signed the ECT and twenty-two more are observers.²¹ Until its August 2009 notification, Russia had signed the ECT, but not ratified it, placing it in the position of provisionally applying the ECT.

Russia's Provisional Application

Whilst 'provisional application' is not a novel concept in international law, the continued non-ratification of the ECT by one of its key signatories in geopolitical terms placed Russia in a unique position. This position was tested in the arbitration proceedings started against Russia by Yukos' majority shareholders for the alleged expropriation of their investment in Yukos.²² In a decision on its jurisdiction and the admissibility of the claims made against Russia, the tribunal found that, for investments pre-dating 18 October 2009, Russia was bound by the ECT. Although the findings of investor-to-State arbitral tribunals have no official precedential value, the authority and stature of the Yukos tribunal is such that this decision is very likely to influence future investor-to-State cases brought against Russia concerning investments for the relevant period.

The Way Forward

What, however, of investments made after 18 November 2009? Russia has made it clear that it is no longer provisionally applying the ECT, but has not formally withdrawn from it in terms (as provided in Article 47 ECT). This places Russia in a grey area such that it is unclear whether Article 47(3) ECT, whereby the protection of the investment chapter survive withdrawal by a period of 20 years, finds application. By not formally withdrawing from the ECT, Russia could conceivably have left the door open to re-entry.

It remains to be seen what proposals Russia will put forward for a 'new generation' ECT and how practicable they might be.²³ It is recognised that there is scope for a fresh perspective on the ECT given the important changes that have taken place, and continue to take place, in the energy geo-political map since its inception. Article 34(7) of the ECT provides for its quinquennial review. The Energy Charter's Secretary-General has raised the possibility that 'new tasks and new directions' be explored, and has singled out transit, which has troubled Russia from the outset, as an area for discussion.²⁴ The ECJ rulings in the cases against Austria, Sweden and Finland provide another timely reason to open these discussions.

However, particular care ought to be taken not to dilute the fundamental treaty protections that have proved useful in creating a stable investment environment, including dispute resolution provisions. The viability and longevity of these core aspects also depend in part on the EU putting forward a clearer and more consistent message and on addressing its internal competence struggles alongside Member States in the energy arena.

Conclusion

International law and the ECT offer standards of substance and flexibility of procedure to provide assistance in the EU-Russia dialogue. It is not a straightforward exercise on either side, but Russia's willingness to step away from an instrument with barely-tested potential appears premature.

International law does have a way of getting back at States who make light of it. The European Court of Human Rights has agreed to hear a \$98 billion case against Russia alleging the unlawful expropriation of Yukos's assets, and a number of freezing orders have been granted in European and U.S. courts with a view to enforcing a ruling against Rosneft, Russia's State oil company which swallowed Yukos's assets.²⁵ Yukos is finding that international law can provide ways to haunt Russia from beyond the grave.

Footnotes

¹ President Dmitry Medvedev, in an interview with the Spanish press, reported in Russiatoday: "Europe needs new Energy Charter – Medvedev", <u>www.russiatoday.com</u>, 1 March 2009.

² Two enactments came into force on 7 May 2008: (1) Law No. 57-FZ "On the Procedure for Contributing Foreign Investments in Legal Entities which are of Strategic Importance for the Defence of the Country and Security of the State" ('Law on Foreign Investments in Strategic Companies'); and (2) Law No. 58-FZ "On Amendments to Certain Legislative Acts of the Russian Federation and the Abolition of Certain Provisions of Legislative Acts of the Russian Federation of the Federal Law [No. 57-FZ]" ('Law on Amendments').

The Law on Foreign Investments lists 42 sectors of strategic importance 'for the defence of the country and the security of the state', where foreign investment is made subject to stricter requirements. These sectors include nuclear energy, natural monopolies, the survey, exploration and production of large deposits of oil, gas, gold, copper and other 'deposits of federal importance', aviation, space and other defence-sensitive industries. For a review of the Law on Foreign Investment from the standpoint of the OECD criteria for legislation aimed at encouraging the growth of foreign investment, see Jesse R Heath, "Strategic Protectionism? National Security and Foreign Investment in the Russian Federation", September 2008, http://ssrn.com/abstract=1264041.

³ Wall Street Journal Online, 28 February 2009.

⁴ Russiatoday, 1 March 2009, supra, footnote 2.

⁵ Available at <u>http://kremlin.ru</u>. See S Nappert, 'Russia proposes "new" Energy Charter Treaty' (2009) Global Arbitration Review Vol.4 Issue 3, p 31.

⁶ It is beyond the scope of this paper to consider the complex issues raised, as a matter of treaty law, by Russia's notification, and Russia's current status with the other Energy Charter Treaty Contracting Parties. Whether the notification amounts to Russia's 'withdrawal' from the ECT, as is often read in the press, is uncertain. Formal withdrawal, according to Article 47(3) ECT, entails the continued application of the ECT's Investment Chapter for a period of twenty years from the date of withdrawal. It also appears incorrect, as a matter of law, to say that Russia's notification simply frees it from the obligation provisionally to apply the ECT, and returns it to the status of mere signatory: see, contra, Dr A Konoplyanik, letter to the Financial Times, 26 August 2009, http://www.ft.com.

⁷ Yukos Universal Ltd, Hulley Enterprises Ltd, Veteran Petroleum Trust v Russian Federation, Interim Award on Jurisdiction and Admissibility, 30 November 2009, available at http://www.encharter.org>.

⁸ See below. Article 45 provides that the ECT is provisionally applied by its signatories provided (i) its provisions are not inconsistent with the Contracting Party's domestic law; (ii) the Contracting Party has not opted out of provisional application.

⁹ Scepticism has been widely expressed on whether these views, or the dissertation itself, were Mr Putin's own. Whatever the position, it does not alter the fact that Mr Putin, once in power, did follow a course of energy policy consistent with the views defended in the dissertation to which he put his name.

¹⁰ Adopted by the Russian government on 28 August 2003: <u>http://ec.europa.eu/energy/Russia/events/doc/2003</u>_ strategy_2020_en.pdf.

¹¹ Energy Strategy of the Russian Federation to 2030, at <u>http://www.energystrategy.ru</u>.

¹² As held by the Permanent Court of International Justice in the seminal case of The SS Wimbledon (1923), cited in this context in J Paulsson, "El Poder de los Estados para Hacer Promesas Significativas a los Extranjeros" (2009) TDM Issue 1, <u>www.transnational-dispute-management.com</u>. See also his recent post, Repudiation of International Arbitration Agreements and the Public Interest, 16 February 2009, <u>http://kluwerarbitrationblog.com</u>. For an historical and witty account of The SS Wimbledon, see J Klabbers, "Clinching the Concept of Sovereignty: Wimbledon Redux" (1998) 3 Austrian Review of International and European Law 345.

¹³ The Treaty of Lisbon (Treaty of Lisbon Amending the Treaty on European Union and the Treaty Establishing the European Community 2007/C 306/01, in force 1 December 2009) and the potential loss of Member States' competence in matters of foreign investment, prompt a new look at sovereignty, which some argue is in need of 'democratic recalibration': see A Kemmerer, "The Crack in Everything: Sovereignty in a European Union of States, Peoples and Citizens", forthcoming in Helge Høibraaten/Jochen Hille (eds.), Northern Europe and the Future of the EU, Berliner Wissenschafts-Verlag, Berlin, available on <u>www.ssrn.com</u>. The official position of the European Union is that Member States "remain independent sovereign nations, but they pool their sovereignty in order to gain a strength and world influence none of them could have on their own": <u>http://europa.eu/institutions/index_en.htm</u>.

¹⁴ S Nappert, 'Le droit dérivé et les investissements', in C Kessedjian and C Leben, Le droit européen et l'investissement, Ed. Panthéon Assas 2009; M Burgstaller, "European Law and Investment Treaties", (2009) Journal Int'l Arb., forthcoming; H Wehland, "Intra-EU Investment Agreements and Arbitration: Is European Community Law an Obstacle?" (2009) ICLQ forthcoming; C Tietje, "The Applicability of the Energy Charter Treaty in ICSID Arbitration of EU Nationals vs. EU Member States", draft in TDM, September 2008.

¹⁵ Notably in Eastern Sugar BV v The Czech Republic, Partial Award, 27 March 2007: http://ita.lawuvic.ca/documents/EasternSugar.pdf.

¹⁶ Micula and others v Romania, ICSID Case No. ARB/05/20, Decision on Jurisdiction and Admissibility, 24 September 2008: http://ita.law.uvic.ca/documents/Miculav.RomaniaJurisdiction.pdf.

¹⁷ Mercuria Energy Group Limited v Republic of Poland, Stockholm Chamber of Commerce, claim registered on 24 July 2008, IAReporter, Vol.1, No.8, 26 August 2008: http://www.iareporter.com; Electrabel S.A. v Republic of Hungary, ICSID Case No. ARB/07/19: http://www.worldbank.org/icsid; AES Summit Generation Limited and AES-Tisza Erömü Kft.v Republic of Hungary, ICSID Case No. ARB/07/22: http://www.worldbank.org/icsid. In the cases against Hungary, the European Commission has applied for amicus curiae participation, arguing that the long-term power purchase agreements at issue, which guarantee a return on investment, violate EU competition law.

¹⁸ Case C-205/06 Commission v Republic of Austria; Case C-249-06 Commission v Kingdom of Sweden, Decisions of the Court, 3 March 2009: <u>http://eur-lex.europa.eu</u>.

¹⁹ Case C-118/07 Commission v Republic of Finland: <u>http://eur-lex.europa.eu</u>.

²⁰ Federal Law N108-FZ amending the law "On Concession Agreements" N115-FZ (2 July 2008). See J M Hertzfeld and M K Ivanov, "Disputes Regarding Immoveable Property (Real Estate) in the Russian Federation: The Competence of Arbitral Tribunals" SCC Newsletter 2/2008.

²¹ www.encharter.org.

²² Supra note 7.

²³ The overall legal framework of the new Russian proposal remains unclear. An agreement strictly between Russia and the EU along the proposed terms does not appear politically feasible: see S Nappert, 'Russia proposes "new" Energy Charter Treaty' (2009) Global Arbitration Review, footnote 5 above.

²⁴ <u>www.encharter.org</u>: "A word from the Secretary General on the Energy Crisis of Early 2009", 13 February 2009.

²⁵ 'A spectre of litigation', The Economist, 27 March-2 April 2010, page 69.

Shale Gas, LNG and Rising Demand – Driving Global Gas Prices

By Benjamin Schlesinger*

As if there wasn't already enough talk about natural gas produced from shale formations, the flapping has intensified in the past six months. Now, even some otherwise staid, sober dull agencies, academics and geologists have gotten starry-eyed about the prospects for shale gas.

The U.S. Potential Gas Committee, a volunteer group of oil and gas developers, geologists and petroleum economists, opened the flood gates. They've quietly reassessed the U.S.'s non-proved gas reserves biannually for generations, always with about the same – but not this time. In its 2008 report (issued September 2009), the Committee suddenly raised its estimate of unproved U.S. gas resources by an astonishing 45%, from 32.7 trillion cubic metres (TCM) up to 47.4 TCM. This, together with the most recent estimate of proved reserves from the U.S. Energy Information Administration (EIA), has brought the US total to 54.3 TCM of gas remaining to be produced. All that would enable about another 86 years of U.S. gas production at current levels, i.e., likely well into the 22nd century.

But others are not as shy. The 30-year-old Virginia firm of Advanced Resources International, which estimates shale and other gas supplies based on direct field work, announced in March that the combined "resource endowment" of seven basins in the U.S. and Canada amount to 136 TCM of shale gas. Further, shale has become the lowest-cost gas resource, cheaper to drill for and produce than conventional gas. ARI's "magnificent seven" include the Barnett, Fayetteville, Haynesville, Woodford and giant Marcel-lus Basins in the U.S., as well as the Horn River and Montney Basins in British Columbia, Canada.

Before long, Europe, China and others will get into the game as well.

Finally, never one for understatement, independent U.S. oilman Fred Julander recently said, "Shale gas is the most important energy development since the discovery of oil."

LNG supplies are increasing as well, and are set to rise by 38 percent in the next three years with completion of liquefaction trains that have already begun construction. Projects that are in planning will add to this number, e.g., LNG from Australia.

Price Effects Already Emerging

What does all this mean, if it's even half true, for U.S. and global gas markets? The answer is: plenty. First, gas is gas, and supplies are, therefore, fungible as long as intercontinental transportation can be had – and transportation can be had, in fact, because



Figure 1 Spot Gas Prices Along the Atlantic, \$/MMBtu Source: BSA 2010, from World Gas Intelligence data.

rising LNG contract gas diversions and spot trading of LNG enable displacement of gas globally through exchanges and substitutions. In other words, extra supplies of gas produced in North America can, in effect, wind up in Europe, even if no ships actually export any LNG from here to there.

Spot prices bear this out. As shown in Figure 1, U.S. and NBP spot gas prices have borne a close relationship for the past year and a half (78.6% percent R-squared). With LNG diversions and substitutions, this is likely to continue, and even tighten, as U.S. overproduction of shale gas forces the price of gas down on both sides of the Atlantic.

Then what happens to gas prices in Europe? Low spot gas prices place significant commercial pressure on long-term contracts, since buyers are more inclined to use low-priced spot gas than excess gas under their base purchase agreements.

*Benjamin Schlesinger is President of Benjamin Schlesinger and Associates, LLC. He may be reached at bschles@bsaenergy.com For example, to the extent spot gas market prices undercut contract prices tied to petroleum price indices, buyers will prefer to ride along on their minimum take-or-pay volumes.

There are three major complications on the road to gas price recovery.

First, more and more LNG that would have otherwise have gone to the U.S., will attempt to go to Europe, thus raising available spot gas supply levels and putting downward pressure on prices. Some LNG that can't land in Europe will be unloaded and stored in the U.S., thus depressing Atlantic market prices anyway.



European Gas Demand Response to Recession

Source: Gas Strategies, 2010.

Second, Europe's economy is bound to recover from its present doldrums and return to normal growth levels. But until that happens - and it hasn't happened yet - industrial and power plant gas demand will be lower than usual. For example, Figure 2 shows how greatly and consistently Europe's industrial demand levels have sunk in response to the current recession. Lower demand amidst higher supplies means prices are pushed lower still.

Third, the drive toward slowing the pace of global warming may directly cause some reductions in gas demand. That's right...reductions. This is surprising because atmospheric carbon rules should favor natural gas, which emits less carbon dioxide than coal or oil when burned. But Europe's aggressive 20/20/20 program, which requires a 20 percent reduction in greenhouse gases in the next decade, could have a depressing effect on gas demand and prices. In addition to 20 percent less greenhouse gases, Europe's program would also require 20 per-

cent increased use of renewable energy and a 20 percent reduction in energy demand – all three goals to be met by 2020. The latter two components of Europe's program would more than reverse gas demand growth that might have accompanied the required reduction in greenhouse gas emissions.

Key: The Pace of Economic Recovery

Collectively, these forces may spell trouble for global gas market prices in the next several years. As shown in Figure 3, the balance of forces affecting global gas prices is likely to remain negative for some years, and even intensify as new LNG supply projects come on line in Asia, West Africa and Australia. This situation may ease, and even reverse, however, when the world's economies improve and gas demand can increase, thus begin to soak up the LNG and shale gas surpluses.

Timing and geography will be critical to how quickly the gas supply imbalance reconciles and where gas prices might recover. Looking at Figure 3, it is clear that some influences may offset one another if



Figure 3 Likely Forces Affecting Global Gas Prices Source: BSA 2010.

they evolve at the same time. In particular, the rise of gas shale production ought to go hand in hand with the implementation of carbon emission rules. This could play out in several ways:

First, in the short run, the global oversupply of LNG won't last forever because pipeline gas supplies from older producing areas will continue their inevitable annual declines. In addition, as global economies improve, sagging gas demand will revive in industries, power plants, and commercial buildings. The pace of these two forces is in question, however - many observers simply assume rising demand will soak up surplus LNG, but the devil is in the details – and timing is everything. We've seen many times that pipeline supplies just refuse to dwindle in the time predicted, which has caused unforeseen price upsets.

The shape of the economic recovery remains very much in question, as illustrated in Figure 4. In 2009, most economists believed the world was in a V-shaped recovery, with quickly rebounding growth and energy demand expected in 2010 and 2011. More recently, however, the prevailing view is that the industrialised world is facing rather a U-shaped recovery, with improvement more likely to take place in 2012-2014, thus delaying the resurgence of gas demand. Others argue that the recovery may follow a Wshaped path, i.e., that a second recession is bound to hit sometime in the next year. Luckily, few seem to believe that the world will have to suffer an L-shaped

path, i.e., no recovery at all!

Each of these 'letters' matters a great deal. The path to recovery is clearly at the heart of the gas pricing issue in the short-term. Indeed, recovery paths may differ within the industrialized world, with recovery in China and South Korea outpacing Europe, Japan and North America. Hence the LNG supply surplus, intensified by rising shale gas production, may hang around longer than expected.

Ultimate Harmony: Shale Gas with Carbon Restrictions

In the longer run, carbon rules need to recognize and embrace the growing role that gas can play through rising production from low-cost shale gas resources. In the first half of the 2010s decade, growth



Possible Shapes of Economic Recovery Source: Deutsche Bank, Adam Sieminski, 2009.

in shale gas production will take place in North America and then, later, in Europe, China, and elsewhere. But gas demand will become the paramount 'supply' issue. This is so because, unlike LNG, shale gas development is flexible, comes in much small increments than LNG supply trains, and (in North America) takes place without long-term gas sales contracts. Thus, a strong base of incremental gas demand is necessary to enable shale gas production to rise; without that, shale gas supplies will fall off.

The most important source of incremental gas demand consists of direct restrictions on emissions of greenhouse gases. As suggested in Fig. 3, carbon emission rules could become as important a contributor to the gas market balance on the demand side as shale gas is on the supply side. Again, timing is everything. If carbon rules are introduced too slowly, then shale gas development will suffer. But if carbon rules are promulgated and enforced quickly and vigorously, then shale gas development will move quickly as well.

Amidst carbon and shale gas pushing and pulling on gas prices, lie two developments that threaten to upset growth in gas demand, namely, the other two parts of Europe's 20-20-20 programme – capital funding of renewables and forced reductions in gas and energy demand. While obviously laudable, these need to be introduced in an organized way that targets high-carbon fuels, rather than natural gas – if not, their laudable effects will backfire. Replacing low-carbon natural gas with renewable resources will reduce far fewer greenhouse gases than replacing high-carbon fuels. Likewise, conserving energy demand at the expense of gas supplies or even nuclear power would not seem to make sense as a greenhouse gas reduction strategy, as opposed to replacing coal demand.

Finally, natural gas vehicles (NGV) are another potential market of importance to maintaining a balance of gas supply and demand. NGV growth needs to be encouraged alongside electric vehicles (the latter from nuclear, renewables and high-efficiency gas-fired GCGTs) so that greenhouse gas reductions will be accelerated. New NGV technologies have been quietly developed to make this easier, e.g., Johns Hopkins Applied Lab's 'flat' tank that enables NGV passenger cars with both a large boot and long-range service between fills.

Conclusions

Shale gas development is proving to be the low-cost option, lower than gas from conventional resources. The downward price effects of increased North American shale gas production are already being felt in Western European spot gas markets via rising LNG trade in the Atlantic LNG. By mid-decade, shale gas development will proceed apace in Europe and China, and there will be more of it still in the U.S. and Canada – but shale gas growth will be stifled without gas demand recovery and policies that encourage incremental gas markets, particularly for electricity generation in a context of carbon emissions rules, and NGVs.

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The Emerging Global Oil Trade Axis: The Russian Connection

By Mamdouh G. Salameh*

Introduction

In the current transparent and increasingly globalized oil markets, oil commerce has come to be shaped by transport costs rather than political relationships. As a result, the world oil trade is moving from west

to east, with demand growing most steeply in a region with few supplies. New oil balances are developing which will shape the oil market and change its geopolitics. Thus a two-forked global oil market is emerging: oil supplies from the Middle East gravitating to the Asia-Pacific region, while supplies to the Atlantic region projected to come mainly from Russia and Central Asia (see Map 1).

The Asia-Pacific region's phenomenal economic growth and its steadily rising energy demand lend urgency to the question of how the region would meet its considerable energy challenges. Oil production in the region has grown more slowly, supplying less than a third of consumption in 2008.¹ Since1995, the Asia-Pacific oil deficit – the shortfall of production over consumption – has exceeded that of the rest of the world outside the exporting countries of Russia, Central Asia and the Middle East: the Atlantic region.²

The shift of the oil deficits to the east is massive and clear. By 2030 the Asia-Pacific region's oil deficit will be seven times that of the Atlantic region, where demand will grow more slowly, even without climate change targets. And also by 2030 the Asia-Pacific deficit will be around 83% of consumption, compared to 10% in the Atlantic (Table 1).

In 2008 the Atlantic region imported 54% of its needs from other countries in the region, 22.5% from Russia and Central Asia and 20% from the Middle East. This compares with 29.5%, 5% and 59.50% respectively for the Asia-Pacific region (see Table 2).

There were striking contrasts between the oil dependence of the two regions in 2008. As Table 2 shows clearly, the Atlantic region is far more self-sufficient than the Asia-Pacific region. More than half of the Atlantic region's imports are from other countries in the region, which includes North and West Africa. On the other hand, the Asia-Pacific region's oil supply depends far more on the Middle East than the Atlantic region does.

The Turning Point

In 2008, 70% of Middle East oil was actually exported to the Asia-Pacific, while only 30% came to the Atlantic. By around 2015, there will be an entirely new situation – a tipping point – because the oil deficit of the Asia-Pacific will outgrow the surplus of the Middle East.³ By 2030 a quarter of the Asia-Pacific deficit will be met from outside the Middle East – essentially from West Africa – with some supplies from Russia and Central Asia.

However, the Atlantic oil deficit will no longer depend on Middle East surpluses but on the surpluses of Russia and Central Asia. This shift will have strategic geopolitical and commercial consequences that could be reflected in the lessening of potential tensions between the biggest oil importers in the world: the United States and China.



Source: Courtesy of the Royal Institute of International Affairs, London.

	Atlantic Region bb	Asia-Pacific Region bb
Projected oil production	43.38	7.10
Projected demand	48.18	41.30
Projected Imports (deficit)	4.80	34.20
% deficit to consumption	10%	83%
		Table 1

Projected Oil Deficit in the Asia-Pacific Region & the Atlantic Region, 2030

(bb)

Source: BP Statistical Review of World Energy, June 2009 / Author's projections.

Oil Imports 2008	% of Imports Into		
•	Asia-Pacific	Atlantic	
	Region	Region	
From other countries in the region	29.50	54.00	
From other importing countries			
(cross trade)	6.00	3.50	
From Russia & Central Asia	5.00	22.50	
From the Middle East	59.50	20.00	
		Table 2	

Origins of Oil Imports in 2008: The Atlantic Region Versus the Asia-Pacific Region

Source: BP Statistical Review of World Energy, June 2008 / US Department of Energy data / Author's calculations

* Mamdouh G. Salameh is an international oil economist, a consultant to the World Bank in Washington, DC on energy affairs and a technical expert of the United Nations Industrial Development Organization (UNIDO) in Vienna. Dr Salameh is Director of the Oil Market Consultancy Service in the UK and a member of both the International Institute for Strategic Studies (IISS) in London and the Royal Institute of International Affairs. He is also a member of the Energy Institute in London. See footnotes at end of text.

Geopolitical Implications

At the start of the 21st century it looked as if growing dependence on Middle East oil by both the United States and the Asia-Pacific region coupled with tight global oil supplies, could increase tension between the U.S. and China and could at some point in the future lead to conflict.

However, as the Atlantic region's (primarily the United States') dependence on the Middle East declines, the fear of a major physical disruption of supplies also declines and with it the possibility, though remote, of the oil weapon ever being used against western countries implicated in the Israel-Palestine question.

Those involved in Middle East politics need to review their options. The Middle East's Asian customers need not worry: their governments have no history of involvement in the complex origins of Middle East conflicts, and no immediate role in their resolutions.

Though Middle East oil will always be pivotal to the global oil trade, it will have to share its limelight with Russia and Central Asia. Therefore, Atlantic importers need to focus on the interests of Russia and Central Asia, where global oil markets and oil security will balance in the future.

The Russian Connection

However, in order for Russia to become a major source of oil supplies to the Atlantic region, it has to expand very significantly its oil production and its export routes and capacity. This needs billions of dollars of investment.

In 2008 Russia produced 9.89 million barrels of crude oil and exported almost 4.0 mbd of it and over 2 mbd of oil products. Roughly 1.5 mbd were exported via the new port of Primorsk, a port on the Gulf of Finland.

Russia has plans to raise the country's crude oil production from 9.89 mbd in 2008 to 11.23 mbd by 2015 and 11.94 mbd by 2020.⁴ But to achieve these targets, the International Energy Agency (IEA) estimates that Russia will need \$550-\$700 billion of investment in energy infrastructure by 2020.⁵ According to a study by the French oil major Total, Russia needs to spend about \$9 bn a year, or \$7 bn more than it spends now, just to replace oil that is now being produced.⁶

Russia's export routes are reaching capacity as production rises, creating an imminent need to build several major pipelines, ports and storage terminals to break the deadlock. Russia needs at least a 6 mbd of port and pipeline capacity.

Current capacity is estimated at 3.6-4.0 mbd while proposed capacity is estimated at 3.6-4.4 mbd.⁷

The port of Primorsk gives Russia a direct outlet to northern European markets, reducing dependence on routes through the Baltic countries. But the waterways through which tankers must travel, leaving from Primorsk and most other Russian export ports, limit tanker size and, therefore, the price competitiveness of their cargoes.

Proposed pipelines would carry oil from Russia's West Siberian and Tyumen-Pechora basins west and north to a deepwater terminal at Murmansk on the Barents Sea. This would enable up to 3 mbd of Russian oil to reach the United States via tankers in only nine days, much quicker than from the Middle East or Africa.⁸

The North Atlantic drift allows the port of Murmank to operate at full capacity 12 months a year. Direct access to North America would turn Murmank into a geo-strategic lynchpin.

Russian Energy Policy

Russian energy trends and policies have possible implications for U.S. energy security. An increase in Russia's energy production and its ability to export that energy westward and eastward may tend to ease the supply situation in energy markets in the Atlantic and Pacific basins. In the Atlantic region, more Russian oil could be available to the United States. In the Pacific area, there would tend to be more supply available to countries such as China and Japan. This may ease the global competition for oil from the Middle East.

The United States has an interest in Russia's large role as a supplier to world energy markets in general, in Russia's role as a possible major exporter of energy to the United States, and in the changed patterns of world energy flows that could result from the completion of new Russian oil and natural gas export pipelines and related facilities. But it is also aware of the geopolitical implications of Russia's quest to emerge as an energy superpower.

Conclusions

New oil balances are developing which will shape the global oil market and change its geopolitics. As

a result, a two-forked global oil market is emerging: oil supplies from the Middle East gravitating to the Asia-Pacific region, while supplies to the Atlantic region are projected to come mainly from Russia and Central Asia and also from the Atlantic basin.

In 2008 the Atlantic region imported 54% of its needs from other countries in the region, 22.5% from Russia and Central Asia and 20% from the Middle East. This compares with 29.5%, 5% and 59.50% respectively for the Asia-Pacific region.

By 2030 the Asia-Pacific region's oil deficit will be seven times that of the Atlantic. And also by 2030 the Asia-Pacific deficit will be around 83% of consumption, compared to 10% in the Atlantic. However, the Atlantic oil deficit will no longer depend on Middle East surpluses but on the surpluses of Russia and Central Asia. This shift will have strategic geopolitical and commercial consequences that could be reflected in the lessening of potential tensions between the biggest oil importers in the world: the United States and China.

Though Middle East oil will always be pivotal to the global oil trade, it will have to share its limelight with Russia, Central Asia and West Africa. Therefore, Atlantic importers need to focus on the interests of Russia and Central Asia, where global oil markets and oil security will balance in future.

Footnotes

¹ BP Statistical Review of World Energy, June 2009, pp. 8 & 11.

² John Mitchell, New Oil Axis, the World Today, March 2010, p. 9.

³ Ibid., pp. 10-11.

⁴ Sergei Blagov, Will Russia Be Able to Sustain Its Oil Production at Current Levels? Eurasia Daily Monitor, May 9, 2008.

- ⁵ Commodity online, 3 October, 2008.
- ⁶ Newsweek, Dec. 31/Jan. 7, 2007, p. 54.

⁷ Mamdouh G Salameh, Russia: An Aspiring Energy Superpower With Feet of Clay (a paper to be presented

at the 29th USAEE/IAEE North American Conference at Calgary, Canada, 14-16 October 2010).

Ibid., p.14.

Report from the Nigerian Association for Energy Economics Student Chapter

The Students affiliate of NAEE was officially inaugurated on the 20th April, 2010, during the 3rd annual NAEE/IAEE international conference held between 19th and 20th April, 2010 at New Chelsea hotel, Abuja, Nigeria.

The inauguration programme was conducted by Professors Akin Iwayemi and Adeola Adenikinju- the NAEE President and Vice President respectively. There were over sixty (60) students from Nigerian Universities at the conference apart from the important dignitaries from all walks of life who came to grace the occasion.

The executives of the students affiliate held their first meeting on the 11th June, 2010, and recorded a huge turn-out. The meeting was conveyed by the president. Critical issues that relate to the activities of the students and general administration of the students wing were articulated and discussed. Minutes of the meeting was later presented to Professor Adeola Adenikinju by the president for further scrutiny and approval.

The names and posts of the officers are listed below:

Joseph Ayoola Omojolaibi
Olusegun Akin Omisakin
Lola Olarinde
Ire Owulo
Vivian Igbogema
Augustine Osigwe
Gbenga Peter Sanusi

President Vice President General Secretary Treasurer Financial Secretary P. R. O Auditor omojo_laibi@yahoo.com brightolusegun@yahoo.com lclassified@yahoo.com Winnnigone2003@yahoo.com egunonline@yahoo.com onyi2amaka@yahoo.com petersbanks1@yahoo.com









FRENCH CHAPTER SPRING WORKSHOP May 3rd, 2010 Université Paris – Dauphine

IAEE French and Swiss Student Chapters Initiative for Common Workshops in 2010

This new initiative was created, with the support of the IAEE, the FAEE and the SAEE, in order to improve the links between IAEE Student Chapters and to promote a closer collaboration in the areas of energy and climate change within the EU; to ease the contact between European PhD students in order to foster future links and collaboration; to allow PhD students to present their works/ projects and give them the possibility to improve their research thanks to the obtained feedbacks and remarks of professors and representatives from major firms and organisations in the area of energy and climate. Directly inspired by the FAEE PhD students seminar, this initiative creates twice a year a common seminar in English: the first, in spring in Paris and the second in autumn in Zurich.

The first seminar, held in Paris, at Université Paris-Dauphine on the 3rd May was organized around six presentations. The Morning presentations were dedicated to energy issues and the afternoon session was focused on renewable energy – carbon markets. Around twenty attendees were present, including professors: P. Geoffron, F. Lantz and S. Meritet and Anne-Laure Levet from Conseil Français de l'Energie and Anne-Marie Epstein from Revue de l'Energie.

The Swiss Student Chapter guests Florian Kienzle and Thomas Geissmann presented respectively their works on "Location-Dependent Valuation of Energy Hubs with Storage in Multi-Carrier Energy Systems" and "Technical and economic analysis of a solar thermal power plant in Switzerland".

The other presented topics were as follows: "Interdependence of electricity markets, energy policies and non cooperation costs in EU", by Morgan Villette (Université Paris–Dauphine, CGEMP); "Will more competition at the retail level of the European natural gas industry necessarily drive down prices for final consumers?", by Bertrand Charmaison (Toulouse School of Economics); "Impacts of oil product demand and CO2 price uncertainties on investment in biomass pre-treatment units to supply second generation biofuel units: the French case study", by Elodie Lecadre (IFP and Université Paris Ouest Nanterre); "Burden Sharing: Estimating Global Demand and Supply Flows of Carbon Emission Reductions for 2020 and 2050", by Iva HRISTOVA (Université Paris-Dauphine, CGEMP).

There were interesting and enriching exchanges and we hope that this is just the beginning of a enriching collaboration between EU Student Chapters.

Russian Oil–A Long Term View

By Leonard L. Coburn*

Russian oil production is hitting historic highs today; however, the long-term question is the ability of the Russian oil sector to maintain these high levels. In March this year, Russian oil production hit 10.12 million barrels per day, a post-Soviet high. Russia's latest energy strategy issued in the autumn of 2009, calls for Russian oil production in 2030 to be 11 million barrels per day, about 10 percent greater than today's production. Can Russia achieve this increase?

Despite an increase of only 10 percent in Russian oil production by 2030 from today's levels, it represents a significant challenge to the Russian oil sector. Most of today's oil production comes from West Siberian oil fields, fields that have been producing oil for decades. Many of these fields have been rehabilitated during the past ten years and are largely responsible for the enormous 50 percent increase in Russian oil production during the last decade. But many of these fields have been substantially depleted and are nearing the end of their useful lives. To reach the goal of 11 million barrels per day, the Russian oil industry will have to find large amounts of investments to keep Western Siberian fields producing while developing new production in East Siberia, Sakhalin, Caspian and extreme Northern fields.

Attracting investment in Russia's oil industry has been a challenge. In 2009, only 60 percent of planned investments were realized in the energy sector as a whole (both oil and gas). While the oil sector has experienced significant investments, they have not been sufficient to stem the high depletion rates of old West Siberian fields, which are about 80 percent depreciated. To meet the goals of the 2030 strategy, four questions must be answered: How much money is needed? Where will this money come from? How much oil does Russia have to meet its future goals? Where is the oil located?

According to the Russian energy strategy, \$600 billion must be invested in the oil industry through 2030 (in 2007 dollars). To break down this enormous number, the strategy assumes for the exploration and production (E&P) sector \$110 billion will be needed from today to 2016, an additional \$110 billion will be necessary from 2016 to 2022, and finally another \$275 billion from 2022 to 2030. The remaining \$105 billion will be needed in refining, transportation and marketing. According to the strategy, most of the E&P investment (approximately 70 percent) will have to be made in East Siberia and Sakhalin due to the very high cost development in those regions. To compare this government estimate with a private sector forecast, Lukoil estimated that \$1 trillion would be needed over the next twenty years just to maintain Russian production at the 10 million barrels per day level.

Before answering the question of where the money will come from, the answer to the third question is there is enough oil to reach the 2030 goal—appears to be yes, there is plenty of oil still to be developed. The strategy indicates that to reach its goal, 77 billion barrels of oil, a cumulative total, will have to be produced by 2030 if Russia increases its production to 11 million barrels per day by 2030. Today, Russia has a productive capacity of about 30 billion barrels. According to the strategy, if \$600 billion in investments are made, this new investment will lead to an additional 91.5 billion barrels productive capacity through 2030. This new capacity will be implemented in stages with most of the new productive capacity in West Siberia (45.4 billion barrels), East Siberia (18.8), European North (4.6), and other areas that include Sakhalin, Volga/Urals, and Caspian (22.7 billion barrels). If all investments are made according to the Russian energy strategy, Russian oil productive capacity will total over 120 billion barrels (new plus existing capacity). This is more than enough to meet the goal of 77 billion barrels (11 million barrels per day by 2030), with over 40 billion barrels remaining that can be produced in the post 2030 period.

But this analysis assumes sufficient reserves and sufficient investment. Are there reserves to meet these goals? BP's yearly analysis of world wide reserves indicates that Russian proved oil reserves amount to 79 billion barrels. There are large areas of undeveloped reserves that are not included in this total. Other analysts say that with enough investment in higher cost regions, Russia could meet its future needs.

This brings us back to the most important question, where will the money come from to meet the investment needs of Russia's long term strategy? In resolving this question, Russia's fiscal and tax policies play an important role. Since 2004, Russia has put in place an extremely high tax regime to meet its budgetary needs. For exported oil, Russia takes 90 percent of revenues in total taxes on the marginal barrel

produced and exported. For all oil on an average basis, Russia's taxes take about 60 percent or more of revenues. To provide some numbers to this analysis, one recent analyst indicated that for the last eight years, Russia's gross oil revenues were about \$1 trillion. Of this, about \$700 billion went directly to taxes and only

*Leonard Coburn is President of Coburn International Energy Consultants. He is a past president of IAEE and may be reached at: coburnel@msn.com about \$150 billion could be considered net income. Out of the \$150 billion, only \$50-70 billion was reinvested in the domestic oil industry. Many of the large Russian oil companies moved their investments offshore rather than put their money back into Russia. The state controlled companies—Gazprom and Rosneft—are not putting sufficient amounts of their profits back into the domestic industry to meet future goals. Foreign investment in the Russian oil sector has been declining sharply due to Russia's policies of renationalizing oil assets, limiting where investments can be made by declaring most important oil fields strategic (a designation of strategic severely limits foreign participation in the deposit), and undermining the investment environment through a variety of hardball tactics, high levels of corruption and weak rule of law. The level of risk is much too high for large foreign investments in Russia today. While Russia has provided some tax incentives for new fields in East Siberia, these investments have been viewed as inadequate to draw the kind of investments from both Russian and foreign companies necessary to sustain long-term production. Thus, it is questionable whether Russia will be able to attract the level of investment necessary to meet its long-term goals. If this is true, then Russia's long-term energy strategy is in doubt.

Energy, Economy, Environment: The Global View

Proceedings of the 32nd IAEE International Conference, San Francisco CA, June 21 to 24, 2009

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Please send me_____copies @ \$130 each (member rate) \$180 each (nonmember rate). Total Enclosed \$_____Check must be in U.S. dollars and drawn on a U.S. bank, payable to USAEE. The last question is where is the oil located that will be developed? Today, the attention in the Russian oil industry is on East Siberia. Tax incentives, pipeline infrastructure, and investments have been focused making East Siberia the future for Russian oil production. But some analysts do not think that is where Russia's future lies. These analysts think that West Siberia, Timan Pechora (northern provinces of Russia) and the North Caspian are the regions with the most oil. These analysts estimate that East Siberia only has about five billion barrels of oil reserves, far less than estimated in the Russian energy strategy.

The future for the Russian oil industry rests on answering the four questions in a way that supports its strategy to 2030. The strategy estimated that \$600 billion is needed, while one private Russian company estimated that \$1 trillion is necessary. In either case, the level of investment necessary is enormous. The strategy indicated that in addition to the current productive capacity of 30 billion barrels, another 77 billion barrels will be needed to increase overall oil production to 11 million barrels per day. Most analysts conclude that Russia has more than enough oil resources (proved reserves and yet to be developed oil) to meet its expectations. While today's focus of development is on East Siberia, a region that must be developed to meet future needs, some think that more should be going into the traditional regions of Russia and especially West Siberia. Of the four questions raised in this article, the big question mark is where the money will come from to meet Russia's future goals. Today, both domestic and foreign investments are inadequate. Russia will have to change its investment environment to provide the incentives and stability necessary to attract the level of investment necessary to meet its future goals. Without changes, achieving the oil production goals of Russia's energy strategy to 2030 is in doubt.

The 2008 Renegotiation of Kazakhstan's Kashagan PSA Field and the Events that Led to It

By Nathan Reich*

Introduction

After obtaining independence in 1991, Kazakhstan rapidly sought to develop its potential as a supplier of oil to world markets: it created a friendly investment environment, initiated progressive domestic reforms, and joined a range of western economic, political, and military organizations. Kazakhstan thus demonstrated a desire to become a member of the international community, a strategic partner of the EU and U.S., and a destination for western international oil companies (IOCs). Yet in 1998, as world oil prices recovered from their lowest point in over a generation, the Kazakh government changed from a cooperative to a confrontational regime. This shift is perhaps nowhere more evident than in its oil and gas sector. Between 1998 and 2008, the Kazakh government fined IOCs upward of \$4US billion,¹ unilaterally revised signed project sharing agreements (PSAs). changed numerous national laws despite international protest, and forced the consortium of energy companies developing its giant Kashagan field to renegotiate the terms of their contract.

Observers have variously interpreted the significance of these events. Some see in this shift from cooperation to confrontation a government that plans to nationalize its oil and gas sector; others see no grand design but merely a duplicitous pursuit of wealth; still others see a legitimate use of authority to correct for previous contractual and legal mistakes. Observers have often based their conclusions on analyses of historically isolated events. One paper has sought to be historically thorough. But the credibility of that investigation is in doubt since its authors use potentially unreliable statements by Kazakh officials to make their case. And its usefulness is limited since the report's chief conclusion is opaque.²

This paper argues that the Kazakh government's behavior toward IOCs should be seen as a case of *constrained resource nationalization*. This concept highlights the role that capacity asymmetries play in bringing together IOCs and emerging resource-rich countries: IOCs have what emerging resource-rich countries need, namely, the overall capacity to bring technologically and environmentally challenging fields on line.³ The absence of this capacity constrains the host government from nationalizing its resources. This concept also highlights the tenuous nature of the contractual agreement in politically risky states: if an emerging resource-rich country acquires the capacity to explore, develop, and produce its own resources, then, in the absence of powerful countervailing forces, it will likely nationalize them.

This paper begins with a brief history of the world's current energy system. It then offers a theory of state behavior. This theory is used to model the behavior of resource-rich emerging states. Model-based predictions are used to test whether the theory explains Kazakhstan's behavior. Conclusions are then offered.

The World's Energy System, 1948-2008

...the energy system is again on an unsustainable path, threatening the political, economic, and social stability necessary for continued world progress.

Henry Kissinger, speech at IEA Ministerial, 14 October 2009

The world's energy system is dynamic. Some periods in the history of the world's energy system are profoundly unstable; others offer such energy peace that empires themselves can rise. The rise of the United States as the world's largest oil producer in the first half of the 20th century marks an era of energy peace. The second half of the 20th century, by contrast, marks an era of energy peril. In the 1950s, the United States became a net importer of oil. In the 1960s, most of the world's known oil reserves shifted hands from IOCs to autocratic states at political loggerheads with the west. The precariousness of this

arrangement culminated in the 1973 Arab oil embargo; a second oil crisis in 1979; and the Carter Doctrine of 1980. After oil prices collapsed in the early 1980s, leading OPEC members to adjust their policies to market realities, the U.S. entered a second era of energy peace, one in which global oil production capacity generally exceeded global demand. This second era of energy peace lasted nearly twenty years (see graph on next page).⁴

As we begin the second decade of the 21st century, global energy security is again threatened. Sources of instability are numerous but one is fundamental: demand for energy is projected to exceed the supply of it. As Fatih Birol,

See footnotes at end of text.

^{*} Nathan Reich is a graduate student in the Jackson School of Geosciences at the University of Texas, Austin. Special thanks to Christopher Jablonowski, Dennis Trombatore, Eugene Gholz, Ilias Bantekas, and Gary Cameron. The author is solely responsible for any errors of fact or interpretation. Reich may be reached at: <u>nathan.m.reich@mail.</u> <u>utexas.edu</u>



Chief Energy Economist of the IEA, said recently, "If all those projects which are already funded [are] implemented...12.5 million barrels a day are still missing....This gap means that we could face a supply shortage and very high prices during the next years."⁵ Consequently, consumers must look to riskier "oil provinces for the new oil to balance out the global market."⁶ In-adequate investment in oil-rich regions along with rising global demand has heightened the value of marginal oil lands, granting previously ignored nations international leverage and a path to prosperity.

A General Theory of State Behavior Applied to Emerging Resource-rich Countries

As a rule, states seek to magnify their power using whatever means they deem appropriate. From hermit states to the most expansive of empires, this rule seems to allow of no violation

since all powers, whether focused inward on increasing domestic strength or outward on foreign acquisition or influence, whether by consent or force, seek to control their environment, and thus not merely to survive but to prosper. This general rule of state behavior may be tailored to resource-rich emerging states.

Emerging states lack an efficient manufacturing base, a large, skilled, and specialized labor force, and effectively functioning government. Underemployment, dramatic wealth and opportunity inequity, ineffective taxation, an amalgam of overlapping, often contradictory laws, and the concentration of power in a few hands tend to be some of their more prominent features.⁷ They also lack the domestic capacity to effectively explore, develop, and produce their natural resource endowment. They must, therefore, look abroad for assistance.

Our tailored rule implies that foreign entities cause an emerging power to select behaviors based on how those entities value its resources. This causal relationship may be modeled. The independent vari-



able (IV) is the value set by foreign entities upon the emerging state's oil endowment; the dependent variable (DV) is the behavior of the emerging state. The intervening variable (IntV) specifies the transmission mechanism whereby foreign perceptions cause the state's behavior.

But the model does more than merely describe the causal efficacy of foreign valuation. It suggests that resource nationalization is the natural strategic objective for a resource-rich emerging state, since all states seek to maximize their power. As

the intervening variable indicates, the emerging state must first partner with a foreign entity before it can pursue a strategy of resource nationalization. To clarify, a "high" value on the IV causes a "yes" value on the IntV, which causes a "high" value on the DV. "Moderate" and "low" IV values follow an identical horizontal path across the diagram (i.e., moderate \rightarrow uncertain \rightarrow moderate; low \rightarrow no \rightarrow low).

Predicting the Historical Record: What We Should Find if the Theory is True

If our model explains Kazakhstan's behavior, we should find in the historical record evidence that:

- Kazakhstan created a friendly investment environment in order to attract foreign companies to explore, develop, and produce its oil.
- As oil prices rose, the Kazakh government used various means to increase its share of oil profits.
- · Kazakhstan's leadership views its oil as a geostrategic resource.
- Nazarbayev confided in advisers his plans to nationalize the country's oil and gas sector.

Chronology

The following chronology centers on the exploration and development of the Kashagan structure from the early 1970s to 2009 while bringing in relevant surrounding events. "Green" highlights oil price developments; "yellow" consortium history and contractual activities; "red" Kazakh government actions to increase oil revenues; and "blue" demarcates decades.

Date	Event
1970-1979	
early 1970s	Soviets discover Kashagan but do not drill because of environmental concerns, high cost, and geologic complexity.
1980-1989	
1990-1999	
17 Dec 1991	Kazakhstan signs Energy Charter. ¹
25 Dec 1991	Kazakhstan obtains formal independence from Russia.
1992	Kazakhstan joins North Atlantic Cooperation Council. ²
15 Dec 1992	Kazakhstan helps found Commonwealth of Independent States. ³
30 Jan 1992	Kazakhstan joins Organization for Security and Cooperation.
March 1993	Kazakh government founds KazakhCaspiShelf (KCS), a state-owned company designed to oversee O&G development in Kazakhstan's Caspian Sea territory. ⁴ Kazakh government invites Eni (Italy), BG Group (UK), BP (UK), Statoil (Norway), Mobil (USA), Shell (UK), Total (France), and KCS to undertake seismic surveys and environmental studies of the north Caspian Sea.
March 1993	Spot price oil just over \$20US/bbl (West Texas Intermediate, FOB)
13 Dec 1993	Kazakhstan joins International Atomic Energy Agency. ⁵
14 Feb 1994	Kazakhstan signs Charter on Democratic Partnership.6
1994	Kazakhstan changes legal system to attract foreign investment.7
1994	IOCs initiate 3 year seismic survey of north Caspian. Parker Drilling initiates 5 year research project into drilling for oil in same while meeting "strict environmental regulations"; research team includes Kazakh, Russian, and other scientists.
1995	Kazakhstan joins NATO's Partnership for Peace.8
1996	Kazakhstan signs Comprehensive Test Ban Treaty; applies for admission to WTO (to date not admitted).9
1996	World Oil estimates Kazakhstan's reserves at 10-20 million barrels.
Nov 1997	After seismic exploration, IOCs and Kazakh government form joint operating company, Offshore Kazakhstan International Operating Company (OKIOC), and sign the North Caspian Sea PSA to explore and produce hydrocarbons on Kashagan prospect. OKIOC includes: Eni (Italy, 14.28%), BG Group (UK, 14.28%), Mobil (USA, 14.28%), Shell (UK, 14.28%), Total (France, 14.28%), BP (UK 9.52%), Statoil (Norway, 4.76%), and Kazakh Government (14.28%). ¹⁰ Budget for Kashagan exploration and development over 40 year life of PSA projected at \$57US billion.
Aug 1998	Kazakh government sells stake in OKIOC to consortium. Government will receive 80% of profits from sale of oil. Inpex (Japan) and ConocoPhillips (USA) enter consortium, purchasing Kazakhstan's 14.28% share for \$500 million.
10 Dec 1998	Spot price on oil drops to \$10US/bbl
4 Sep 1999	OKIOC spuds Kashagan East Well at depth of 5000 meters; estimates as high as 4 billion barrels of oil (BBO). American officials worry that the discovery will accelerate competition between US and Russia for control over future pipelines from Central Asia.
2000-2009	
Jan 2000	Spot oil price nearly \$30US/bbl. ¹¹
16 Oct 2000	Oil analysts suggest that Caspian reserves may be large enough to provide alternative to Persian Gulf supplies.
Jan 2001	Spot oil price holds at \$30US/bbl
July 2001	"Contrary toU.SKazakhstan tax treaty," the Ministry of Finance assesses Parker Drilling for USS29 million in unpaid taxes. ¹² Parker files lawsuit against Kazakh government, and wins in April, 2002, ¹¹
Feb 2001	Agip Caspian Sea B.V., a subsidiary of Eni, is selected by OKIOC consortium to act as sole operator of Kashagan. OKIOC is renamed Agip Kazakhstan North Caspian Operating Company (Agip KCO). Kashagan expected to produce commercially by 2005.
2001	BP (9.52%) and Statoil (4.76%) sell shares in project; consortium partners, using preemption rights, purchase BP and Statoil shares. New distribution: BG (16.67%), Eni-Agip (16.67%), ExxonMobil (16.67%), Shell (16.67%), Total (16.67%), Conoco-Phillips (8.33%), and Inpex (8.33%).
15 June 2001	Kazakhstan and China found Shanghai Cooperation Organization.
2001	Kazakh government creates Kazakhstan National Fund ¹⁴
Dec 2001	Kazakhstan signs Energy Partnership Declaration with the United States. ¹⁵
Jan 2002	Spot oil price falls to \$21US/bbl
June 2002	Kashagan declared commercial; BG sells share (16.67%).
June 2002	Kazakh government stakes claim on BG share, causing two years of negotiations with Agip KCO, and works to change national law governing preemptive rights so that the state oil company, KazMunayGaz (KMG), can buy back into consortium. ¹⁶
July 2002	After 2-year appraisal program, Kashagan's reserves are placed at 7-9 BBO; 9-13 BBO with secondary recovery.
7 Oct 2002	Kazakhstan joins Armenia, Belarus, Kyrgyzstan, Russia, and Tajikistan in founding the Collective Security Treaty Organization.
Oct 2002	Agip KCO selects Karabatan as location to build plant to process gas from Kashagan. ¹⁷
Nov 2002	Public break between Kazakh government and ChevronTexaco as the government seeks to "revise agreements unilaterally"; revision would divert oil profits to government rather than to expanding oil production. ¹⁸
25 Nov 2002	Agip KCO plans sulfur recovery projects at Kashagan: 3 trains, each handling 1,900 tons per day. Project completion expected in 2006.
Dec 2002	Tengiz/Chevroil ¹⁹ is fined \$71US million by Kazakh court for "ecological damage" (in 2003 fine reduced to \$7US million). Parker Drilling warns Kazakh government that it will stop drilling if disagreement between Tengiz/Chevroil and Kazakh government pesists. Agip KCO also threatens to suspend work if the government seeks to unilaterally revise signed agreements.
Jan 2003	Spot oil price rises to nearly \$35US/bbl
Jan 2003	Government introduces new foreign investment law, which "offers fewer protections to foreign investors and limits exemptions from customs fees to one year, with extensions limited to no more than five years[and removes] the right to international arbitration to settle disputes." ²⁰
March 2003	Kashagan first oil now expected in 2006 or 2007. BG seeks to sell share (16.67%) to China National Offshore Oil Company (CNOOC) and Sinopee, for \$1.23US billion. Agip KCO partners exercise right of first refusal, denying CNOOC and Sinopee membership in Kashagan

Jan 2004	Spot oil price rises to \$36US/bbl
1 Jan 2004	Kazakh government changes tax policy: excess profit tax contracts are now "subject to taxes and other obligatory payments in accord with the tax legislation in effect on the date the tax liabilities arise," ¹¹
1 March 2004	Kashagan first oil postponed until 2008. Capital investment costs for full field development over 15 year horizon estimated to range from \$29US to \$30US billion; development plan "addressessevere climatic conditions, sensitive environment, high reservoir pressure, hydrogen sulfide content, relative remoteness, and lack of established infrastructure," including construction of onshore Kashagan-gas processing facilities and offshore facilities for raw gas reinjection. ²²
2004	IOCs pay fine of \$150US million to Kazakh government for Kashagan delays; both parties agree that the 2005 production start date was "unrealistic,"
2004	Kazakh government adopts new law concerning "environmental contraventions."
2 July 2004	Kazakh government impounds Parker Drilling's "Sunkar" barge rig, alleging \$6US million in unpaid duties. ³³ The Oil and Gas Journal reports that this may be a "strong-arm tactic" to ensure that the Kazakh government obtains BG's share (16.67%).
Nov 2004	Kazakh government changes legislation governing preemptive purchase rights. KazMunayGaz can now buy back into Agip KCO.
Jan 2005	Spot oil price rises to \$49US/bbl
2005	Between 1998 and 2005 the "imputed value" of the Kashagan field rose from US\$3.5 billion to US\$7.4 billion. 24
14 March 2005	Kazakhstan agrees to purchase half (8.33%) of BG's share in Agip KCO. Consortium members will share the remaining half (8.33%).
31 Aug 2005	Nazarbeyev announces that contracts signed with foreign investors will not be revised; and that Kazakhstan's labor force, which has obtained sufficient training, will in future likely undertake oil E&P on its own. ²⁵
3 July 2005	Kashagan's resource in place estimated to be 39.6 BBO.
Jan 2006	Spot oil price rises to US\$68/bbl
March 2006	Eni increases production cost of Kashagan to US\$33-\$35 billion "because of weakened dollar and higher equipment costs."26
11 Oct 2006	Agip KCO receives three certifications by independent audit in recognition of its business, environmental, occupational and employee safety management systems. ²⁷
16 Oct 2006	Eni will present revised development schedule and budget to Agip KCO by end of 2006. Eni's CEO Paolo Scaroni explains that delayed production of Kashagan is due to implementation of additional "environment and health protection measures."
Jan 2007	Spot oil price falls to \$60.77
1 Aug 2007	Kazakh government suspends Kashagan project for three months, citing "environmental concerns." Nurlan Iskakov, Kazakhstan's Minister of Environmental Protection, claims that further work on project will cause "irreversible ecological damage." ²⁶
27 Aug 2007	Iskakov states that Agip KCO's work may be stopped over environmental concerns.
29 Aug 2007	Agip KCO submits new budget and timeline for Kashagan to Kazakh government, elevating costs from \$57US billion to \$136US billion and postponing commercial production from 2008 to latter half of 2010. ²⁹
10 Sept 2007	Kazakh government threatens further suspension of Kashagan project, claiming environmental violations and breach of contract; asks for "adequate compensation" for cost overrun and production delays; and expresses interest in having KazMunayGaz become joint operator of Kashagan project.
26 Sept 2007	Kazakh parliament accepts amendments to Law on Subsurface and Subsurface Use. Amendments give Kazakh government the right to unilaterally review and break contracts with subsoil users if those contracts are judged to threaten the contry's national and economic security. ¹⁰ European Commission initiates review to determine whether changed subsoil laws conflict with the Energy Charter Treaty; questions also raised about the constitutionality of amended subsoil laws. ³¹
1 Oct 2007	Despite rising costs, the Kazakh government demands the profits they would have received in 1997 when they signed the North Caspian Sea PSA; and fines TengizChevroil \$609US million for environmental violations.
8 Oct 2007	Minister of Energy and Mineral Resources, Sauat Mynbayev, states that Kazakhstan may drop its demand to make KazMunayGaz joint operator of Agip KCO; he sees no reason for the western consortium to cease work on the Kashagan field.
15 Oct 2007	President Nazarbayev reiterates that his government will not revise the terms of its contract with Agip KCO, but also states that Kazakhstan "reserves the right" to reconsider/renegotiate/annul contracts with foreign companies that break their contracts.
1 Nov 2007	Kazakh government announces that Agip KCO may be fined an additional \$10US billion for Kashagan production delays.
Jan 2008	Spot oil price nearly filts \$100US/bbl.
1 Jan 2008	New contract for the development of the Kashagan doubles KazMunayGaz's share from 8.33% to 16.66% and reduces other partner shares. Agip KCO will pay Kazakhstan between \$2.5US and \$4.5US billion for project delays. New contract changes Eni from sole operator to partial operator, sharing responsibility with ExxonMobil, Royal Dutch Shell, and Total.
1 April 2008	Kazakh government agrees to pay Agip's IOCs \$1.78US billion for its 16.66% share, a price judged to be well below market value. ³²
8 June 2008	Kazakh government and Agip KCO postpone first oil until 2013; Agip KCO commits to pay floating royalties linked to the price of oil. Expiration date for Agip KCO PSA is 2041.
3 July 2008	Spot oil price hits \$145.31US/bbl
Jan 2009	Spot oil price falls to \$42US/bbl
2 Feb 2009	The North Caspian Operating Co. BV (NCOC) replaces Agip KCO as the operator of the Kashagan field. Members include KazMunayGaz (16.18%), Eni (16.18%), Total (16.18%), ExxonMobil (16.18%), Royal Dutch Shell (16.18%), ConocoPhillips (8.4%), and Inpex (7.55%). Under contractual terms effective as of January 22 ^{ad} , 2009, NCOC will "manage planning, coordination, reservoir modeling, conceptual studies, appraisal plans, early development plans, and government interfaces."

Analysis of Predictions

...Kazakhstan...seeks to secure investment while retaining control of [its oil and gas] sector, but there is no agreement on how this can be accomplished.⁴⁰

Mark Kaiser and Allan Pulsipher

Earlier I listed four predictions. These predictions specify observations we should make if our model explains the Kazakh government's behavior. Below each prediction is examined.

Prediction 1. The above chronology shows that Kazakhstan aggressively sought to develop an investment friendly environment immediately after obtaining its independence from Russia (1991), when average world oil prices were relatively low (\$20bbl, 1993) and Kazakhstan's oil reserves were believed to be relatively trivial (10-20 million barrels, 1996). Between 1991 and 1996, Kazakhstan passed several

laws to encourage foreign investment. These allowed foreign firms to participate in nearly every sector of its economy, providing them with duty free imports, total tax relief or substantial tax breaks, guarantees against future changes to Kazakh law, and customs exemptions.⁴¹ Over the same time period, Kazakhstan entered an array of western cooperative military, economic/energy security, and trade organizations, including the Energy Charter Treaty, NATO's North Atlantic Cooperation Council and Partnership for Peace, the OSCE, the Charter on Democratic Partnership, and the IAEA. IOCs responded by entering Kazakhstan to explore, develop, and produce its resources. For nearly eight years they were not fined. Evidence strongly confirms prediction 1.

Prediction 2. The year 2000 defines an inflection point in Kazakh-IOC relations. In the year 2000, world oil prices began to recover from a low of \$US10/bbl and estimates of Kashagan's resource in place jumped from 4 BBO to 8-50 BBO, leading observers to suggest that Kazakh oil may offer an alternative to Persian Gulf supplies. Kazakh authorities responded to the rise in price and international interest by taking lawful and (arguably) unlawful actions to increase the country's revenues from its oil and gas sector. Between 2000 and 2008, world oil prices rose (from \$US30 barrel to \$US145 barrel) along with Kashagan reserve estimates (from 4 BBO to 13 BBO using enhanced recovery). Over this same period, the Kazakh government charged IOCs with a variety of crimes (tax, duty, and environmental), leading to prolonged negotiations and court battles. It also fined IOCs in excess of \$US4 billion; gave itself the legal right to unilaterally revise/annul previously signed PSAs; used strong-arm tactics to force IOC compliance (e.g., impoundment, work suspension on fabricated environmental charges); increased tax rates on IOC activities; and forced a renegotiation of the terms of the original Kashagan PSA. Evidence strongly confirms prediction 2.

Prediction 3. Kazakh authorities view international competition over their energy resources as an opportunity to magnify the country's power, prestige, and prosperity. Known as "Kazakhstan 2030," Nazarbayev has implemented an ambitious plan to make Kazakhstan one of the fifty most competitive countries in the world. His plan substantially depends on oil revenues.⁴² The rising value foreign entities (the U.S., the EU, Russia, India, China and Iran) have placed on Kazakhstan's oil resources and their competition for regional influence and access to resources, has enabled Kazakh authorities to act with little regard for the concerns of western investors and IOCs. As Kazakhstan's former energy minister Vladimir Shkolnik put it: "You do not like it – leave. There is already a whole line of those desiring Kazakhstan's oil fields." Evidence strongly confirms prediction 3.

Prediction 4. We have no access to recordings of conversations held privately between Nazarbayev and his ministers, but public statements and actions do suggest that Kazakh authorities hope either to nationalize the country's resources or to drive off the IOCs now involved in their development. In 2005, Nazarbayev declared that Kazakhstan would in future take over the exploration, development, and production of its energy resources. Having obtained the requisite training from oil and gas companies, it was merely a matter of acquiring the financial wherewithal to do so. Two years later, the Kazakh government threatened to increase its share in OKIOC from less than 10% to 40% and to take over as joint operator. They relinquished this demand, but not without doubling their share in the Kashagan project and strengthening the operations role of the state oil company. With the recovery of world oil prices and the discovery of Kazakhstan's giant oil reserves, the Kazakh government has consistently been hostile toward IOCs, suggesting that it would rather conduct its oil and gas operations without them. As Shkolnik's comment suggests (see prediction 3), the Kazakh government feels that competition for access to its resources has given it leverage. Taken together, these statements and actions suggest that the Kazakh government does not feel beholden to the IOCs, but they do not decisively confirm or disconfirm prediction 4. The statements referenced here were made publicly, not privately, and may have been calculated to produce an effect rather than to communicate a purpose.

A Case of "Constrained Resource Nationalization"

If the Kazakh government plans to nationalize its resources, why haven't they done so already? As the above chronology and discussion demonstrate, nationalization has not been avoided because of a collegial relationship between Kazakh authorities and the IOCs. Considering the improved overall capacity of the Kazakh government to explore and develop its own resources and its ambitious domestic economic and foreign policy objectives, the most plausible explanation is that it depends on the IOCs. As Tanya Costello of Eurasia Group has observed, "Although the...government...[has] pushed for an increased role in the oil sector...the state is unlikely to want to take on the financial and technical challenge of Kashagan."⁴³ But partnering with IOCs has enhanced Kazakhstan's ability to undertake fundamental oil and gas activities. If it obtains the financial wherewithal to shoulder the costs of E&P, an essential constraint on its behavior will be removed. Freed of this constraint, chances are it will nationalize its oil and gas resources. The Kashagan should, therefore, be viewed as a case of *constrained resource nationalization*.

As Kazakhstan's oil and gas sector matures, evidence will confirm or disconfirm whether our model of resource-rich emerging states explains the Kazakh government's behavior. Given its record, it is likely that Kazakhstan will use rising world oil prices to force changes to existing PSAs; that these changes will increase the rate of technology transfer and government margins; and that the Kazakh government will ultimately pursue a policy of resource nationalization, thus maximizing its oil and gas revenues while minimizing outside interference in its affairs.

Footnotes

¹ \$4US billion consists mainly of fines against IOCs developing the Kashagan, 1997-2008, and may significantly understate the total amount the Kazakh government fined IOCs countrywide over this same time period.

² Campaner, Nadia, and Shamil Yenikeyeff. 2008. "The Kashagan Field: A Test Case for Kazakhstan's Governance of its Oil and Gas Sector." The Institut Français des Relations Internationales. October. <u>www.ifri.org/files/Energie/Kashaganbis.pdf</u>. Campaner and Yenikeyeff conclude that "the renegotiation of the conditions of the Kashagan consortium should be seen as a particular case in...a hugely complex industrial project rather than yet another sign of... 'resource nationalism'...." The Kashagan project is certainly complex. But is it meaningful to say that the renegotiation should be seen "as a particular case"? A particular case of what? Campaner and Yenikeyeff's omission of a noun that would summarize the implied general principle yields a statement whose meaning is troublingly opaque.

³ By "overall capacity" I mean the technological resources, managerial and administrative experience, internal knowhow, operational efficiency, and access to capital and risk distribution options.

⁴ WTRG Economics. 2009. James L. Williams. www.wtrg.com

⁵ Relocalize.net. 2009. Post Carbon Institute. www.relocalize.net

⁶ Neff, Andrew. 2005. "Caspian oil not likely to fill market void or depress prices." The Oil and Gas Journal. June 6, 39.

⁷ Bantekas, Ilias, John Paterson, and M. K. Suleimenov. 2004. Oil and Gas Law in Kazakhstan: National and International Perspectives. The Hague/London/New York: Kluwer Law International.

⁸ Energy Charter Secretariat. www.encharter.org

9 NATO.int. 2009. North Atlantic Treaty Organization. www.nato.int

¹⁰ Mowchan, Major John, A. 2009. "The Militarization of the Collective Security Treaty Organization." Center for Strategic Leadership, U.S. Army War College. www.csl.army.mil/usacsl/publications/IP_6_09_Militarization_of_the_CSTO.pdf

¹¹AgipKCO. 2009. www.agipkco.com

¹² FAS. 2009. Federation of American Scientists. "US Warmly Welcomes Kazakhstan's Accession to NPT Treaty." www.fas.org.

13 Ibid.

¹⁴ "A new Foreign Investment Law in 1994...provide[s] stronger guarantees against changes in Kazakhstan's legislation, greater clarity on investment requirements and on the credit facilities available to foreign investors... additional customs exemptions, and a guarantee of the right to recourse to international arbitration to settle disputes." Nations Encyclopedia. 2009. "Kazakhstan - Foreign Investment." www.nationsencyclopedia.com

¹⁵ NATO. 2009. "Partnership for Peace." www.nato.int.

¹⁶ WTO. 2009. World Trade Organization. www.wto.org.

¹⁷ Gaddy, Dean, E. 1999. "Rig clubs help alleviate Caspian Sea drilling shortage." Oil and Gas Journal. November 8, 63.

¹⁸ EIA. 2009. Energy Information Administration. tonto.eia.doe.gov.

¹⁹ IRS.gov. 2009. www.irs.gov/pub/irs-trty/kazakh.pdf.

²⁰ Parker Drilling. 2009. www.parkerdrilling.com.

²¹ Kaiser, Mark, and Alan Pulsipher. 2006. "High costs, uncertainty challenge operators in promising Kazakhstan." The Oil and Gas Journal. July 3, 39.

²² Prosites-kazakhembus.homestead. 2009. "Kazakhstan and the U.S. Confirm 'Commitment to Strengthen the Long-term Strategic Partnership." prosites-kazakhembus.homestead.com

²³ Wilson, Michael. 2006. "The State's Pre-emptive Right." Oil and Gas Magazine. January 9. www.mwp.kz

²⁴ Staffetta News: Oil, Gas, and Power in Italy. 2009. www.staffettaonline.com

²⁵ Chevron. 2009. Chevron Corporation. www.chevron.com.

²⁶ Tengizchevroil. 2009. www.tengizchevroil.com.

²⁷ Nations Encyclopedia. 2009. "Kazakhstan - Foreign Investment." www.nationsencyclopedia.com.

²⁸ "How Kazakhstan's Contractual Arrangements have Changed." 2006. The Oil and Gas Journal. July 10, 34.

²⁹ "The North Caspian Sea." 2004. The Oil and Gas Journal. March 1, 8.

³⁰ Parker Drilling. 2009. <u>www.parkerdrilling.com</u>.

³¹ Kaiser, Mark, and Alan Pulsipher. 2006. "High costs, uncertainty challenge operators in promising Kazakhstan." The Oil and Gas Journal. July 3, 39.

³² In Nazarbayev's words, "Now...we have come to this time, we began to buy our shares back, we became the participants of largest projects as Kazakhstan now has money, our personnel learnt to work with the best. We know where to take technologies, where to learn. Now we go forward so that in the future we would likely develop [mineral deposits] on our own, when we would grow rich." Quoted in "Contracts with foreign investors signed earlier will not be revised." 2005. Kazakhstan Oil and Gas Weekly. August 31.

³³ "Eni: Kashagan field more 'generous' than thought." 2007. The Oil and Gas Journal. Feb 5.

³⁴AgipKCO. 2009. www.agipkco.com.

³⁵ "Deja-Vu: Eni May Lose Kashagan over Environmental Violations." 2007. Business Monitor International. Aug 1.

³⁶ Prosites-kazakhembus.homestead. 2009. prosites-kazakhembus.homestead.com

³⁷ Russian Law News. 2008. "Kazakhstan further stiffens its mineral development regime – New controls for strategic fields and pipelines." <u>www.russianlaws.com</u>.

³⁸ Konyrova, Kulpash. 2007. "Nazarbayev signs subsoil law, throws investors into a tailspin." New Europe. www.neurope.eu.

³⁹ "Eni's Kashagan Reserves Fall by 76mn barrels." 2008. Business Monitor International. April 1.

⁴⁰ Kaiser, Mark and Alan Pulsipher. 2006. "Business environment still seen as risky in Kazakhstan." The Oil and Gas Journal. July 17, 32.

⁴¹ Nations Encyclopedia. 2009. www.nationsencyclopedia.com.

⁴² According to Nazarbayev, delays at Kashagan forced the government to postpone fulfillment of economic promises made to the public, causing the Kazakh people to suffer. Nazarbayev, Nursultan. "Prosperity, Security and Ever Growing Welfare of all Kazakhstanis." portal.mfa.kz

⁴³ Lesova, Polya. 2007. "Kazakhstan seeks changes to major oil field contract." Wall Street Journal: Market Watch. July 31. www.marketwatch.com.

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(Note: All conferences are presented in English unless otherwise noted)

Date	Event and Event Title	Location	Supporting Organizations(s)	Contact
2010				
August 25-28	11th IAEE European Conference Energy Economy, Policies and Supply Security: Surviving the Global Economic Crisis http://www.iaee2010.org/	Vilnius, Lithuania	LAEE/IAEE	Inga Konstantinaviciute inga@mail.lei.lt
September 22-23	8th BIEE Academic Conference Energy in a Low Carbon Economy: New roles for governments and markets http://www.iaee.org/documents/2010/BIEE.pdf	Oxford, England	BIEE	Debbie Heywood admin@biee.org
October 14-16	29th USAEE/IAEE North American Conference Energy and the Environment: Conventional and Unconventional Solutions http://www.usaee.org/	Calgary, AB, Canada	USAEE/CAEE/IAEE	USAEE Headquarters usaee@usaee.org
2011				
January 7-9	Annual ASSA Meeting Two IAEE Sessions Under Development	Denver, CO, USA	IAEE	IAEE Headquarters iaee@iaee.org
February 16-18	8th IEWT at Vienna University of Technology Language: German & English	Vienna University of Technology, Austria	AAEE	Reinhard Haas haas@eeg.tuwien.ac.at
April 18-19	3rd ELAEE Conference Energy, Climate Change and Sustainable Development: The Challenges for Latin America Language: Spanish & English	Buenos Aires, Argentina		Gerardo Rabinovich gerardoa@speedy.com.ar
June 19-23	34th IAEE International Conference Institutions, Efficiency and Evolving Energy Technologies http://www.hhs.se/iaee-2011	Stockholm, Sweden	SAEE/IAEE	Lars Bergman lars.bergman@hhs.se
October 9-12	30th USAEE/IAEE North American Conference Redefining the Energy Economy: Changing Roles of Industry, Government and Research	Washington, DC	USAEE/NCAC/IAEE	USAEE Headquarters usaee@usaee.org
2012				
June 24-27,	35th IAEE International Conference Energy Markets Evolution under Global Carbon Constraints: Assessing Kyoto and Looking Forwa	Perth, Australia rd	AAEE/IAEE	Ron Ripple r.ripple@curtin.edu.au
Date To Be Determined	12th IAEE European Conference	Venice, Italy	AIEE/IAEE	Edgardo Curcio e.curcio@aiee.it
2013				
June 23-27	36th IAEE International Conference Realizing the Potential of Energy and Material Efficiency	Daegu, Korea	KRAEE/IAEE	HoesungLee hoesung@unitel.co.kr
Date To Be Determined	13th IAEE European Conference	Athens, Greece	HAEE/IAEE	Christos Papadopoulos cpapad@otenet.gr

Applied Price Theory: Prospects for a "Gas OPEC"

By Diego Villalobos Alberú*

Introduction

"...focus on coordinating investment policies to dissuade countries from further flooding the market", such was the latest stated intention of the Gas Exporting Countries Forum (GECF), an organization commonly referred to as the 'Gas OPEC' that has been gaining momentum of late, and which last week elected its first secretary general at a meeting in Qatar, where it is headquartered. Most of OPEC member countries are also members of GECF. More worrisome however, is the fact that GECF countries hold a bigger share of world gas reserves than OPEC does for oil.

Consequently, it is not surprising that western officials are increasingly concerned about the possibility that an international gas cartel may materialize, especially in a carbon constrained world which is becoming increasingly reliant on gas, as it substitutes away from more carbon intensive commodities like oil and coal. How worried should we be, and what can western policy makers do in order to minimize this possibility?

In answering these questions, one needs to distinguish between two things: Firstly, the likelihood of a gas export cartel actually materializing. Secondly, the potential impacts that a higher price may inflict on gas consuming economies. Regarding the latter, my preferred view is that there is no strong reason to be alarmed, as gas prices have widely fluctuated in the past, and present assets in the economy are geared to higher expected gas prices. Besides, it seems unlikely that the price movements derived from the cartel will be greater than those witnessed in the recent past. Moreover, a higher gas price need not necessarily be at odds with the goal of pricing carbon. Therefore, the rest of this article focuses on addressing the former issue, namely, what can economics tell us about the potential for coordinated gas export policies.

The Economics of Cartels: Why Isn't There a Gas OPEC?

There are a number of characteristics that facilitate the formation of cartels (i.e., explicitly colluding to limit production in order to raise price) that may or may not be present in markets. As a result, it is more likely to find cartel-like behavior in some markets than in others. The most important characteristics are listed in the table on the next page, and include things like the number of producers, the similarity of the cost structures, and the ability to monitor compliance, which in turn depends on how transparent pricing is.

An immediate question comes to mind: do the international oil and gas markets share those characteristics? If they do, then why is there an oil exporting cartel and not a gas one? It turns out that both commodities share most of the economic factors that facilitate the formation of cartels, to a lesser or greater extent. However, there are some important ones that are not (yet) present in the gas market:

- 1. Most of the gas is sold under long-term contracts between producers and consumers. This is how the market hedged the hold-up risks associated with relatively higher capital-intensive investments for producing and trading gas, compared to oil. These contracts specify a quantity to be delivered regularly for a period of some 20 to 25 years, at a specified price that is linked to the price of oil, but it is not publicly available. This implies that producers have little flexibility to reduce output, and makes gas pricing quite un-transparent, as opposed to oil.
- 2. Exporting and importing liquefied natural gas (LNG)² requires liquefaction and re-gasification plants, which as mentioned, are highly capital intensive compared to oil infrastructure. Once the infrastructure is built, there is little incentive to restrict the use of these assets. On the contrary, owners are induced to 'sweat' them as much as possible in order to recover the costs. This is true in markets where the costs of the assets are big relative to the size of the demand, as is the case in a relatively small market, like the LNG one when compared to piped gas.

3. Partly due to point 1 above, there isn't a liquid, flexible and transparent international gas market. Nevertheless, LNG spot prices are developing in the U.S. and the UK,, particularly due to the increasing importance of flexible LNG supplies. Critically though, due to the low penetration of LNG in these two markets, and the ease of substitutability with piped gas, these gas prices are not responsive to economic and political signals from LNG producers. It is worth emphasizing that the creation of a single international gas market, with its corresponding single gas price, relies on the creation of a LNG market. This is mainly

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Market Conditions that Facilitate Cartels	Oil Market	Gas Market	Comments
<i>Theoretical</i>	2		Defers to member countries of OPEC (12) and Cas Eurorting
Ongopoly market structure	N	V	Countries Forum (14. 7 of which are in OPEC too)
Homogeneous product	\checkmark	\checkmark	
Similar cost structures	~	~	Some reserves are more costly to exploit than others. The situation is similar in both sectors
Slow technological change	~		Recent technological improvements have untapped vast new gas reserves in the U.S.
Low short term elasticity of demand	\checkmark	~	Gas can be substituted with coal, and flexible markets with access to piped gas
Limited scope for entry	\checkmark	\checkmark	Entry to the market that would undermine the effectiveness of the cartel. Entry is subject to new oil/gas field discoveries and expansion of non-OPEC production
Multi-market contacts	\checkmark	\checkmark	Provides more scope for retaliating deviations from agreed production quotas
Scope for retaliation	~	~	Limited. It is in the interests of countries to sustain cooperation since it is an infinitely repeated game
Price transparency	\checkmark		Facilitates monitoring of deviations from agreed prices or quantities
Oil/gas market specific			
Contractual flexibility	\checkmark		Most gas sales bound by long-term contracts
Spot price	\checkmark	\checkmark	LNG spot market developing, but does not have critical mass enable LNG-specific price formation, not gas-to-gas competition

because of the arbitrage opportunities brought about by LNG, where a tanker could in theory be diverted towards the port of the highest bidder, wherever in the world that may be.

These factors, together with the fact that gas acquired an economic value much later than oil (in fact, to date, gas is commonly burnt as a bi-product of oil extraction), go a long way to explaining why there is no international gas cartel as of yet. But, is this likely to remain unchanged going forward?

The Changing Face of the International Gas Market

There are uncontroversial economic signals which suggest that the international gas market is evolving in a manner favorable to the creation of an international cartel. In particular, the factors described above are changing in the following way:

- 1. The pervasive presence of long-term contracts is diminishing, as the new ones tend to be shorter than the old ones, and new supplies are coming into the market in a flexible form, namely, to be sold to the highest bidder. Hence, the proportion of spot trading has been on the rise. This results from a reduction in the hold-up problem, which long-term contracts addressed. The main reasons are diminishing asset specificity (e.g., nowadays there are more alternative LNG buyers and sellers, and there is more liquefaction and re-gasification infrastructure developed); and lower costs of LNG infrastructure due to economies of scale.
- 2. The incentive to fully utilize LNG assets once built (and hence not reduce output) is weakened as the market grows. Consider the decision faced by a LNG exporting country considering reducing output to raise price on the volumes it sells: if it has few assets and production, then a given absolute reduction in total throughput also implies a relatively high proportional reduction, therefore the opportunity cost in foregone revenue is high. However, if the producer has a lot of assets and production, then the same absolute reduction only implies a small proportional reduction. Since the costs of doing so are smaller (foregone revenue) relative to the gains (higher price on all the units sold), it will be more likely to reduce output when the quantity produced is large.
- 3. Asian demand, which mainly operated under long-term contracts, has been increasingly reliant on the more flexible Atlantic basin LNG supply. This has brought up Atlantic basin LNG prices more in line with those underlying the Asian long-term contracts, making international LNG prices more convergent. In addition, gas-to-gas competition has been intensifying in the Atlantic basin, as some LNG cargoes have been diverted to/from the U.S. and Europe in order to exploit the

arbitrage possibilities due to the price differential between these two geographies, also bringing prices together. Besides being closer to a single international price for LNG, the increased volume of LNG being traded in spot markets adds transparency to prices.

In short, the evidence indicates the present economic conditions are not quite there for an international gas cartel to be successful. However, the changes that are gradually taking place in the international gas market are making prices more transparent; increasing the incentives to reduce output; and enabling producers to do so as they are less and less bound by long-term contracts. In other words, the ongoing and foreseen market developments increase the ease, and thus likelihood of an international gas cartel being successfully created in the future.

What About Policy Against a Gas OPEC?

When it comes to energy policy, western policy makers tend to see increased gas consumption, and the development of a wider, more transparent LNG market as desirable, given that it helps them deliver on a number of their objectives. For example, a more diverse gas supply, made possible by the development of LNG, increases security of supply by reducing reliance on certain producers; and substituting coal and oil for gas reduces greenhouse gas emissions, as gas is a cleaner fossil fuel. It was with this in mind that the EU energy commissioner recently declared: "Gas is fundamental to Europe's energy security, Europe's economy and to our battle against climate change... Qatar's investment in Liquefied Natural Gas comes conveniently at a time when the EU is developing new import openings for this fuel, as well as a common action plan for LNG"³.

Policy in this direction is only encouraging a bigger and more transparent LNG market. This, in turn, reinforces the market developments described above, which facilitate the creation of a cartel of gas exporting countries. Consequently, western policy makers face a tradeoff between further encouraging the development of the LNG market, and acting to prevent the creation of a Gas OPEC, a fine balancing act. **Conclusion**

A review of the international gas market through the lens of economic theory reveals that up to now, it is likely that an international gas cartel has not materialized because some of the conditions that facilitate collusion have not been present. The main ones are: a pervasive presence of long-term contracts that cause a lack of transparency in gas pricing restrains producers (exporters) from reducing output, and limiting the liquidity of LNG spot markets; and relatively high capital intensive assets needed for the trade of LNG, which induces the owners to fully utilize them.

However, recent and ongoing market developments have been in a direction favorable to the creation of a cartel: long-term contracts are becoming shorter in length and there are fewer of them; and the share of LNG traded in flexible spot markets is increasing. This is causing pricing to converge and become more transparent. Moreover, with a bigger market, the incentive to withhold output is also greater.

By ignoring the economics of cartels, the current policy drive in the west (at least in Europe) of encouraging the further development of LNG markets may have unintended consequences, as it reinforces the pro-cartel market developments, and makes it easier for LNG producers to explicitly collude. This is not to say that stopping a Gas OPEC should dominate the objective of developing transparent LNG markets. It only means that policy makers should include the potential pro-cartel effects of their policies in their calculations, as it is likely that they are seldom considered.

Footnotes

¹ http://www.nytimes.com/2009/12/10/business/energy-environment/10gas.html

² Natural gas is liquefied into LNG at liquefaction facilities usually located at the export port, then loaded into tankers and, in principle, can be shipped anywhere in the world where there is a re-gasification plant.

³ http://www.montesquieu-instituut.nl/9353000/1/j9tvgajcor7dxyk_j9vvhfxcd6p0lcl/vi39ig6m3yvx?ctx= vgv 62rns92q2

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Report from the IAEE Rio International Conference

THE FUTURE OF ENERGY: GLOBAL CHALLENGES, DIVERSE SOLUTIONS

By Edmar de Almeida and Helder Queiroz Pinto Jr.

In all, the 33rd IAEE's International conference received 415 technical papers. From this total, 243 papers were approved to be presented in 67 parallel sessions on key issues in energy economics. Besides these sessions, 13 plenary sessions (including one special session) were organized.

In general, one can say that the goals and objectives of the conference have been achieved. Among these achievements we can mention: bringing foreign energy specialists to Brazil, attracting a large audience; promoting contact between students, professionals and academics in the field of energy economics and academic contributions to the energy economics issues, and encouraging debate.

The 13 plenary sessions have covered all segments of energy economics (oil, gas, electricity, renewable, regulation and the environment) and it would not be possible to make a summary of each one in this paper. Instead, we want to highlight some presentations and the conclusions of some specific plenary sessions that are representative of the debate carried out during the seminar.

The inaugural session was very representative of the type of debate and research questions discussed during the seminar. The title of the inaugural sessions was, "*Why We Need a New Energy Policy*?" This session was presented by Professor José Goldemberg. His presentation was focused on three questions: i) what is the present energy order? ii) whether the present order is sustainable; and iii) if its duration can be extended. Based on these questions, Professor Goldemberg outlined his vision for a new world energy order and potential vectors to achieve this new order.

What is the present energy policy? The current energy policy is based on the predominant use of non-renewable fossil fuels: coal, oil and natural gas. Together, these three energy inputs accounted for more than three quarters of primary energy supply in the world in 2008. The evolution of the contribution of these sources in final consumption over the past 30 years was relieved by the growth of the share of electricity, but not significantly. The energy consumption in this energy policy is concentrated in the industrial, residential and transportation segments.

Is this order sustainable? Although the most debated issue of the current energy policy is global warming, Goldemberg said that this is in his view only one of five problems of equal importance, that cause the need for change. These are: (1) unequal access to energy, (2) the exhaustion of fossil fuels on the horizon of a century, (3) issues of sovereignty and security of energy supply, (4) health problems directly generated by the current energy pattern, and finally (5) global warming.

Can the duration of this energy order be extended? In his reflection on this question Goldemberg began by outlining the difference in the evolution of the energy efficiency of the U.S. state of California and the United States as a whole. In California, the energy consumption per capita has remained relatively stable since 1976. In the U.S., the consumption per capita has grown steadily over the same period. This difference is related to the California lead in regulating energy. Since the 1970s, California government has been implementing actions and programs aimed at controlling the energy efficiency of the state's economy. Therefore, the California experience shows that it is possible to control the energy efficiency with the adoption of appropriate mechanisms. He added that without the efforts already undertaken in the world for greater energy efficiency, the current energy consumption would be 58% higher.

Goldemberg argued, finally, that a new world energy order is needed to combat the problems of (i) inequality in access to energy, (ii) the massive use of an exhaustible source of energy (petroleum), (iii) the high geopolitical tensions (iv) of the health problems arising from the use of fuels and (v) of global warming. Goldemberg has showed that the duration of the current energy policy can not be extended; making sure that change is needed. He sustained that the way for this change to go through: i) rural electrification programs in the world to mitigate the problems of unequal access to power; ii) the adoption of renewable fuels in the transportation sector, especially through the increased blending of ethanol with gasoline; iii) and finally, the orientation of national energy policies toward a greater share of renewables in electricity production.

The session on the future of energy demand in transport has developed a detailed discussion on the potential for the diffusion of electric vehicles. This session was chaired by Professor Lee Schipper from Stanford University. The panelists were Lewis Fulton (IEA), Suzana Kahn-Ribeiro (from Federal University of Rio de Janeiro) and Pietro Erber (from the Brazilian Electric Vehicles Association - ABVE). Lewis Fulton tried to answer the following question – How the electric car fits into the future? Fulton

has explained that the International Energy Agency (IEA) is working with scenarios. The scenario that foresees a larger reduction of CO_2 is called BLUE MAP. In this scenario, to achieve the target of reducing CO_2 emissions by 2030, the world needs to reduce consumption of fossil fuels in vehicles by 50%. This change would be made by replacing part of the vehicle fleet today with vehicles that use biofuels and/or electricity. To achieve current CO_2 emissions targets it will be necessary to have 100 million plug-in hybrids cars.

How to pay for this? Electric cars are very expensive. The batteries cost between \$18,000 and \$24,000. Between 5 and 10 years, this figure may drop to somewhere around \$9,000. Now the costs are greater than the energy savings that is done. But when the battery price drops to around \$9,000, electric vehicles will be economically viable.

For the world to achieve the commitments of CO_2 emissions in 2030, all continents need to have electric cars. In this case, 10% of all passenger cars should be electric or plug-in hybrids. Therefore, it is necessary that the battery cost is reduced and that cities improve their infrastructure.

Suzana-Kahn Ribeiro has stressed that, currently, global CO_2 emissions are 40-45 Gt CO_2 per year. To reduce the current temperature in 2°C, as agreed in Copenhagen, emissions should be 18 Gt of CO_2 per year. Transport is the most important contributor for CO_2 emissions, especially road transport (even if one considers only private vehicles). In 2030, there will be an even greater demand for transportation.

The challenge in the transportation sector should consider improvements in vehicle weight, materials used, and the air resistance and so on. The combination of electric vehicles and vehicles powered by biofuels is also a great solution. But it is essential to improve vehicle technology. Electric vehicle batteries still have little ability to store energy, limiting the autonomy of the vehicles, besides having a very long recharge time.

Pietro Erber has explained that electric cars are not exactly new technology. In 1900, in the United States, 38% of cars were electric. When discussing the implementation of electric cars on the road, one must take into consideration some issues such as: (i) reducing emissions by climate change in accordance with the GHG Protocol, (ii) improved urban environment, (iii) preservation of urban mobility, (iv) security of energy supply, and (v) technological and industrial development.

Some factors are still limiting for marketing the electric car. There is a high initial cost to purchase an electric vehicle since the batteries are expensive and there are no economies of scale for the current production. The low autonomy of the electric car, the high recharge time and lack of infrastructure for recharge limit the diffusion of technology. The risk of obsolescence of technology is an obstacle to initial investment, thus, there was a resistance to innovation. Moreover, it would be necessary to implement technologies that would ensure that the recharge was made out of peak hours of energy consumption (as the smart grid).

The ABVE estimates that electric vehicles will have a market penetration of 30% of all vehicles by 2030. Hybrid cars (HEV) would be 30% of the total and the remaining 40% would be divided between the cars plug-in hybrids (PHEV) and only the battery-powered (BEV).

In the session on Energy Regulation, Einar Hope, chair of this session and President of IAEE, highlighted the main future challenges to be faced by regulatory bodies:

Establishing a Market Design for the electricity sector;

The regulation of sectors characterized by natural monopoly;

The environmental regulation associated with electricity production;

The challenges of regulation related to the issue of energy security.

Regarding the definition of Market Design, Professor Hope highlighted the need for clear rules to separate competitive segments to those characterized by natural monopolies (unbundling regulation) in order to stimulate competition in energy production and trade. In turn, he emphasized the need for better regulation of transmission and distribution networks, especially in non-vertically integrated market structures in order to ensure the expansion of investment in this infrastructure.

On environmental issues, the need for reconciliation between the market of CO_2 and other environmental policies (taxes, subsidies, etc.) was stated. Moreover, it was emphasized the importance of the electricity market in environmental policy.

The plenary session dedicated to OPEC debated the history and the role of OPEC in the oil market. These debates discussed the future role of the organization in a world driven by sustainable practices and a respect for the environment. According to Mr. Majid Moneef (OPEC's Governor for Saudi Arabia), OPEC has been of paramount importance in the international geopolitical relations for 50 years and will probably keep this role for quite some time. The member countries are responsible for approximately 40% of world oil production, holding approximately 79% and 50% of world oil and gas reserves, respectively

In this context, Mr. Rachid Bencherif, senior analyst for planning the OPEC Fund for International Development (OFID), states that, contrary to what is commonly thought, OPEC is not a cartel. He explains that the organization's power to affect prices fluctuated over time. Mr. Bencherif explained that there were always specific reasons for OPEC production policies, either by supply constraints, or influenced by macroeconomic, political and market conditions variables. Several academic studies have extensively studied OPEC's behavior and have not identified a strict cartel behavior, except some papers in the 1980s.

It was stressed that OPEC is a mature and unique organization. Despite OPEC's influence over members' production decisions, it respects its members national sovereignty and has great ability to adapt to a changing international context. It also presents an intense cooperation with key players and sector regulators, showing initiative in seeking greater transparency in terms of data and information.

The challenges for OPEC in the future will be: (i) energy security - influenced by the uncertainties regarding investments and the need for coordination between consumers and producers, (ii) climate change - directly affecting member countries, (iii) transition of the energy mix in the long run (iv) combating poverty – it is a proven link between energy and development, and in this sense, universal energy access becomes crucial.

Mr. Ivan Sandra, international vice president of strategic affairs in E&P at Statoil, discussed OPEC's challenges regarding the issue of reducing global dependence on fuel. Mr. Sandra has questioned if it was possible to imagine a radically different world in terms of energy consumption. He stressed that the transportation sector will maintain its dependence to oil, even though major innovations could change this scenario. Mr. Sandra has also questioned whether there would be limitations on available resources which accelerate the need for an energy transition. In this respect, the scenarios produced by different agencies showed large differences, demonstrating the difficulty to make projections that include paradigm shifts in consumption and technology.

Finally, the presentation by Mr. Bassam Fattouh from the Oxford Institute for Energy Studies, focused mainly on financial issues and markets. He pointed out that price signaling is crucial to the functioning of the markets. Mr. Fattouh stressed that OPEC often does not produce good price signals, complicating the understanding of its actions and goals. He also stressed that after the last international financial crisis, market signals from OPEC have been coherent and clearly understood by the agents in the oil market. OPEC has clearly presented the principles (focal point) of its market strategy, which can be explained by better leadership in Saudi Arabia. What could change this type of behavior are mainly changes in policies for the environment and energy security.

It is important to mention the Special Session dedicated to the presentation of the EIA-DOE's International Energy Outlook. This presentation was performed by Dr. Richard Newell, the Administrator of EIA-DOE. The Chair of this session, Joseph Dukert, stressed that though Outlook is prepared by the U.S. Energy Information Administration, it is not biased because the studies are done independently of the White House or other political pressure.

Although the EIA's International Energy Outlook contains three long-term scenarios (baseline, high economic performance and low economic growth), Dr. Newell presented only the reference scenario. This scenario assumes that current legislation and regulations will be maintained. Dr. Newell highlighted the impact of the recession in 2007 and the projected demand by 2035. According to Newell, the economic crisis has negatively affected the global demand for energy, which shrank 1.2% in 2008 and 2.2% in 2009. This downward trend, however, should not be maintained in the long run. The prospect is that energy consumption will grow 49% between 2007 and 2035. However, this growth is uneven across countries. While in non-OECD countries, total demand for energy will increase 84%, in OECD countries the increase should be only 14%. The main reason for the strong growth in energy consumption in non-OECD countries is the fast and also strong economic growth. According to Newell, the economic growth of developing countries should correspond on average to 4.4% per year, in contrast to 2% per year in OECD countries. Energy consumption should increase the use of all energy sources, and fossil fuels (coal, natural gas, petroleum and petroleum products) should continue to meet most demand. However, despite continuing as the main source, the share of fossil fuels in global energy production should decrease from 35 to 30% in 2035. This decline can partly be explained by the expected increase in oil prices from \$79 per barrel in 2010 to U.S. \$133 per barrel in 2035. This increase will foster a greater diversification of energy sources.

Newell mentioned that the reduction in the proportion of fossil fuels in different sectors depends on

the technological and policy ability to replace them with other sources. For now, the transportation sector is the largest consumer of fossil fuels, especially in non-OECD countries, as a result of rising incomes and urbanization in these countries. In fact, the energy consumption for the transportation sector in non-OECD countries should grow 2.6% annually between 2007 and 2035, while in OECD countries is the expected growth is only 0.3% in the same period. This low growth rate is due in large extent to the greater efficiency of fuel used.

The participation of the transport sector in the consumption of liquid fuels should increase from 53% in 2007 to 61% in 2035, accounting for 87% of the total increase in consumption of liquid fuels in the world. Thus, understanding the dynamics of the transportation sector is essential to project the future demand for energy in the case of liquid fuels.

With respect to emissions of greenhouse gases, Newell stressed that emissions should continue to grow but at lower rates due, among other factors, to greater energy efficiency. Again, the non-OECD countries should provide higher growth rates. Anyway, Newell argues that any projection of long-term emissions involves many uncertainties.

On the supply side, it is projected that OPEC will increase its production capacity for liquid fuels in order to maintain its market share by approximately 40% of the total production of liquids by 2035. The production from unconventional sources of liquid fuels should reach 12% of the total production match in 2035. Most of this increase will be related to the production of biofuels in Brazil and the United States and production from oil sands in Canada.

With regard to natural gas, Newell points to growth in consumption of 44% between 2007 and 2035. To meet this demand, the production of natural gas should increase 46% in the same period. The increased production should be greater in the Middle East, Africa and Russia. As in the case of liquid fuels, gas production from unconventional sources such as, for example, tight gas, shale and coal bed methane should grow, especially in the United States, Canada and China.

Coal production and consumption should increase given the lack of a global agreement to limit emissions of greenhouse gases. According to the projections, coal consumption should grow by an average of 1.6% per year. Most of this growth should occur in non-OECD Asia, which must correspond to 95% of the demand for coal between 2007 and 2035.

Finally, the closing plenary session tackled the following question: *Energy and Environment: What Will Come After Kyoto?* It was stressed that the Climate Conference held in late 2009 in Copenhagen was a failure in political terms and did not progress to the adoption of concrete measures. Considering forecasted growth in emissions of greenhouse gases, technological advances alone will not solve the problem of climate change, requiring the adoption of policy instruments, besides increasing the role of best practice models.

Nebojsa Nakicenovic (Vienna University of Technology) articulated his talk around the concept of decarbonization, which should be viewed as a long-term energy strategy, as an evolving trend for energy. According to Nakicenovic, radical changes are needed in order to mitigate the effects of climate change. The decarbonization is a prerequisite to meet the challenges related to climate changes.

We are experiencing a confluence of crises: financial, unsustainable consumption, climate change, access to food and electricity, among other global issues. Integrated solutions must be present in the Rio+20 conference discussions, to be held in 2012 (20 years after the Rio conference in 1992).

A difficult question surrounding the policy formulation to tackle climate change is the fact that measures must be adopted immediately, but the results/benefits are only observed in the very long term. Nakicenovic has also raised the question of what mechanisms to use, "carrots or sticks?" Nakicenovic argued it is necessary to use a combination of both.

Perry Sioshansi (Menlo Energy Economics) pointed that the most relevant factors to the mitigation of climate change are technology and policies. He also mentioned the pessimism toward Cancun, given the failure of Copenhagen. He stressed that power consumption can be reduced significantly by the adoption of energy conservation measures. Some individual efforts to reduce emissions, such as California and Canada, demonstrate that there are important opportunities to reduce energy demand without radical technological changes.

Thus, a large number of key issues were discussed at the 33rd IAEE International Conference, strengthening the exchange of experience and energy among economists from different parts of the world and promoting a greater interaction between academia, energy companies and government institutions.



Innovation Centre Energy

The development of sustainable energy technologies takes place in a framework of competing interests of climate protection, environmental constraints, energy security, and markets. Energy research has to answer challenging questions exceeding the pure technical focus but enclosing the whole system of environmental, social and economic challenges. The Innovation Centre Energy is committed to contribute answers to the current energy debate. The Innovation Centre Energy (IZE) is bundling the research activities on energy at the Berlin Institute of Technology (TU Berlin). The approach is holistic. Besides focusing on engineering issues, the research activities are embedded in economical and societal systems research. The cooperation is structured in clusters.



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Scenes from the 2010 IAEE RIO International Conference (June 6-9, 2010)





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Report of the Third NAEE/IAEE International Conference

Introduction

The 3rd NAEE/IAEE International Conference with the theme "Energy, Environment and Economic Growth" took place on 19th and 20th April 2010 at the New Chelsea Hotel, Abuja, Nigeria. The two day conference was attended by 153 delegates from academics, energy industry, government, the press among others. Also in attendance were over 50 students – undergraduates and postgraduates – from universities across the country. Nigerian postgraduate students studying in Universities abroad – Japan,

West Germany and Britain also attended and presented papers at the Conference.

However, attendance at the Conference was affected by the volcanic ash eruption in Iceland that led to the shut down of airports across Europe. This led to cancellation from Professor Einar Hope, the 2010 IAEE President who was billed to attend and present paper at the Conference. The IAEE Executive Director, Mr. Dave Williams also had to cancel his earlier plan to attend the Conference. Few other participants that had previously indicated their participations could not attend due to the flight disruptions.

First Day – Monday 19th April 2010

The First day started with an Opening Ceremony presided over by the Special Adviser to the President on Petroleum Matters, Dr. Emmanuel Egbogah, a renowned Petroleum Engineer. In his welcome address, the NAEE

ence and made apologies on behalf of the IAEE President and the IAEE Executive Director who could not attend the Conference due to the volcanic cloud in parts of Europe. Goodwill Message was delivered on behalf of the Governor of the Central Bank of Nigeria, Mallam Lamido Sanusi who was ably represented by a Deputy Director at the CBN, Dr. Uwatt B. Uwatt. The Keynote Address was delivered by Professor A.S. Sambo, the Director-General of the Energy Commission of Nigeria. The keynote address titled, "Energy and Environmental Interactions for Sustainable Economic Growth in Nigeria" made a case for the country to enact a policy to reduce Green House Gas Emissions by 60-90% below 1990 levels by 2050. The Conference Program Chairman, Professor Adeola Adenikinju gave the vote of thanks. He appealed for financial support for the students' arm of the association who have consistently showed a lot of enthusiasms in the annual conferences of the Association. He also acknowledged the financial support of the Sponsors for the Conference: CBN, Shell, ECN, Budget Office of the Federation and the IAEE. The 3rd Annual Conference was declared open A few of the Conference Delegates

3RD ANNUAL NAEE/IAEE

INTERNATIONAL CONFERENCE

President, Professor Akin Iwayemi took the audience through the four years of the Association and the remarkable progress that has been recorded. He underscored the importance of the theme of the Confer-

NAEE Award Recipients. From left, Mr. Mutiu Sunmonu, Country Chair, Shell; Dr. Emmanuel Egbogah, Presidential Adviser on Petroleum Matters: Professor A.O. Adegbulugbe, Former Presidential Adviser on Energy Matters and Engr. Johnson Ojosu, representing Professor A.S. Sambo, Director General, Energy Commission of Nigeria.

by the Conference Chairman. Other important dignitaries at the Opening Ceremony included Professor A.O. Adegbulugbe, Former Special Adviser to the former President Obasanjo on Energy Matters; Engr. Chima Ibenechie, Managing Director of Nigerian Liquefied Natural Gas (NLNG) Company and a representative of the Country Director of USAID

There were four plenary sessions on the First Day. The First Plenary Session on Petroleum and Energy Sector Outlook was chaired by the Managing Director of the Nigerian Liquefied Natural Gas (NLNG) Company, Engr. Chima Ibeneche. Two papers were presented at the Session. The First paper on the topic: "Is the World Really Running out of Oil – Lessons from the Last Four Decades, 1970-2008" was writ-



ten by Professor Wumi Iledare, Director, Energy Information Division, LSU Center for Energy Studies, and presented on his behalf by Professor Adeola Adenikinju of Department of Economics, University of Ibadan. The highly informative paper reviewed the arguments of the two schools of thought on the debate. His review of the various indicators of global oil reserves and production showed that while the world may be running out of cheap oil, oil will remain an important source of global energy for many decades to come. The paper identified key factors that will impact on global oil resources and supply.

The second paper on Power Sector Outlook – Looking Ahead was delivered by Engr. Clement Oke, Group General Manager (Power), Nigerian National Petroleum Corporation (NNPC). The paper provided a detailed overview of the structure, conduct and performance of the electricity sector in Nigeria. It identified the key issues and challenges facing the sector and recommended that commercial environment for profitability should be entrenched in the sector.

The Second Plenary Session on Domestic Gas Industry – Options for Growth was chaired by Professor Abiola Kehinde, Head of Chemical Engineering Department, University of Lagos. The only paper in this session was by Professor Adeola Adenikinju who presented a paper on "Developing Nigeria's Domestic Gas Industry: Role of Appropriate Pricing". The author argued that the current low price of domestic gas relative to LNG will not create incentives for gas producers to invest in long term supply of gas to the domestic market. He therefore called for efficient pricing of gas and the use of fiscal instruments to support strategic sectors in the short term.

The Third Plenary Session on Electric Power Industry Regulations was chaired by Professor Layi Fagbenle of the Department of Mechanical Engineering, Obafemi Awolowo University, Ile –Ife. There were two presentations during the session. The First was the paper prepared by the IAEE President, Professor Einar Hope on Market and Regulatory Design for Electric Power Systems: Principles, Experiences and Challenges. The Paper was presented on his behalf by Professor Akin Iwayemi. The second paper, titled, "Resolving the Power Pricing Issues in Nigeria: The Multi Year Tariff Order (MYTO) was presented on behalf of Dr. Haliru Dikko of the Nigerian Electricity Regulatory Commission (NERC), by an official of the Commission. The paper provided a detailed discussion of the methodology used in deriving the MYTO and the outstanding issues that still confront appropriate pricing of electricity in Nigeria.

The Final plenary session was a Roundtable discussion on Climate Change and Energy Development Options for Nigeria. The session was chaired by Professor Adeola Adenikinju and featured discussion on the link between climate change and Nigeria's growth process. Three speakers that featured at the Roundtable were Professor Akin Iwayemi, Professor Layi Fagbenle and Mr. Ewah Eleri, Director, ICEED. The presenters offer several recommendations on how Nigeria can take advantage of the ongoing global initiatives on climate change to fashion out a sustainable development strategy.

Each of the plenary session was followed by lively questions and contributions from the floor.

The First Day ended with a Cocktail Reception hosted by The Central Bank of Nigeria. The Cocktail provided opportunity for the delegates to interact and unwind after a very exciting day.

Second Day: Tuesday April 20, 2010

The Second Day and Final Day of the Conference featured four, two concurrent sessions each. Twenty nine out of thirty-six papers slated for presentations were presented at the various concurrent sessions. The First Concurrent Session was on Energy Sector Reforms and Regulations. It was chaired by Professor Abiola Kehinde of the University of Lagos. Presenters at this session include Professor Wumi Iledare who presented a paper on "An Appraisal of the Fiscal Provisions in the Nigerian Petroleum Industry Bill". Ms Balkisu Saidu of the Graduate School of Law, Keio University, Tokyo, Japan delivered a paper on "Committing to Legal and Regulatory Framework in the Electricity Supply Industry in Nigeria". Glenn Olowojaiye presented a paper on "Social Expediency and Economic Reality: Can a Liberalized Electricity and Gas Sector Give Birth to Viable IPPs (Gas Fired) in Nigeria? The Final paper in the session was a joint authored paper by Ogundari, I.O., A.S. Momodu, J.B. Akarakiri and W.O. Siyanbola, of the National Centre for Technology Management, OAU, Ile Ife, on "Kerosene Subsidy and Oil Deregulation Policy in Nigeria".

The Second Concurrent Session on Energy Security and MDGs was chaired by Engr. (Rev.) Johnson O. Ojosu, Director, Energy Commission of Nigeria. Four papers were delivered in this session. Aliyu, A.O. and A.E.A Etah of Energy Commission of Nigeria, presented a paper on "Energy Security and Its Implications on Developing Economy". Obi, Ben and Elisha M. Auta of Department of Economics, University of Abuja, Nigeria, delivered a paper on "Energizing Developing Economies to Achieve Millennium Development Goals: Challenges and Opportunities". The third paper was presented by by Aliyu, A.O. and J.Y. Bawa, of Energy Commission of Nigeria, on "Energy: The Clear Vision for Achieving

the MDGs in Nigeria". Finally, Mr. Olugbenga Adesanya of Jily Continentals Limited presented a paper titled, "Global Low Carbon Power Celerity".

The Third Concurrent Session on Renewable Energy and Bio-Fuels was chaired by Professor A.O. Adegbulugbe, Former Special Adviser to President Obasanjo on Energy Matters. The session featured three presentations. *Tasie, C. Oyinkansola of School of Law, University of Aberdeen, UK, presented a paper on* "Fossil Energy and Renewable Energy: A Case Study of U.K. and Nigeria". Abaka, A.U., L. Mohammed and A. Aliyu (Energy Commission of Nigeria), delivered a paper on "Renewable Energy for Sustainable Development". The final paper was by *Ogundari, I.O., A.S. Momodu, A.J. Famurewa, J.B. Akarakiri and W.O. Siyanbola, (National Centre for Technology Management, OAU, Ile Ife), on* "Techno-Policy Considerations on Sustainable Cassava Biofuel Production in Nigeria"

The Fourth session on Climate Change Issues was chaired by Mrs Edith Olubanjo, General Manager, CPDD, NNPC. The session featured presentations by *Omojolaibi*, J. Ayoola (Department of Economics, University of Ibadan) on "Climate Change and Sustainable Development in sub-Saharan Africa: An Application of Panel Cointegration to Some Selected Countries". Oniemola, K. Peter (Faculty of Law, University of Ibadan) spoke on "Climate Change and Sustainable Development: Any way Forward After Copenhagen? Eregha, P. Bright (Department of Economics and Statistics, University of Benin, Nigeria) delivered a paper on "Oil Exploration and Biodiversity Depletion in Nigeria's Niger Delta: Issues and Implications". Finally, Chuku A. Chuku (Department of Economics, University of Uyo, Nigeria) presented a paper on, "Climate Change in Development Policies: The Framings for an Integrated Approach".

The fifth Session on Oil Price Shocks was chaired by Professor Akin Iwayemi, NAEE President, University of Ibadan, Ibadan, Nigeria. Presentation at the Session include Babatunde, M. Adetunji and M.Isa Shuaibu (Department of Economics, University of Ibadan) on "The Balassa-Samuelson Hypothesis and Oil Price Shocks in Nigeria". Auwar, Umar (Department of Economics, Ahmadu Bello University, Zaria) on "Volatility in Crude Oil Prices: Analysis of Monthly Pattern and its Implications on Revenue in Nigeria". Adeniyi, A. Oluwatosin (Department of Economics, University of Ibadan) delivered a paper on "Oil Price shocks and Economic Growth in Nigeria: Are Thresholds Important? Finally Adenikinju, Olayinka (Department of Economics, Bowen University, Iwo) spoke on "Determinants of Performance of Quoted Oil Companies in Nigeria".

Session Six was on Energy Modelling and Statistics 1 and chaired by Dr Bennett Obi of Department of Economics, University of Abuja. There were four presentations during the session. Oderinde, L.O. (Department of Economics and Business studies, Redeemer's University, Nigeria) presented a paper on "The Dynamics of Output, Electricity Consumption and Exports in Nigeria: evidence from Multivariate Causality Tests". Second Paper was presented by Abdurrahaman, Ahmed (Energy Commission of Nigeria) on "Modelling Tools for Elaborating Sustainable Energy Development Strategies for Developing Countries". Chuku A. Chuku and U. Akpan, (Department of Economics, University of Uyo) presented a paper on "Energy Efficiency, Environmental Sustainability and Economic Growth: A Computable General Equilibrium Framework for Nigeria". Isola, W.A. and L.O. Oderinde (Department of Economics, University of Lagos) delivered a paper on "Interfuel Substitution and Allocative Efficiency in Electricity Production in Nigeria".

The seventh Session on Energy Modelling and Statistics 2 was chaired by Mr. Julius Ola Peters, Chief Economist, NLNG. The session featured three Speakers. *Yusuf, M.B.S. and A.O. Yusuf (Energy Commission of Nigeria and Nigerian Electricity Regulatory Commission) spoke on* "Modeling Effects of Policy Incentives on Market Competitiveness of Renewable Energy Based". *Yusuf, A.O. (Nigerian Electricity Regulatory Commission, Abuja)* delivered his paper titled "Least Cost Mix of Renewable Energy for an Affordable Feed-in Tariff: A Linear Programming Approach". The final paper in this section was presented by Aliyu, A.O. and Abdulkabir Aliyu (Energy Commission of Nigeria) on "Energy Statistics: The Basis for Energy Sustainable Development in Nigeria".

The eight Concurrent Session on Energy Demand and Economic Growth was chaired by Dr. Ben Obi, University of Abuja, Nigeria. There were three presentations. Osigwe, C. Augustine (Department of Economics, University of Ibadan) delivered a paper on "Macroeconomic Responses to Oil Price Increases and Decreases in Nigeria: Cointegration and VAR approaches". Omisakin, A. Olusegun (Department of Economics and Business Studies, Redeemer's University), presented a paper on "Structural Breaks, Parameter Stability and Energy Demand Modelling in Nigeria". Olaniyan, Kayode (National Graduate Institute for Policy Studies, Tokyo) presented the final paper titled "Energy Consumption and Growth Causality in West Africa". The following individuals joined IAEE from 4/1/10 to 6/30/10

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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 <u>iaee@iaee.org</u> 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.
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Publications

Weather Risk Management: A guide for Corporations, Hedge Funds and Investors, Kenny Tang (2010). Price: £125.00. Contact: Risk Books, Haymarket House, 28–29 Haymarket, London, SW1Y 4RX, UK. Phone:44 (0) 870 240 8859. Fax: 44 (0) 20 7484 9797. Email: <u>books@incisivemedia.com</u> URL: <u>http://</u> riskbooks.com

Calendar

25-28 August 2010, 11th IAEE European Conference: Energy Economy, Policies and Supply Security: Surviving the Global Economic Crisis at Vilnius, Lithuania. Contact: David Williams, Executive Director, 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 August 29, 2010 - September 3, 2010, 9th International NCCR Climate Summer School: Adaptation and Mitigation: Responses to Climate Change at Grindelwald, Switzerland. Contact: University of Bern, NCCR Climate Management Centre, Hringerstrasse 25, Bern, CH-3012, Switzerland. Phone: +41 31 631 31 45. Fax: +41 31 631 43 38 Email: nccr-climate@oeschger.unibe.ch URL: http://www.nccr-climate.unibe.ch/summer_school/2010/

August 30, 2010 - September 3, 2010, 5-Day PV Design & Installation Training Classes at Ontario Solar Academy 350 Jacob Keffer Parkway Vaughan, Ontario L4K 4V7 Canada. Contact: Jacob Travis, Director, Mr., Ontario Solar Academy, 350 Jacob Keffer Parkway, Vaughan, Ontario, L4K 4V7, Canada. Phone: 416-900-7191. Fax: 416-900-7191 Email: <u>contact@solaracademy.com</u> URL: <u>http://www.solaracademy.ca/</u>

22-23 September 2010, BIEE 8th Academic Conference at St Johns College, Oxford, UK. Contact: BIEE Admin Office, British Institute of Energy Economics, United Kingdom. Phone: + 44 01296 747916 Email: admin@biee.org URL: www.biee.org

27-29 September 2010, Hydro 2010 - Meeting Demands for a Changing World at Lisbon, Portugal. Contact: Mrs. Margaret Bourke, Coordinator, Hydropower & Dams, PO Box 285, Wallington, Surrey, SM6 6AN, United Kingdom. Fax: 44-0-20-8773-7255 Email: mb@hydropower-dams.com URL: http://www.hydropower-

dams.com

5-7 October 2010, 2010 Coal Market Strategies at Tucson, Arizona - JW Marriott Starpass. Contact: Teresa Coffer, American Coal Council, 1101 Pennsylvania Ave. N.W., Ste. 600, Washington, DC, 20004. Phone: 202-756-4540 Email: tcoffer@americancoalcouncil.org URL: www.americancoalcouncil.org

6-7 October 2010, KIOGE / 18 th Kazakhstan International Oil & Gas Conference at Intercontinental Hotel, Almaty. Contact: Vladislav Grabovsky, Senior Project Manager, ITE Groupl 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

14-16 October 2010, 29th USAEE/IAEE North American Conference: Energy and the Environment: Conventional and Unconventional Solutions at Calgary, AB, Canada. Contact: USAEE, 28790 Chagrin Blvd Ste 350, Cleveland, OH, 44122, USA. Phone: 216-464-2785. Fax: 216-464-2768 Email: <u>usaee@usaee.org</u> URL: <u>www.usaee.org</u>

21-22 October 2010, Exploration & Production Technology Summit at JW Marriott, Houston, Texas. Contact: Laura Cooper, Marketing Manager, World Trade Group, 211 Yonge St, 6th floor, Toronto, ON, M5B1M4, Canada. Phone: +1 416 214 1144. Fax: +1 416 214 3403 Email: <u>laura.cooper@wtgevents.com</u> URL: <u>www.ex-proevent.com</u>

October 31, 2010 - November 3, 2010, 9th International Oil & Gas Conference and Exhibition. at New Delhi, India. Contact: U.N Bose, Petrotech-2010, Petrotech, C/O Office of GM (HR) – Head Coordination, ONGC, 8th Floor, Jeevan Bharati Building, 124 Indira Chowk, New Delhi, Delhi, 110001, India. Phone: +91-11-23301220 Email: technical@petrotech.in URL: http://www. petrotech.in 22-23 November 2010, Financial Modelling in the Oil & Gas Industry at Copthorne Tara Hotel, London. Contact: Andrew Gibbons, Mr, SMi Group, 30 Great Guildford Street, London, SE1 0HS, United Kingdom. Phone: +44 (0)20 7827 6156 Email: agibbons@smi-online.co.uk URL: <u>http://www.smi-online.co.uk/10finmodel13.asp</u>

29-30 November 2010, Oil and Gas Supply Chain Management at London, UK. Contact: Conference Organizor, Supply Chain Performance, United Kingdom. Phone: 44-0-20-7827-6156 Email: agibbons@smi-online.co.uk URL: www.supplychainperformance.co.uk

6-7 December 2010, 2010 Coal Trading Conference at New York, NY. Contact: Teresa Coffer, American Coal Council, 1101 Pennsylvania Ave. N.W., Ste. 600, Washington, DC, 20004, USA. Phone: 202-756-4540 Email: tcoffer@americancoalcouncil.org URL: www.americancoalcouncil.org

February 27, 2011 - March 2, 2011, Nanotech Insight at Cairo, Egypt. Contact: Ms. Neveen Samy, Administration Assistant, SabryCorp Ltd. for Science and Development, Egypt. Phone: +20 2 2414 6493. Fax: +20 2 2415 0992 URL: <u>http://www.nanote-chinsight.net/conf/nanoinsight/11/</u>

23-25 March 2011, 10th Offshore Mediterranean Conference at Ravenna, Italy at Ravenna Italy. Contact: Conference Secretariat, OMC, Viale L C Farini 14, Ravenna, 48121, Italy, Conference Secretariat, OMC, Viale L C Farini 14, Italy, Ravenna, 48121, Italy. Phone: 39-0544-219418 Email: <u>conference@omc.it</u> URL: <u>www.OMC.IT</u>

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