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INTERNATIONAL ASSOCIATION for ENERGY ECONOMICS

IAEE Energy Forum

Fourth Quarter 2010 International Association for Energy Economics

President's Message

The 11th IAEE European Conference in Vilnius, Lithuania, 25-28 August, was a great success, with more participants and more papers being presented than hardly ever before at a European IAEE conference. A deepfelt word of thanks goes to the General Conference Chair, Jürgis Vilemas, and his team for organizing the conference so efficiently and competently, professionally as well as socially.

This was the first time a European IAEE conference was held in one of the Baltic countries. This is a milestone in itself, but it is also part of a deliberate strategy of the IAEE to build a strong and sustainable platform in Eastern Europe, in close cooperation with East-European economists in energy economics and related areas. We are in dialogue with several East-European countries, investigating the possibility of establishing IAEE affiliates there, including Russia, where we now are close to having an affiliate established.

I think that this is very interesting and promising, not only in a European context, but also from a broader perspective of IAEE development as an international association. I had the pleasure of attending the 2010 Economic Forum in Krynica, Poland, in the beginning of September, where a number of energy and environmental issues were discussed in a multi-disciplinary setting. This is a big annual East-European conference event, or the "Davos of the East" as it is sometimes called, gathering almost 2500 delegates this year. So things are moving in this region.

In my previous Message I dwelt a little on IAEE developments in Latin-America and the potential for establishing a Latin-American Regional IAEE Conference there, comparable to what we already have in North-America, Asia and Europe. Similarly, we are discussing with colleagues in Africa the development of a form of regional conference there, starting off from the highly successful Nigerian IAEE annual conference, organized by the Nigerian Affiliate of the IAEE. And then there is the resource-rich Middle-East region, where an IAEE conference is planned to be held in May next year.

I sincerely hope that our Association will succeed in developing these initiatives into ongoing, sustainable conference and other professional activities to reflect the diversity of energy and environmental economics and policy issues that we are faced with in different regions of the world, and at the same time manage to maintain an overall global perspective on those issues.

At the Vilnius IAEE Council meeting an important decision was made by Council, i.e., to launch a new IAEE publication on energy and environmental economics and policy, in addition to the two existing IAEE publications, *The Energy Journal* and the *Energy Forum*. I have mentioned this initiative in my previous Messages, and now a formal decision has been reached by Council. The working title of the publication has thus far been *Journal of Energy and Environmental Policy* (JEEP), which has now been changed to *Energy and Environmental Economics and Policy* (EEEP). This title may, however, still be open to modifications before the first issue is published.

A Working Group has been appointed by Council to bring the new publication into operation. I am proud to announce that the WG has succeeded in recruiting a very competent team of editors for this new publication; individuals of high international professional standing and reputation, i.e., Jean-Michel Glachant as Editor-in-Chief and Paul Joskow and Michael Pollitt as Co-Editors. Jean-Michel Glachant is Director of the Florence School of Regulation and Director of Loyola de Palacio Energy Policy Programme

(continued on page 2)

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CONTENTS

Editor: David L. Williams

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

at the European University Institute in Florence, Italy. Paul Joskow is President of the Alfred P. Sloan Foundation and Professor of Economics at MIT, and Michael Pollitt is Professor of Economics at the Judge Business School, Cambridge University. A Board of Editors consisting of some 25 members will also be appointed.

EEEP is meant as a policy oriented publication in the interface between energy and environmental economics and policy, and will publish a range of material that is considered relevant for decision-makers in government, industry and other sectors to improve energy and environmental policy decisions. It will be designed and edited so as to be made accessible to a broad group of readers interested in the energy and environmental economics and policy area. The first issue of the new publication is planned to be out in January 2012.

I think that the new publication will complement and supplement the current IAEE publication portfolio nicely, and extend the range of products and services which IAEE offers to give value to its membership. I wish it every success and feel confident that the Editors and the Editorial Board will work diligently to make it an interesting international publication.

This is my last President's Message. It has been a most interesting and rewarding year for me personally. I would like to thank all, individually and collectively, who have worked together with me for the IAEE during 2010 for their dedication, effort and commitment to our common cause: to develop and strengthen the IAEE in accordance with its Mission Statement as the leading international association in its field. I would like, in particular, to thank members of Council, members of the two Working Groups on the new IAEE publication, and not least, our Executive Director, David Williams, for his around-the-clock dedication and support. Finally, I wish the incoming President, Mine K. Yücel, all the best for her presidential year.

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

In this issue of the Forum we continue our focus on Russia and the former Soviet Union. We will conclude this theme with the first quarter 2011 issue.

Once again we are privileged to have a condensed version of the BP Statistical Review. This year Christof Ruehl and Joseph Giljum discuss the volatility and structural changes that occurred in 2009-2010 and the lessons to be learned from them.

Ian Bourne discusses the debate about oil price formation, noting the arguments (or lack thereof) put forth by those claiming that financial flows and speculators have caused oil price volatility and those who hold it is the complex of fundamentals of supply, demand and inventory levels that are the determinants. He discusses the impact rising diesel demand and its capacity constraint had on the ultimate oil price spike. He concludes that the physical oil price is set by the market and stresses the importance of governments and industry trusting price signals rather than constantly questioning them.

Leonard Coburn writes that the Central Asian pipelines have become a modern day version of the old silk routes. He details the developments of both oil and gas pipelines in the area along with their interesting political implications.

The Finnish chapter of the IAEE recently organized a seminar about Russia's energy economy. The seminar included four presentations offering different views on the Russian energy sector, such as the gas trade relations between Russia and EU countries, the significance of the energy sector in the Russian economy, the experiences of a foreign power company acquiring a Russian regional power company, and Russia's post-Kyoto climate policy. Virve Rouhiainen and Adriaan Perrels provide a summary of the seminar and then two of the papers, one by Vitaly Protassov and the other by Anna Korppoo, follow on subsequent pages.

David Tarr explains that the Russian gas giant, Gazprom, has failed to invest adequately, resulting in very little development of new gas supplies in Russia. The result has been progressively increasing use of central Asian gas supplies, at progressively higher prices for Russia. The increased prices of gas for Russian consumers have shown that it is crucial for Russian welfare to allow new entrants, and to introduce competition in the Russian domestic market. Europe should not expect to achieve cheaper Russian gas as a result of structural reforms within the Russian gas market. More promising avenues for European energy diversification are new pipeline construction to open up new sources of supply independent of Russia and liquefied natural gas purchases.

Jurgis Vilemas notes that after the collapse of the Soviet Union, Lithuania was left with an oversized energy sector. The situation was complicated by the fact that Lithuania has almost no conventional primary energy resources and imports all of them, oil, gas, and nuclear, from one country. A sharp reduction of energy demand occurred following the collapse due to fundamental changes in the structure of the economy. He reports how the country is working its way out of the situation.

Aitor Ciarreta and Shahriyar Nasirov discuss the Azerbaijan oil and gas situation noting that the country is endowed with rich oil and gas resources and recently has experienced an oil production boom. Since 1994, Azerbaijan has received a large amount of foreign investment in the oil sector and has signed several important energy contracts under Production Sharing Agreements which have encouraged the inflow of foreign investment.

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 http://www.iaee.org/en/inside/merch.aspx and view our new online store!

34th IAEE International Conference

Stockholm June19-23, 2011

CALL FOR PAPERS

Institutions, Efficiency and Evolving Energy Technologies

Stockholm School of Economics

VATTENFALL

Energimyndigheten

Energimarknads inspektionen

Söderenergi

Research Institute of Industrial Economics

preem

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.

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.

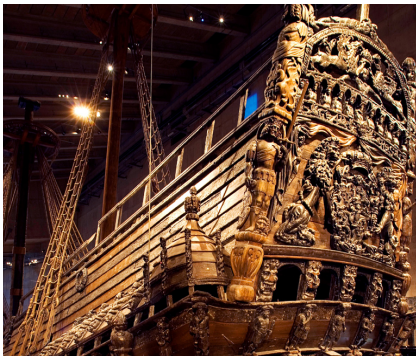
CONFERENCE VENUE

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 € 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 Apr 18	Apr18-May18	After 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 € (single ticket). The Airport Bus, also to the Central Station, takes around 45 minutes and costs around 10 €, while a taxi would take 35 minutes (depending on traffic) and cost around 40 €.

DATE	PROGRAM	TIME
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 21	Secretariat	08:00-18:00
	European Affiliate Leaders Meeting	08:00-09:00
	EJ Editors 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 Boat Trip	18:30-22:00
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

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.

All IAEE & USAEE members are invited to attend the following sessions to be held during the Allied Social Science Associations (ASSA) annual meeting in Denver, Colorado.

IAEE/AEA Session

"Environment, Climate Change, and Economic Growth"

3rd Joint IAEE/AEA Session

January 7, 2011 – 10:15am, Hotel TBA

Presiding: **Andre Plourde** (University of Alberta)

Speakers: **Philippe Aghion** (Harvard University) – *Inducing Green Technology*

Pantelos Capros (National Technical University of Athens) – *Costs and Economic Growth Implications of European GHG Emissions Reductions*

Jean Tirole (Toulouse School of Economics) – *Economic Implications of Alternative Post-Copenhagen Climate Policy Architecture*

IAEE/USAEE Session

"Topics in Energy Modeling"

13th Annual IAEE/USAEE Session at ASSA Meeting

Time/Day/Location TBA

Presiding: **Carol Dahl** (Colorado School of Mines)

Peter R Hartley, Kenneth B Medlock III, Ted Temzelides and **Xinya Zhang** (Rice University) – *Innovation, Renewable Energy, and Macroeconomic Growth*

Prakash Loungani (International Monetary Fund) and **Marianna Riggi** (University of Rome) – *A Slippery Relationship: Cross-Country Evidence on the Changing Impact of Oil Prices on GDP*

Leigh Tesfatsion (Iowa State University) and **Hongyan Li** (ABB Inc.) – *ISO Net Surplus Collection and Allocation in Restructured North American Wholesale Power Markets*

Jevgenijs Steinbuks (University of Cambridge) and **Karsten Neuhoff** (German Institute of Economic Research, DIW Berlin) – *Operational and Investment Response to Energy Prices in the OECD Manufacturing: Evidence from the Vintage Capital Model*

Please visit the IAEE/USAEE Cocktail Party which will take place during the ASSA meetings. We invite you to attend this event!

Recession and Recovery: Lessons From the 2010 BP Statistical Review of World Energy

By Christof Rühl and Joseph Giljum*

Introduction

2009 was a year of recession and of tentative recovery, with global energy demand falling sharply. And while individual fuel markets each have a unique story to tell, there is also a larger underlying theme: The global economy continues to undergo rapid structural change, with large swaths of the world aspiring to catch up to the income level of the OECD. Access to energy lies at the heart of this transformation. Energy data - more so perhaps than many macroeconomic indicators – show just how far we have come in this process and that the recession and recovery from 2007 to date did not interrupt this transformation. The following is a summary of the findings of the 2010 Statistical Review of World Energy, a rigorous and objective review of last year's energy data. We address the major theme of last year – recession and recovery – before turning to individual fuel markets.

Recession and Recovery

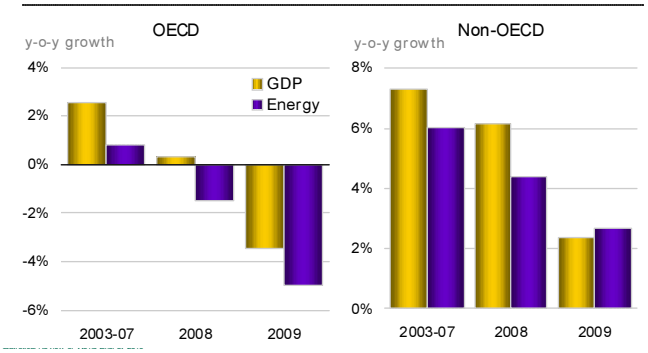
On the face of it, the world is coming out of recession.

After the financial crisis escalated in the summer of 2008, GDP across the world fell 4% from peak to trough. It was, as has so often been repeated, the first global decline since the Second World War. Governments the world over had to deploy all the policy means at their disposal to stop it. And so they did.

Underneath these turbulences, the world's growth centres continued to shift. Asia is leading the recovery. China's stimulus package was of enormous importance in stabilizing global demand. The fiscal deficits in major OECD economies threaten their growth prospects. And after all, a deep recession has successfully been avoided in large non-OECD countries, most notably in China and India.

The current recovery takes place in the midst of deep structural change, with many industrializing countries aspiring to catch up with the income levels of mature economies. The global re-allocation of energy resources supporting this process is proceeding apace. In 2009, it accelerated.

GDP and Energy Consumption Growth



Annual data for 2009 averages periods of growth and decline but still, it reflects the force of the underlying shift. In 2009, the global economy contracted by 2% - with the OECD falling by 3.4%, and the non-OECD rising by 2.4%.

Primary energy consumption throws this pattern into sharper relief. Global primary energy consumption also fell - by 1.1%, the first decline since 1982. In volumetric terms, this was the largest decline in our data (which goes back to 1965). OECD energy consumption fell by 5% - more than its decline in GDP. Non-OECD consumption rose by 2.7% - more than its increase in GDP.

A 5% decrease in energy consumption in the OECD means that the world's 30 most developed economies consumed less energy last year than they did ten years ago, although their economies have since grown by 18%. Over the same period, the economies outside the OECD grew by 75% and increased primary energy consumption by 57%. Long term, energy consumption grows less rapidly than GDP in both camps.

Energy consumption outpacing GDP outside the OECD means that energy intensity rose last year, for only the third time in 20 years. Energy growth was concentrated in China and India, where consumption rose by 8.7% and 6.6%, respectively. Without the contribution of India and China, non-OECD energy demand would have fallen by 1.5% instead of growing almost 3%; and global energy demand would have fallen by almost 4% instead of the 1% actually recorded.

Energy consumption grew faster than GDP in China and India. In the OECD, all fossil fuels fell faster than GDP. And in the former Soviet Union, driven by Russia, energy consumption declined less than GDP. What happened?

Part of the answer lies with the disproportionate impact of the recession on industrial production and, conversely, with economic stimulus programs heavily

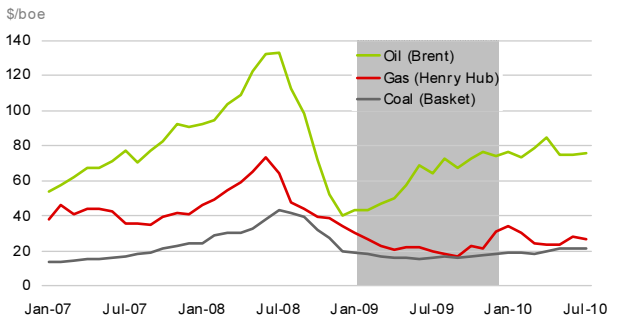
* Christof Rühl is Chief Economist and Vice President at BP plc. Joseph Giljum is an economist with the firm. The Statistical Review data and a more detailed analysis can be found at www.bp.com/statisticalreview

slanted toward energy intensive activities.

In the U.S., and the OECD more broadly, energy consumption in the industrial sector fell faster than in other sectors. During a year in which overall U.S. energy consumption fell by 5%, industrial energy consumption declined twice as fast. And those declines, like the overall contraction of GDP, were concentrated in the first half of the year.

China, at the other extreme, succeeded in avoiding a collapse of industrial activity by undertaking infrastructure projects and construction on a grand scale. The increase in coal (and oil) mirrors an increase in cement and steel production, and of other industries required for infrastructure development.

Energy Prices



Over the course of these events global fuel prices all declined, and then stabilized or increased as the recovery took hold. But the pattern after the initial decline differs widely across fuels, each telling its own story. Crude prices recovered early in 2009, at a time when oil demand was still falling – and at a time when OPEC cut production aggressively, to catch up with falling demand. Natural gas prices declined and then stayed low until today – driven by the continued growth of unconventional gas production in the U.S. and a wave of new LNG supply. Coal prices recovered only gradually – more so in Asia Pacific and in direct response to accelerated Chinese and Indian import demand.

To appreciate and better understand these developments, we have to look at the data fuel by fuel.

Fuel by fuel

Non-fossil fuels

Hydroelectricity and nuclear energy are still the largest non-fossil fuels, with a combined share of 12% in primary energy. Hydroelectricity, at 1.5% [39 TWh], was the fastest growing fuel in primary energy last year, on the back of growth in China, Brazil and the U.S.. But this increase was more than offset by a decrease in nuclear power generation [1.3% or 43 TWh], largely because of outages in Europe's aging nuclear fleet.

The share of non-fossil fuels in power generation (that is, of hydro, nuclear, wind, solar and geothermal) was in decline for most of the past decade because hydro and nuclear were unable to keep up with global electricity growth. The share increased for the last two years, reaching 31% in 2009. Electricity demand growth had fallen in 2009 and this helped - but it was also the rapidly growing contribution of wind that made a difference.

Overall, wind, solar and geothermal resources contributed an estimated 1.7% to total power generation in 2009 – or about 0.7% of primary energy consumption.

Fuel ethanol production grew 8% to 770 kb/d of oil equivalent. On an energy content basis, the annual production of ethanol in 2009 was equivalent to 1% of global oil production – about 0.3% of primary energy consumption.

Crude oil

Like other fuel markets, the oil market in 2009 was characterized by a rapid decline in consumption in the first half, and a slow recovery later in the year. Unlike other markets, the oil story highlights the significance of a producer cartel and its ability to manage supply. As a result of production cuts implemented in late 2008, oil prices recovered earlier than other fuels, and to higher levels.

Even with aggressive OPEC production cuts, annual oil prices in 2009 fell for the first time since 2001, breaking an unprecedented string of seven consecutive increases. Dated Brent averaged $62 per barrel, more than $35 below the 2008 average. Prices began the year below $40 and recovered steadily, doubling by June. For the rest of 2009, crude traded in a range around $70-75 and is averaging $77 so far this year.

Global oil consumption declined by 1.7%, or 1.2 Mb/d, in 2009 – a second consecutive annual decline and the largest since 1982. The contraction was concentrated in the OECD, where consumption declined for the fourth year in a row, to reach the lowest level since 1995. The decline in OECD consumption began in 2006, when the economy was still growing rapidly – suggesting that recession has not been the only driver. Price also matters and there are good grounds for arguing that OECD demand has peaked, or is settling on a path of structural decline.

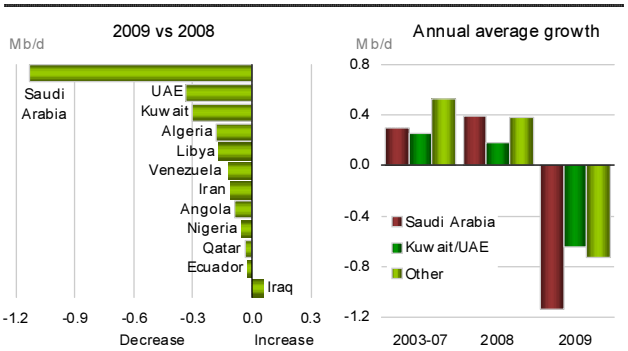
Oil consumption growth outside the OECD slowed but did not contract. It rose by 860 Kb/d. All of the net growth came from China [540 kb/d], Saudi Arabia [220 Kb/d] and India [110 kb/d]. Saudi Arabia had the strongest and China the second strongest consumption growth on record.

Global oil production fell by 2.6% in 2009, about 2 Mb/d more than consumption. Of course, this decline is primarily the consequence of OPEC's supply management during the year. OPEC production fell by nearly 2.5 Mb/d or 7.3% after making three successive production cuts in late 2008. OPEC-11 crude production reached its lowest point in April last year, when output was more than 3.3 Mb/d below the September 2008 baseline; it is still 2.6 Mb/d below that mark today.

On the non-OPEC side of things, supply increased by 450 Kb/d [0.9%]. By far the biggest contribution to production growth came from the U.S. where output rose by 460 Kb/d, the strongest increase since 1970 – driven by deepwater production in the Gulf of Mexico, which grew by 390 Kb/d, triple the previous record growth.

Elsewhere, production was broadly flat. Continued growth in the former Soviet Union and Brazil was offset by continued decline in mature provinces, including Mexico – once again the largest non-OPEC decline – the North Sea and Canada. Russian crude oil production rose by 140 Kb/d, helped by a change in fiscal regime motivated by the economic crisis. Russia surpassed Saudi Arabia as the world's leading oil producer last year.

OPEC Production



One of the reasons why OPEC cut production so aggressively was high inventories. Commercial inventories were high from the beginning of the year and with consumption falling faster than production early in the year, they rose further. Floating storage was employed and rose above 100 Mbbls early in 2009. By year-end, with consumption rising and OPEC maintaining production discipline, inventories began to fall sharply. For the year as a whole, OECD commercial inventories fell by 30 Mbbls and floating storage grew by 70 Mbbls. So far this year, commercial inventories on shore are tracking above the 5-year range, but this masks a continued decline in stocks at sea.

There are plenty of sub-plots in the oil market – the role of speculation and of subsidies, the relationship between oil and other asset classes, the persistent contango in forward prices. At a high level, however, the story for 2009 – and so far for this year – is that production fell by more than consumption, which tightened inventories and supported higher prices.

Refining

In 2009, almost 2 Mb/d of new refining capacity was added globally, on top of 1 Mb/d in 2008. Capacity additions were concentrated in India [580 kb/d], China [820 kb/d], and elsewhere in the East of Suez region. For the first time, installed capacity in the non-OECD overtook that of the OECD – and the new installations have to compete, exporting surplus production into markets where demand was falling.

Needless to say, there is no cartel to shield the market for refined products. Instead, margins have to fall to the point that capacity becomes uneconomic to run. In 2009, global refining margins as measured by BP's global indicator margin averaged $4 per barrel, the lowest level for 7 years, and triggering a 1.5 Mb/d reduction in global crude runs.

In 2009 global refining utilisation fell to 81%—the lowest for 15 years—and global unused capacity now exceeds 17 Mb/d, the highest since 1985. Still more new capacity is under construction because of decisions made during the good years; competing non refinery sourced supplies such as NGLs and biofuels will also take a significant share of demand growth. Further consolidation, therefore, seems inevitable.

Natural gas

Among all the fuels we track, natural gas experienced the sharpest contraction in 2009. At the same time, unconventional production in the U.S. and a cyclical overhang of globally available LNG caused significant changes in regional gas markets. The global gas market is integrating further, but this is not a smooth and easily predictable process.

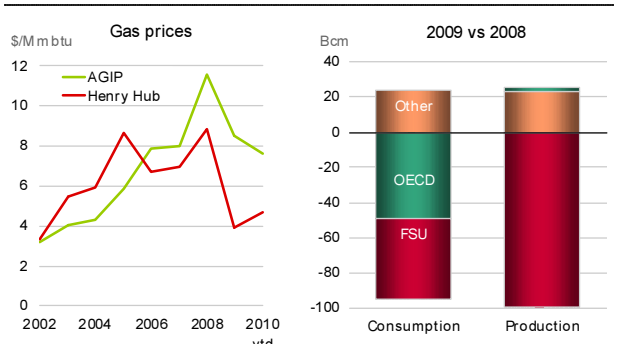
Natural gas consumption reacted to the recession with the largest decline in our data, falling by 2.1% [70 Bcm]. The plunge was concentrated where the recession hit hardest: In the OECD [-3.1% or 49 Bcm]

and in the former Soviet Union [-7.3% or 46 Bcm] consumption declined more than ever before. Consumption grew only in the Middle East and Asia, largely driven by the growing availability of domestic resources in Iran, India and China.

Global production was scaled back in response to lower demand, falling by 2.1% [74 Bcm] - the first decline ever. The brunt was borne by the former Soviet Union, where production fell by an unprecedented 12% [99 Bcm]. OECD production, in contrast, grew slightly, led by the U.S.

Gas prices reacted to the recession in predictable ways: prices in liberalised markets dropped sharply – around 55% year-on-year in the U.S. and UK; oil-indexed prices, sheltered by the higher price of oil, fell by less – the Average German Import Price or the LNG price in Japan, for example, by 26% and 28%. Oil-indexed prices stayed above spot prices during the entire year and in 2010 to date, an unusual occurrence.

Natural Gas Market



Underneath these adjustments to the economic situation, structural and cyclical changes are reshaping global gas markets. Regional markets remain segmented, but arbitrage increased. A wave of new supplies boosted LNG trade by almost 8% [16 Bcm] in 2009 while pipeline trade declined; LNG now constitutes 28% of all international trade. Together with a structural increase in the production of unconventional gas in the US, this accelerated the integration of global markets and challenges the traditional pattern of gas flows and pricing in Europe.

Unconventional gas, shale gas in particular, has transformed the U.S. gas market. In 2009, the overall rig count fell steeply, while production increased due to prolific shale deposits, which now have become the cheapest source of supply. For the third year running, the U.S. had the world's largest production increase and in 2009, it overtook Russia as the world's largest gas producer. Momentum is continuing so far.

As a result of investment during the years of high demand, global liquefaction and re-gasification capacities are seeing major increments in 2009 and 2010. At the same time, traditional import markets in Asia were hit hard by the recession. Reduced demand, the global rise in LNG supply and limited need for U.S. imports created a substantial LNG overhang.

To satisfy high demand growth, Asia had attracted additional cargoes in 2007 and 2008, often by offering higher spot prices to redirect cargoes from the Atlantic Basin. Flexible LNG reacted to spot prices. The recession did not stop this gradual shift toward flexible prices, but changed its driver: In 2009, it was no longer customers but producers, who made cargoes responsive to spot pricing. The prime beneficiary of this process to date has been Europe: Record LNG amounts have become available, keeping European spot prices low and offering an easily accessible alternative to the more expensive oil-indexed contract supplies.

European producers reacted to lower prices with output cuts. Indigenous European production fell by almost 5% [14 Bcm]. But the main victim of gas-on-gas competition became oil-indexed pipeline supplies. European imports of pipeline gas from North Africa and Russia slowed by 13% each [5.9 Bcm and 20 Bcm], while net purchases of LNG jumped by 23% [12 Bcm].

As a result of declining demand for European pipeline imports, signs of price flexibility emerged. A number of European buyers re-negotiated penalties or received an extension for take-or-pay deliveries. And in February of this year, Gazprom announced it would index gas deliveries above the minimum take-or-pay volumes to spot rather than to oil prices. Statoil employed similar measures. The pressure on oil indexed gas prices had spread to European pipeline trade.

Ironically, a year which had started with Russia suspending gas exports to the Ukraine and Europe in January 2009, ended with progress towards a more flexible and better integrated global market. The future will show whether the structural effects of greater trading and unconventional gas can persist, once the cyclical effects of an oversupply of LNG are corrected.

Coal

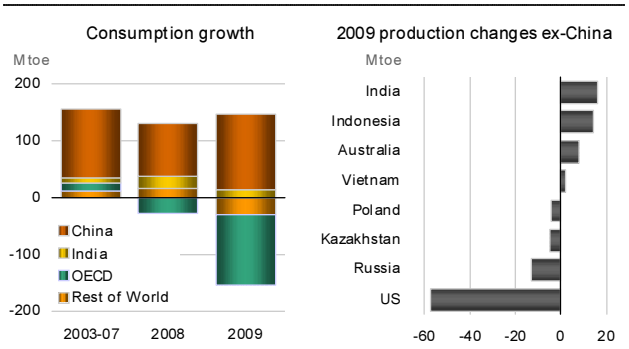
Global coal consumption was flat in 2009. However, this masks the opposing forces of strong growth in China and India versus a steep decline in the OECD and FSU. Consumption fell by 10.4% [123 mt]

in the OECD and 13.3% [24 mt] in the former Soviet Union, the largest declines on record. Reduced demand from industry and power generation was given a further twist by competition from other fuels, such as gas in the U.S. and Europe, or recovering nuclear power in Japan.

China's coal consumption, in contrast, grew by almost 10% [131 mt] and India's by almost 7% [15 mt], in both cases faster than the ten year average and faster than GDP. Together they counterbalanced all markets where coal demand decreased.

Repeating this pattern, global production in 2009 grew by 2.4% - despite weak demand. While OECD and FSU production dropped the most in a decade, indigenous production increased in China and India at or above the ten year average in both cases [9.2% (127 mt) and 8.4% (16 mt)]. China's data dominates the global balance and so it deserves to be noted that China's National Statistical Bureau has classified the very high Chinese production numbers as preliminary.

Coal Consumption and Production



Coal consumption growth in China and India has been facilitated by imports. In fact, China became a major coal importer for the first time in 2009, jumping to second place behind Japan. Imports surged by 211% [86 mt], by far their biggest increment ever. The major beneficiary was Australia, which saw its exports to China increase more than fourteen-fold. India's coal imports rose by about 33% [19 mt].

In the background, the Chinese state procurement system had changed, leaving it for the first time to coal users to source their own supplies. In addition, falling global consumption had brought international coal prices down; for the year 2009, prices for internationally traded coal had fallen considerably below Chinese domestic prices.

This robustness of energy consumption growth in China becomes even more intriguing if one considers one of the hallmarks of industrialization in the developing world, namely the relationship between GDP, electricity and energy consumption growth. For years, power generation in the developing world, and in particular in China, has grown faster than GDP, driving fossil fuel growth (not so in India, though, where electrification proceeded more slowly). In China, this held true for eight of the last ten years – until the relationship broke down in 2008 and 2009. In 2009, higher energy demand growth coincided with lower electricity demand growth relative to GDP: Clearly, the additional energy consumed was not driven by power generation growth.

So, what was the coal needed for and why was it imported? The increased import reliance mirrors the developments just discussed; and the increased use of coal is a function of the energy intensive nature of the stimulus package. In late 2008, the government acted quickly to avert a recession by unleashing major domestic infrastructure projects. Construction activity created heavy demand for energy intensive products. Steel and cement production, for example, rose by 13% and 16%. As a consequence, coal consumption in these sectors grew about three times faster than in power generation, and faster than coal consumption overall.

The surge in Chinese coal imports thus is the result of demand growth triggered by the economic stimulus package, the further liberalisation of domestic markets, and the availability of attractively priced coal from foreign locations. Once again, international coal markets showed that they do operate in a very competitive fashion.

Conclusion

So many stories – but the year leaves us with a few unifying themes.

First, the strong link between energy consumption and economic growth reasserted itself. Energy demand fell – by more - where economies contracted, and it increased – by more - in growing economies.

Second, in a particular twist during the recession, the link between energy and growth extended itself to those economic stimulus programs which succeeded in supporting growth. As a rule, such programs have been energy intensive. The three largest recovery programs (as a share of GDP in 2009 and 2010) are being implemented in Russia, Saudi Arabia and China. They drove up the ratio of energy to GDP in all three countries.

The mirror image is provided by the U.S., where the drag of falling industrial production on energy demand dominated the data before the stimulus could kick in. The next few years will decide how much energy demand was lost permanently, and how the "green" components in U.S. economic policy will

play themselves out.

Third, a strong variance of supply side reactions on the back of institutional differences and the interface of structural and cyclical factors, allowed different price responses across the major fuel markets. The oil market was the only one where production fell faster than demand, for well known institutional reasons. In refining, cyclical overbuilding kept margins depressed. In natural gas, structural and cyclical factors combined to keep supply high and spot prices low. Coal markets saw a fast, competitive adjustment to new international patterns of demand.

Finally, underneath all the turbulence, long term energy trends remain in place. In fact, they accelerated during 2009. The decline in OECD oil demand, the ongoing global integration of gas markets, the internationalisation of competitive coal markets, and the rising weight of renewable energy are poignant examples. Crucially, this is also the case for the bigger structural shift in economic growth and energy consumption. China's and India's "catching up" process accelerated in 2009. In 1999 China's energy consumption per capita was just 20% of the UK level; in 2009 it reached 50%. More broadly, ten years ago the share of the developing world in global energy consumption was 42%, now it is 53%. Increased wealth and income levels, hopefully, will soon follow these investments.

Price Signals in Oil Markets

By Ian Bourne*

The peak in crude prices in July 2008 has led to a heated debate about oil price formation. On one side, many politicians — not just from inside oil producers' group Opec — and some influential lobbyists, such as Michael Masters, say that financial flows and speculators have caused oil price volatility, distorting prices and breaking the link with fundamentals such as inventory levels. On the other side, long-time commentators on the oil markets say that the complex fundamentals of supply, demand and inventory levels are the determining factors in all recent price movements in oil markets, as explained by oil economics as established in Paul Frankel's Essentials of Petroleum (1946).

The temperature of this debate was raised further by policy-makers' concern about systemic risk in financial markets after the credit crunch of August 2007 and the credit freeze of September 2008. The political mood changed, as markets were seen as part of the problem, rather than a solution. Politicians took aim at derivatives, and have started to enact laws that seek to control derivatives trading more closely. The scope of these laws includes commodity derivatives, not just financial derivatives.

President Barack Obama signed a new U.S. law on derivatives on 21 July — the Dodd-Frank Wall Street Reform and Consumer Protection Act — in which commercial hedging is exempt, and which defines over-the-counter derivatives narrowly, to include swaps but not forwards. But, these exemptions aside, oil and other energy commodity OTC derivatives are covered by new oversight powers for the regulator, the Commodity Futures Trading Commission (CFTC), under the new U.S. law. The EU is also moving forwards with an agenda to increase regulation of derivatives, including commodity derivatives.

Legislators appear to have accepted the arguments of those who see speculation in all derivatives markets — financial and commodities — as a danger that needs regulating. The theory is that speculators have driven up the price in defiance of market fundamentals. Yet the case against oil derivatives has not been made, and the idea that speculators drive prices is not proven.

Discussion about oil markets has become polarised. Those who believe that oil prices are formed by financial investors, often referred to as speculators, do not accept that no empirical evidence exists to back up this claim. The Paris-based International Energy Agency (IAE) has attempted to act as an honest broker, gathering participants from both sides of the argument at round-table discussions. But, faced with the unshakeable belief of the "speculators are to blame" proponents, the IAE has found it hard to dismiss the speculative case. After its round-table discussion on oil price volatility in Tokyo in February 2010, the IEA noted: "Debate on the precise degree of price impact derived from speculation was inconclusive."

This appears to be a way of ducking the argument, but the IEA's careful words in fact reveal that it is highly sceptical of the argument that speculation distorts oil prices. If the "precise impact" of an economic effect cannot be measured, one plausible conclusion is that this effect does not exist. Some analysts who came into the debate asserting that speculation is in control of prices are now back-tracking, after repeated failure to win the debate through reasoned arguments. The manner of back-tracking takes several forms.

The most ardent proponents of the speculative case now admit that fundamentals play a role, but that some undefined share of the oil price is the result of speculation. They cannot put a number on this element of the oil price, but assert that it exists.

A second group of back-trackers seeks to appear diplomatic. The debate about the relative importance of fundamentals against speculation cannot be decided, they say, and further discussion is of little use. The problem with this approach is that it suggests that the evidence is balanced, whereas in fact no evidence backs up the speculative case.

Another attempt to circumvent this problem is to accept the lack of evidence, but to say that this does not matter. A report for the French government by Professor Jean-Marie Chevalier says it is "difficult to distinguish between the defenders of the physical fundamentals… and the defenders of financial fundamentals". The report goes on to admit: "Nor do available statistical data establish clearly the links of causality between the open positions of financial investors in futures prices and the prices observed in the spot market." Yet, despite this evidence-based fact, the report then asserts that "nothing suggests these links can be excluded". This is not a reasonable position, undermining the report's following assertions that oil market risks "may generate systemic risk" and that "the price of oil emerges as a problem for general financial market regulation" (Report of the Working Group on the Volatility of Oil Prices, February

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2010).

A final form of back-tracking by those who find it hard to give up the belief that speculative forces mould oil prices, although they cannot prove their case, is to say that it is up to their opponents to prove the opposite case. They call on proponents of the fundamentals-based argument to prove that supply, demand and inventory levels define the oil price at all times. This is impossible, because while fundamentals can explain price movements, they cannot pinpoint an exact price at any time, such as North Sea Dated and cash WTI crude ending the day on 3 July at $144.08/bl and $145.29/bl respectively.

One reason for this is that it is never possible to obtain a timely, detailed and accurate global supply and demand dataset. And even if perfect data were obtainable, economists could still only use this to infer the price direction implied by the fundamentals, not the absolute magnitude of price changes. The "fair price" cannot be determined by economic theory, but is whatever price the market agrees.

Those who need to prove their case are the commentators and politicians arguing that financial flows have become a key driver of oil prices, displacing fundamentals. The idea that factors other than the supply and demand for oil drive its price in the market is so unorthodox in terms of practical oil economics that its adherents should be asked to prove it. So far they have not been able to, despite at least 10 years of research.

One of the terms used by followers of the speculative argument is the "financialised" commodity markets. This term is unclear and unhelpful in analysing oil markets, and has not been defined. The term "financialised" commodity markets appears to be based on the idea of some co-movement between oil market volatility and other financial markets during the financial crisis, and between oil markets and other commodity markets (Index investing and the financialization of commodities, Ke Tang and Wei Xiong, Princeton University, February 2010).

The idea implies spillover from the financial market crisis into oil market volatility. In itself, the idea of spillover is not contentious, given the drop in oil demand caused by the recession that followed the crisis, and given the issues of creditworthiness and liquidity surrounding certain oil market participants during the credit freeze after the collapse of Lehman Brothers in September 2008. But spillover does not prove causality.

Proponents of the speculative argument need to look beyond temporal correlations. The question is whether financial investors' positions and inflows cause the price increase. Almost all serious analyses use Granger tests for this, showing no causality between financial flows and investors' positions and oil price movements. Arguments based on the supposed "financialisation" of oil prices have failed to prove that speculators drive prices.

Studies such as those using the term "financialisation" invariably focus on crude futures, ignoring the links between futures and physical oil markets. A lack of understanding of physical oil markets skews research into oil price formation, as it becomes biased towards what may or may not be affecting activity on futures markets. This leads it to focus on expectations. This factor is a valid and useful analysis of one of the elements in futures prices further along the curve, but it is of limited use in explaining physical oil prices.

An understanding of physical oil markets requires research into how prices are identified in these markets. Price discovery in physical oil markets is made transparent by price reporting agencies (PRAs). Reporters at PRAs identify the price of physical spot oil cargoes, which are formed in open markets by negotiation between buyers and sellers — the spot market participants. The PRAs publish methodologies publicly explaining the process by which prices are identified. In many oil markets, PRAs show bids, offers and deals with counterparties named. This is a level of transparency beyond that provided by futures markets.

Price benchmarks provided by PRAs are far from simply being a satellite of futures. The North Sea physical and forward market is the benchmark against which the Ice Brent futures contract is cash settled. Ice gasoil and Nymex WTI can be physically delivered. Atlantic basin crude is priced against North Sea Dated, not Ice Brent. Physical oil tethers the futures markets.

Discussions of the price swings of 2008-09 that focus on headline crude futures prices alone are flawed. The failure to understand the real role of physical markets in crude and products means that this sort of analysis looks at crude as if it is an isolated commodity, traded for its own sake. In fact, crude is simply a feedstock. Crude is bought by refiners to make products, not for its own sake. Frankel's Essentials of Petroleum notes "how vital it is to think always in terms of the whole industry rather than to try to solve the problems of any one of its component parts as if it were self-contained".

The 2008 price spike was mainly the result of a diesel shortage, accompanied by Opec supply restraint. Diesel prices drove all oil prices higher, and premiums for capacity-constrained diesel to crude

and to other products that were in surplus — such as fuel oil and even gasoline — widened. "Each product sells at the price its market will bear," as Frankel notes. "The relation of prices to yields can only be fully understood if we keep in mind that any one petroleum product can be made only if others are derived simultaneously."

Refiners had to make as much diesel as possible to meet demand and were making unprecedented margins of nearly $40/bl on diesel, so they bid up the price first of low-sulphur crude, supply of which is limited, and then of higher-sulphur crude, supply of which was constrained by Opec.

Rising diesel demand is a direct cause of rising crude demand, although processing enough crude to meet diesel requirements may well cause excess gasoline and fuel oil output. This is what happened during the latter part of the oil price cycle of 2003-08. At the same time as demand for crude was rising, Opec members refused to increase production, claiming that high oil prices were not their responsibility, but were caused by speculative financial flows into oil.

The feedbacks from fuel oil, diesel and gasoline demand into crude demand (and, therefore, pricing) is crucial in oil today's market cycles. It is not possible to analyse crude prices without analysing products prices. Desulphurisation and upgrading capacity in the refining system was stretched to its limits up to mid-2008. Refinery utilisation rates have never been so high as during the price boom. From 2004 to mid 2008, outright global refining capacity was being utilised at levels of over 85pc — record high levels and effectively full utilisation, given maintenance requirements and sub-marginal capacity in Africa, eastern Europe, the FSU and South America. This was because diesel is essentially a straight-run product, requiring refiners to process more crude to make more diesel.

The first half of 2008 was characterised in particular by huge diesel premiums, partly because of increased Chinese demand ahead of the Beijing Olympics, including demand that may have been for inventory building rather than consumption. Diesel demand had to be capped through record high prices to keep it within the supply limits of the capacity constrained refining system.

The diesel constraint involved total crude refining capacity, but especially upgrading capacity and desulphurisation capacity. Diesel demand growth in 2004-08 was far greater than expected, as the economy was growing strongly. This was especially the case in China in 2004 and again in 2008. This capacity constraint argument is a simple but compelling explanation of the price spike.

Prices collapsed after July 2008 because of a drop in demand when the recession struck, especially after the collapse of Lehman Brothers in September 2008, exacerbated by destocking along the supply chain (tertiary oil stocks, petrochemicals, plastics), and on the supply side by Saudi Arabia relaxing output restraint after May in the face of crude's damaging rally towards $150/bl.

The prompt price reflects supply and demand of and for various grades of crude and products, tied together through refinery economics; the supply chain (freight rates, time lags, etc.); and inventory economics. Nearby futures prices are tied to this prompt price through settlement procedures, although overshoots or undershoots can occur in intra-day futures prices — such as the famous intra-day highs of $147.27/bl on Nymex WTI and $147.50/bl on Ice Brent futures on 11 July 2008.

Supply and demand expectations affect the longer-dated contracts on the forward curve. These factors, often called "future fundamentals", are uncertain. But current fundamentals are hardly any more certain. Today's fundamentals are not known until several months after the present time. The weekly U.S. data are always revised, monthly data are revised several times and sometimes very heavily seven to eight months after the year in question (U.S. EIA summer revisions). Non-U.S. data have much greater time lags than U.S. data, and Chinese demand data have to be implied from trade, output and refinery statistics. No inventory data exist for many countries, including China — the world's second largest consumer.

The best guide to current fundamentals is not supply, demand and inventory data. The best guide to current fundamentals is the prompt price. Later, when fundamentals data become available, an explanation always comes through of how physical oil flows define oil prices.

Fundamental factors invariably explain overall oil price formation and direction. But oil market commentators need to keep an independent and open mind, looking at evidence for other factors, such as links with speculation by non-commercial investors. It is important to look at all evidence-based explanations of oil price formation. So far, all of the evidence suggests that so-called speculators play almost no part in price formation.

One of the latest evidence-based studies into speculation is by the OECD. It argues against the popular notion that flows of investment into oil futures markets increase demand for oil futures and, therefore, must push up the price. This logic, while apparently common sense, does not apply to oil futures because the supply of oil futures contracts is infinite. Each new transaction creates a new "paper" contract. For every buyer in a swaps or futures market, there is an equal and opposite position taken by a seller. Each

time an investor buys (sells) a contract, it is created. The supply of contracts is limited only by liquidity — by the willingness of other participants to sell (buy). Oil futures markets are highly liquid, so demand and supply of oil futures contracts is, in theory, infinite.

As the OECD study explains: "The first possible logical inconsistency within the bubble argument is equating money inflows to commodity futures markets with demand. With equally informed market participants, there is no limit to the number of futures contracts that can be created at a given price level. Index fund buying in this situation is no more 'new demand' than the corresponding selling is 'new supply.' Combined with the observation that commodity futures markets are zero-sum games, this implies that money flows in and of themselves do not necessarily impact prices. Prices will only change if new information emerges that causes market participants to revise their estimates of physical supply and/or demand." (Speculation and financial fund activity, OECD draft report, May 2010 www.olis.oecd.org/olis/2010doc.nsf/ENGDATCORPLOOK/NT000029BA/$FILE/JT03282467.pdf).

Many of those who argue that speculators drive oil prices insist that empirical studies of trading positions are of little or no use because the data are flawed. They say that data aggregation by the CFTC renders the statistics worthless. But it is important to note that the key CFTC studies on price formation were written by the commission staff with full access to the full disaggregated data set. The CFTC has analysed uncoded data that are unavailable to non-staff (in order to protect market participants' individual market positions).

A key CFTC study is "Price volatility, liquidity provision and the role of managed money traders in energy futures markets" by staff of the Commodity Futures Trading Commission, Public Company Accounting Oversight Board (November 2005). It states: "Employing a unique dataset consisting of trader positions in U.S. energy futures markets, we analyze trading relationships between managed money traders (MMTs) and other groups of traders (e.g., floor brokers, swap dealers, producers, manufacturers). We find that on average MMTs do not change their positions as frequently as other groups. Using causal techniques we determine that, on average, changes in MMTs positions are triggered by position changes of other trader groups. We find that MMTs are an important source of liquidity to the other participants and we reject the hypothesis that MMT trading causes price volatility in futures markets."

This report built on previous staff studies, such as "Market Growth, Trader Participation and Derivative Pricing," by Michael Haigh, Jeffrey Harris, James Overdahl and Michel Robe. In this study, the CFTC economists maintain that "hedge fund activity does not affect prices in energy futures markets." The latest CFTC staff study was its "Interagency Task Force on Commodity Markets, Special Report on Commodity Markets", which is available in draft form only because it was not published by the CFTC. It states: "Whereas the publicly available data only identifies commercial and non-commercial categories of participants in the crude oil futures market, the COT report is built upon confidential CFTC data collected for market surveillance purposes which allows for a more precise categorization."

In this draft report, the CFTC says it has analysed "daily price changes and position changes by various trader groups and combinations of trader groups between January 2003 and October 2008." It finds that: "Over the full time period, there is little evidence that daily position changes by any of the trader subcategories systematically precede price changes. This result holds for all potential categories of speculators, for non-commercial traders in total, for hedge funds and swap dealers individually, and for the positions of non-commercial traders combined with swap dealers. A reaction in the positive direction indicates that trader positions increase (decrease) following a price increase (decrease) on the previous day. A reaction in the negative direction indicates that trader positions decrease (increase) following a price increase (decrease) on the previous day. These results are representative and have been subject to a variety of robustness checks." (Interagency Task Force on Commodity Markets, Special Report on Commodity Markets, online.wsj.com/public/resources/documents/DraftITFReport010509.pdf

The physical oil price is set by the market. The fair or reasonable price is decided every day by those buying and selling oil. It is identified through price discovery by PRAs. Futures prices are tethered to these physical prices, and all of the evidence suggests that the whole price complex sends out signals that reflect the fundamentals of supply, demand and inventory levels. It is important for governments and the industry to trust the resulting price signals rather than constantly question them.

Central Asia: Pipelines Are the New Silk Road

By Leonard L. Coburn*

Central Asia (includes Caucasus in this discussion) historically has been a region where major powers fought for control of the overland trade routes between China on the east, Europe on the west, and Russia to the north. The various "silk" routes crisscrossed the region carrying out an active inter-regional trade. The rise of the Soviet Union in modern times changed the political dynamic of the region as Russia brought the five "stans" of Central Asia and the Caucasus within its political sphere. With Russia's dominance, the energy trade developed in a north-south pattern with all pipelines and other modes, rail, electric power lines, and water, all moving north into Russia. Today, the effort to break this monopoly on transport routes is at the forefront of energy politics in the region.

The players include Russia attempting to maintain its political and economic hegemony over the region; China entering into long term relationships to sustain economic growth and satisfy its energy security; EU seeking new sources of energy (primarily gas) to meet future demand and enhance its energy security; U.S. seeking to enhance its political and economic influence to counterbalance Russia and China; and the region's countries working out a delicate balance among all these competing interests. In this heightened political atmosphere, pipelines become the new silk road—the control over them is seen as the way to maintain Russia's political and economic hegemony or the way for each of the other players to break Russia's dominance and at the same time help the countries of the region diversify economically and politically.

Oil Pipelines

In the Soviet era all pipelines went north into Russia. In the post Soviet era new pipelines or new routes using old pipelines developed to provide diversity. Many cracks developed in the Russian monopoly. The United States, with European backing, supported this diversity with its multiple pipeline strategy to break Russia's monopoly. Today, route diversity and competition undermine Russia's former monopoly.

The first crack developed in Azerbaijan with pipeline and rail routes starting in Baku, Azerbaijan and transiting Georgia carrying oil to the Black Sea ports of Supsa and Batumi. The second crack was the Caspian Pipeline Consortium (CPC) pipeline opened in October 2001 carrying oil 1500 kilometers from Kazakhstan's Tengiz oil field to the Black Sea via Russia. CPC was first and remains the only oil pipeline within Russia not controlled by state-owned Transneft, Russia's oil pipeline monopoly. The third crack was the Baku-Tblisi-Ceyhan (BTC) pipeline—an 1100 mile, 1 million barrels per day crude pipeline from Baku to Ceyhan, a deepwater port on the Mediterranean that opened in July 2006. BTC provides a significant new route out of the region, breaking Russian monopoly on shipments and also bypasses the Bosporus bottleneck.

The next crack in Russia's was the completion of the Kazakhstan to China oil pipeline in July 2006 carrying crude oil 613 miles from Atasu (NE Kazakhstan) to Alashankou in China's Xinjiang region (origin of west-east China pipeline). This pipeline now has been extended across Kazakhstan to Atyrau to link up with its western oil fields. The oil in this pipeline comes from Kazak fields developed by Chinese oil companies. Finally, Kazakhstan is developing a trans-Caspian barge system that will ship oil from the port of Aktau via barge to the BTC pipeline. The current 200 mbpd shipments are expected to double with the opening of Kashagan.

A new possibility is part of French President Sarkozy's recent agreement with Kazakhstan's President Nazarbayev to enhance economic and political relations. This includes the possibility of a pipeline from Kashagan (Total is a major participant) directly across the Caspian to Baku, rather than using existing pipelines (CPC or Russian network).

All these new routes provide Central Asia with competitive and diverse routes undermining Russia's monopoly position. All the countries must continue to balance their relationships with Russia carefully since Russia still has a strong position in Central Asia, but Russia no longer dominates as in former times.

Gas Pipelines

During the Soviet era, all gas pipelines went north and connected with the Russian gas system. In the post Soviet era, the emergence of Gazprom as Russia's state controlled gas monopoly (85% of Russian production; 100% of gas pipeline transit; sole gas exporter) continued Russia's domination of Central Asian gas transportation. The Central Asia Center Pipeline (CAC) connected

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Kazakhstan, Turkmenistan, and Uzbekistan for distribution of gas within the region and export to Russia. Gazprom continued to dominate this system by contracting with the three countries to buy all the available capacity in the CAC system. With this contract, Gazprom was able to maintain its monopoly over Central Asian gas.

The Russian monopoly is slowly dissipating as alternatives are developed. In Azerbaijan, the development of the Shah Deniz gas field in the Caspian, considered one of the largest natural gas discoveries in the last 20 years, led to the development of the 429-mile South Caucasus Pipeline (SCP) that carries gas from Baku through Tbilisi, Georgia to Erzurum, Turkey (often called the BTE pipeline), where it connects to the Turkish gas pipeline network. SCP parallels BTC and began gas exports in 2007, marking the change of Azerbaijan from a net importer of Russian gas to a net exporter of its own gas.

In June 2009, Azerbaijan's President Aliyev signed an agreement with Russia's President Medvedev for Azerbaijan to export gas to Russia. This agreement was followed by an implementing agreement in October 2009 signed by Gazprom and Azerbaijan's gas company. The agreement runs from 2010 to 2014 for the sale of 500 million cubic meters per year through the pipeline Russia used to sell gas to Azerbaijan.

While Russia thought it had staged a coup by buying Azeri gas and precluding any commitment by Azerbaijan to Nabucco. Closer analysis revealed that Azerbaijan got the better of the deal since it was able to sell its surplus gas for a limited period of time at world prices (one source indicated the price was $350 per thousand cubic meters-mcm), but retained the ability to commit gas in the future to Nabucco since Nabucco is not expected to begin operations until 2015, a year after the Russian contract expires. Furthermore, Azerbaijan made no commitments for phase 2 of Shah Deniz, preferring to remain non-committal with the hope that it can sign a deal with Nabucco. Azerbaijan continues to seek gas export alternatives and is now working with Bulgaria for pipeline and tanker movements of compressed natural gas for additional gas exports.

Another wedge in Russia's dominant gas position is taking place in Turkmenistan. In past years, Gazprom turned to Turkmenistan when its own Russian production leveled off and found that it was cheaper to buy Turkmen gas at $50 mcm than to develop its fields in Yamal. Under President Niyazov, Turkmenistan was content to sell its gas to Russia or Ukraine, while making overtures to the west about a trans-Caspian pipeline. This situation continued until the death of Niyazov in December 2006.

Turkmen President Gurbanguly Berdymukhamedov was elected in February 2007. In 2007, the president signed an agreement with Russia to expand the Prikaspiiski pipeline system that runs along the eastern shore of the Caspian. With Gazprom's contracts for all the capacity of the CAC gas pipeline system and the expansion of the Prikaspiiski pipeline, it appeared that Russia had moved aggressively to re-assert its hegemony over Central Asia and especially over its gas.

This illusion did not last long. Turkmenistan and China signed a gas export deal in December 2006 (weeks before Niyazov's death) for the export of gas to the east. Construction of the Turkmen section of the gas export pipeline—188 km—began in August 2007 and has just been completed. The Uzbek section—525 km—began construction in June 2008, while the Kazak section—4860 km—began construction in July 2008. The Chinese National Petroleum Company (CNPC) is providing most of the financing for the pipeline. China and Turkmenistan expect that gas will start flowing in the Turkmen section in December 2009 and small volumes of gas will reach China in early 2010. The initial agreement with China was for 30 billion cubic meters per year for 30 years. A new agreement was signed in June 2009 for an additional 10 billion cubic meters per year.

In the meantime, negotiations with Gazprom over the expansion of the Prikaspiiski pipeline continued and still have not been completed primarily due to lack of agreement over price terms. A 600 km east-west spur line also was to be built and financed by Gazprom to connect central Turkmenistan gas fields with the expansion. Rather than have Gazprom finance the pipeline, Turkmenistan has requested tenders from international companies for the pipeline's construction. Turkmenistan now thinks that Gazprom lacks the financial capacity to complete the east-west spur. Moreover, this is an indication that Turkmenistan wants to set its own course independent of Russia.

In the spring of 2009, Gazprom came under intense pressure due to the steep global recession. Gas demand from Europe, Gazprom's prime export market, fell by 25% to 30% or more. Oil prices reached their nadir in December 2008 falling to the mid-$30/bbl range from their high of $147/bbl. Gas prices started to fall in 2009 since Gazprom's gas contracts are all linked to oil prices and follow oil prices with a six to nine month lag. Prices did start to fall significantly for Gazprom during the first three quarters of 2009 and only now have stabilized. With Gazprom paying "world prices" for Turkmen gas in Central Asia, Gazprom was losing significant amounts of money on every cubic meter of Turkmen gas it was

selling in Europe or at home.

On April 9, 2009, a blast occurred on the CAC-4 section of the Turkmen-Russian pipeline stopping all Turkmen gas shipments to Russia. Whatever the cause, no gas has flowed from Turkmenistan to Russia since the explosion. On April 24, 2009, at a 2 day international energy conference in Ashgabat, President Berdymukhamedov declared Turkmenistan's energy independence from Russia. Berdymukhamedov's statements have important implications for China, EU and the U.S. He said, "Today we are looking for conditions to diversify energy routes and the inclusion of new countries and regions….Turkmenistan must create a new system of relations with Europe. In the current situation, the diversification of energy routes could help to stabilize the global economy." He continued that "it is normal and absolutely justified…for any energy producer country wishing to maintain its economic and energy security to assert its national interests….Energy security has been the cornerstone of the foreign economic strategy of Turkmenistan."

Representatives from the United States in attendance at the conference expressed interest in having Turkmen gas committed to a trans-Caspian pipeline route. European representatives also in attendance were seeking commitments to supply gas to Europe.

Since the April explosion and the April conference, Gazprom has been working hard with Turkmenistan to re-establish gas flows. Russia pressured for lower gas prices or gas volumes or both. Turkmenistan resisted all Russian efforts to date, despite Turkmenistan's loss of $1 billion per month in revenue from its gas sales.

Turkmenistan is working with China to develop its South Yoloten gas field in eastern Turkmenistan. Some estimates have placed the reserves in this field as high as 14 trillion cubic meters, which is about twice current total Turkmen reserves. CNPC is the first foreign company to develop a major onshore field under license in Turkmenistan. China has provided a $4 billion line of credit for the development of South Yoloten and Osman fields. China also is financing a fertilizer plant that will export its output to China. Additional incentives have been offered as well. Turkmen-Sino relationship is important since China provides financing, demand guarantees (security of demand), spin-off projects, and political cultivation.

China is not alone in its pursuit of Turkmen gas. The EU is seeking commitments from Turkmenistan for its Nabucco pipeline. President Berdymukhamedov indicated recently that South Yoloten has enough gas to supply Europe through Nabucco. The development of Nabucco is proceeding since on July 13, 2009, Nabucco and its partners signed transit agreements with Turkey and European countries (Bulgaria, Romania, Hungary, Austria) to permit the Nabucco pipeline to carry gas across each country's territory. The EU is now more optimistic than at any other time that Nabucco will be built. The lessening influence of Russia and Gazprom over Berdymukhamedov and Turkmenistan is providing new opportunities for China, EU and U.S.

A relatively new pipeline proposal, White Stream, a private venture, may provide an opportunity to carry Azeri gas directly to Europe, bypassing Turkey. White Stream shows up in EU's strategy for a Southern Corridor for natural gas to Europe. The private companies would transport gas across Georgia (relying on a 100 mile pipeline from the South Caucasus Pipeline to Supsa), then under the Black Sea for 1,100 km to the Romanian coast near Constanta and then using Romania's gas transmission on to EU markets. Total capacity would be 32 bcm. EU's Southern Corridor gas strategy includes Nabucco, White Stream, and the Turkey-Greece-Italy Interconnector with potential capacity ranging from 60 bcm to 120 bcm—larger than Nabucco's 31 bcm capacity. Adding White Stream to the Southern Corridor strategy removes competition between Nabucco and White Stream. It also sends a message to Turkey to stop trying to monopolize gas transit from Caspian to Europe. Turkey has not signed a European standard agreement for gas transit from Azerbaijan to Europe. Turkey also wants to buy Azeri gas at deeply discounted prices. These tactics are holding up expansion of Shah Deniz, hampering Nabucco development. Turkey's conduct persists despite signing the July 13, 2009 agreement on Nabucco. Turkey's behavior undermines Central Asian efforts at gas diversification. Note that Azerbaijan and Turkey are working hard to resolve these differences.

Since the demise of the Soviet Union in 1991, many cracks developed in Russia's energy hegemony over Central Asia and the Caucasus. Diversification of oil routes occurred first, starting in the mid-1990s and continues to the present. Diversification of gas routes occurred much later and we are only now witnessing diversification in gas export routes. All the countries of the region rely on pipelines for their energy trade, the modern day version of the old silk routes.

Russia's Energy Economy – Views From Within and From Neighbors. Report on the Finnish Chapter Seminar

The Finnish chapter of the IAEE, the SEE, organized a seminar about Russia's energy economy on 11-11-2009 in Helsinki. The seminar comprised of four presentations offering different views on the Russian energy sector, such as the gas trade relations between Russia and EU countries, the significance of the energy sector in the Russian economy, the experiences of a foreign power company acquiring a Russian regional power company, and Russia's post-Kyoto climate policy. Three of these papers follow on subsequent pages.

Energy economists in Europe, including those in Finland, tend to have limited knowledge and understanding of the Russian economy and the Russian energy sector. Similarly, Russian energy specialists may not have full grasp of all aspects of the interpretation of the Russian energy economy by energy economists in EU countries, e.g., due to different projections of the post-Kyoto climate policy framework. The seminar however enjoyed the luxury of having speakers and a moderator who were the proverbial exception to the 'rule'.

The seminar underscored how crucial the fossil fuel sector is for the Russian economy. Ms. Laura Solanko, of the Institute for Economies in Transition of the Bank of Finland, explained the key position of fossil energy production and exports in the Russian economy. About 65% of Russia's export income comes from oil and gas exports. The duties on these exports cover about half of the Russian federal budget funding. The value added of Gazprom alone is estimated to represent about 10% of Russia's GDP. Russia took several measures that aim to attenuate the public sector volatility created by the state revenue dependency on fossil fuel income. For example, Russia established a sovereign wealth fund 10 years ago. In her contribution in this issue Ms. Solanko focuses on the economic significance of the enormous low-cost energy efficiency improvement potential in Russia. The Russian economy needs to diversify as fossil fuel production cannot be sustained for long at current levels. Energy efficiency provides a key to such a transition.

The guest speaker from the Russian Institute for Energy and Finance, Mr. Vitaly Protassov, demonstrated a keen understanding of natural gas markets in Europe and reasons for different expectations in both areas. The domestic and neighbor countries markets are not or are barely profitable, whereas export to EU countries produces significant net revenues. These revenues provide the main source of revenue for investment in the highly necessary modernization of the oil and gas sector. The diverging views of Russia and EU countries regarding future natural gas needs and supplies in Europe are, therefore, of significant concern in strategic investment planning. In his contribution he calls for more co-operation between Russia, the EU, and third countries with respect to scenario work.

Ms. Anna Korppoo, of the Finnish Institute of International Relations, considered the Russian role in international climate negotiations. The Russian decision to sign the Kyoto protocol, albeit belated, was, of course, crucial for getting the protocol into effect. On the other hand the Russian interpretation of so-called 'hot air', i.e., surplus emission allowances based on reference year (1990) emission levels predating the collapse of the Russian heavy industry, is an important risk factor for effective post-Kyoto global emission reduction regimes. Creation of a global (interlinked) trading system of assigned amounts without a settlement on 'hot air' could lead to an abundant sales of emission rights not representing any true reduction in the selling country (notably Russia and Ukraine). In the contributed article Korppoo focuses on greenhouse gas emission scenarios for Russia and the implications and likelihood of failing programs for energy efficiency and/or renewable energy.

The seminar succeeded to present some new perspectives to the participants. For example, it was argued that the liberalization of the Russian electric power market has made more progress than the comparable process in the EU, while it also enabled foreign involvement. Various Russian regional power companies are owned by foreign energy companies, among others Fortum from Finland. In relation to this the moderator, Rene Nyberg, referred to the very conducive role played by Anatolji Tsubais, who in his ministerial time outlined and initiated the liberalization of the Russian electricity generation sector.

Virve Rouhiainen (chair of the Finnish Association of Energy Economics – SEE)

Adriaan Perrels (vice-chair of the Finnish Association of Energy Economics – SEE)

Russia's Climate Commitments: Which GDP Growth Contributes To Emissions?

By Anna Korppoo*

Introduction

The Kyoto Protocol aimed at reducing the industrialized country group Annex I emissions by at least 5% of the 1990 level by 2008-2012.[1] Further, based on the Fourth Assessment Report of the Inter-governmental Panel on Climate Change (IPCC), industrialized countries need to achieve aggregate emissions cuts of 25-40% by 2020 in order to limit global warming to 2˚C[2]. As expected, the Copenhagen climate negotiation session failed to establish a comprehensive international climate regime; the unilateral pledges under the non-legally binding Copenhagen Accord would limit warming to some 3˚C by 2100 [3]. As a result, the issue of burden sharing is still strongly on the agenda of future climate negotiations.

The evolution of the Russian emission limitation pledge for the future climate regime since summer 2009 has been intriguing. In June, 2009 Russian President Dmitry Medvedev announced a 2020 emissions reduction target of 10-15% below 1990 levels.[4] At the EU-Russia Summit in Stockholm in November 2009, he pledged a deeper target of 22-25% over the same period[5]; in Copenhagen, the negotiation process never reached the stage of bargaining over emission reduction commitments due to fundamental differences between the developed and developing country groups. After the summit, the UNFCCC Secretariat invited pledges under the Copenhagen Accord by the end of January, 2010. This time, the Russian government took a step back offering a 15-25% limitation only from 1990 levels[6]. Further, at a meeting of domestic stakeholders, president Medvedev confirmed the Russian commitment to the 25% below 1990 level in February 2010.[7]

Russian Emissions

Figure 1 outlines the development of the main energy and carbon indicators of the Russian economy. It illustrates the impact of the economic transition from year 1990; both the year of comparison under the Kyoto Protocol and the emission limitation Russia has committed to. The significant difference between this commitment and actual emissions (34% below 1990 level in 2006) suggests a large potential to pledge to a considerably deeper emission limitation beyond 2012.

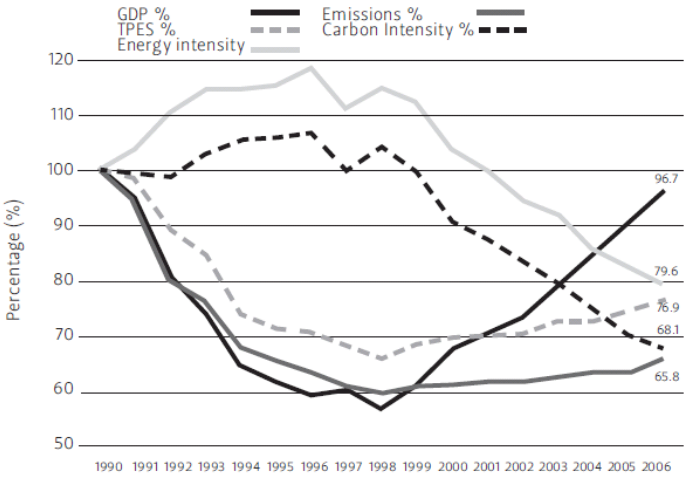

Figure 1. Trends in Russian Energy and Emissions.
Source: Korppoo, Anna; Jakobson, Linda; Urpelainen, Johannes; Vihma, Antto and Luta, Alex (2009). *Towards a new climate regime? Views of China, India, Japan, Russia and the United States on the road to Copenhagen*. FIIA report 19, the Finnish Institute of International Affairs.

Figure 1 provides evidence that the emissions started decoupling from GDP growth at the end of the 1990s; however, the emission trend has been growing slowly but steadily over most of the 2000s. Even though the structural shift of the economy from heavy industry towards the service sector provides a partial explanation, the decoupling of the emission trend from GDP was to a large extent delivered by the dramatic increase of the value of GDP as a result of the peaking oil prices in the 2000s. Depending on the estimate and method, the energy sector accounts for 20-30% of the Russian GDP[8].

Russian Pledge vs. Business-as-usual Trend

The economic crisis of the late 2000s, which had a significant impact on GDP - 7.9% decline in 2009 from 5.6% growth in 2008[9] - has influenced the emission path from 2009 onwards. In the absence of emission data[10], Figure 2 outlines a rough expert estimate of the economic crisis impact on emissions, i.e., a collapse of the emissions to some 38% below 1990 level in 2009. The red projection illustrates the continuation of the trend of the 2000s growth after the crisis without emission reduction measures. The green projection estimates the impact of the reduction of energy intensity by 40% by 2020 as established in June, 2008 order by the President[11] under a similar GDP growth assumption. For comparison, the blue projection extrapolates the direction of emissions based on the historic trend in the absence of the

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See footnotes at end of text.

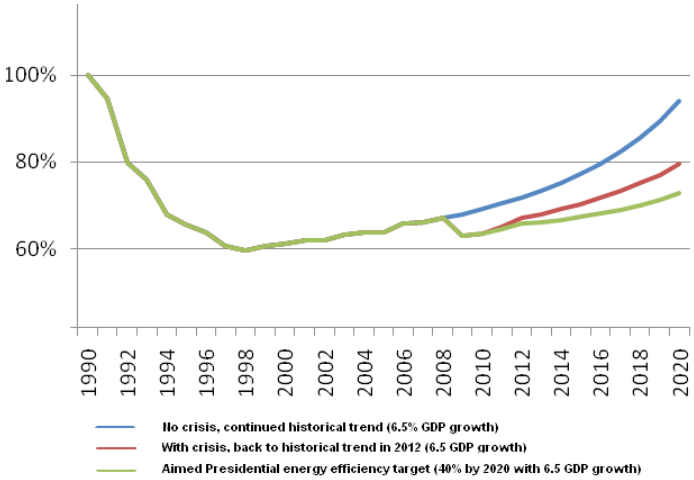

Figure 2 GHG Emission Projections for Russia
Source: Safonov (forthcoming).

2009 economic crisis.

In Novikova, Korppoo and Sharmina (2009)[12], we produced scenarios of CO_2 emissions based on various energy intensity developments and fuel mix cases in order to study the potential impacts of the existing policies on emissions. The policies reflected include the above-mentioned energy intensity reduction target as well as the target of increasing the share of renewable energy from less than 1% to 6.6% by 2020[13].

The scenarios chosen include the following:

- Constant fuel mix, i.e., the announced renewable energy not achieved and only autonomous energy efficiency improvement[14], i.e., no additional policies implemented in order to achieve the efficiency target announced (no policy implementation).
- The announced renewable target achieved and autonomous energy efficiency improvement (partial policy implementation).
- Constant fuel mix and energy efficiency target achieved fully (partial policy implementation).
- The announced renewable target achieved and energy efficiency target achieved fully (full policy implementation).

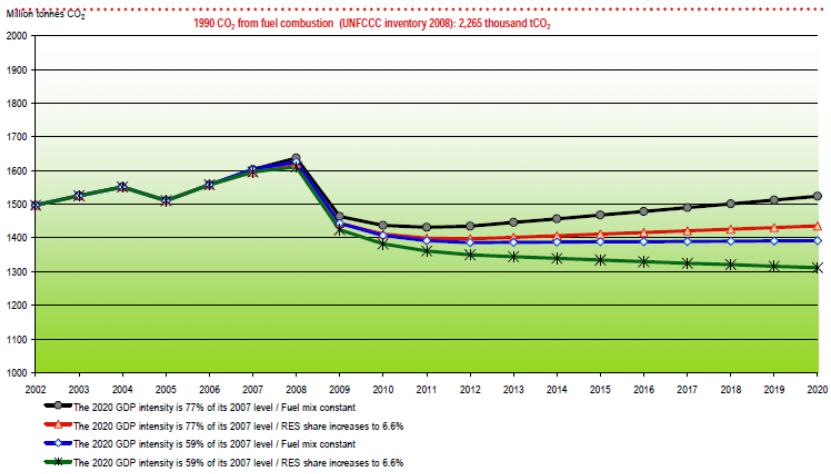

Figure 3. Scenarios of CO_2 Emissions to 2020 for Different Efficiency and Fuel Mix Cases (GDP growth is limited to about. 4% p.a.).
Source: Novikova, Aleksandra; Anna Korppoo and Maria Sharmina (2009). 'Russian pledge vs. business-as-usual: Implementing energy efficiency policies can curb carbon emissions', UPI Working Paper 61, 4 December 2009.

Based on this, the Russian potential to pledge emission limitations/reductions can be approached in roughly two ways. First, it could be assumed that the implementation of existing policies will fail. However, the autonomous energy efficiency improvement would still limit emission growth. Second, it could be assumed that the existing policies are implemented as announced.

In the first case, 33% pledge is likely to represent the no-regret option with a 4% GDP growth assumption since it can be achieved with the autonomous energy efficiency improvement without significant changes in fuel mix. Significantly higher GDP growth (6.6% by 2020) would have to be assumed in order to 'reach' the current Russian pledge of 25% below 1990 level by 2020 even under such policy failure option. In the second case of successful policy-implementation, the scenarios show that under the assumption of 4% GDP growth, about a 40% limitation of 1990 level emissions by 2020 is likely to represent the most likely emission trend.

Linking the Growth Factors of Russia to Emissions

The model used in Novikova, Korppoo and Sharmina (2009) also demonstrates the importance of GDP growth as a factor defining emission growth: the more optimistic GDP growth assumption leads to a constantly growing emission trend, while the more conservative GDP development path generates a flat trend of emissions.

When estimating emission limitation potential based on GDP projections, the GDP growth factors should be further scrutinized. Beyond the high oil price, the explaining factors behind the rapid economic growth (6.9% on average) over 2000-2008 included the existing under-utilized production capacity, which could be brought online without large investments, as well as the structural shift of the economy towards the service sector and a growing middle class consuming these services. These elements can no

longer provide additional growth beyond a brief post-crisis peak; the existing production capacity was in almost full use in 2008, and under the current economic circumstances it will be difficult to attract investments required for modernizing the economy and increasing production capacity. As a result, Russia's growth potential[15] is widely believed to be some 4-5% per annum[16].

It is notoriously difficult to estimate the future development of international oil prices, which could boost the Russian GDP to growth beyond its natural growth potential, i.e., over 4-5% per annum. The European Central Bank estimates that an oil price change by 1% changes Russia's GDP growth by 0.5 percentage-points the same year [17]. Further, Ollus (2007) has estimated that a US$10 increase in international oil prices translates to 2% increase of the Russian GDP.[18] Figure 4 illustrates the correlation of the Russian GDP with oil prices.

However, Figure 1 illustrates how the GHG trend decoupled from the booming oil price based GDP growth in the 2000s. Hence, it can be concluded that this type of peak GDP growth in Russia does not directly lead to skyrocketing emissions. As a result, it could be argued that when estimating the potential to limit emissions, the Russian government should separate the impact of the oil price to GDP growth in order to arrive in a more rigorous conclusion, while taking into account the multiplicative effect of oil revenues to domestic consumption.

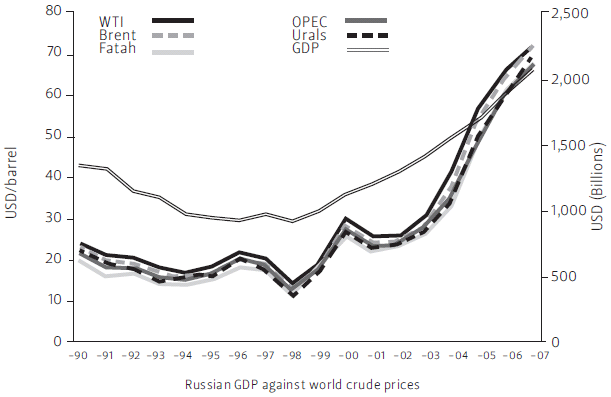

Figure 4. Evolution of Russian Gross Domestic Product at Purchasing Power Parity (plotted against annual averages of chief crude oil price indicators)[19]

Source: Korppoo, Anna; Jakobson, Linda; Urpelainen, Johannes; Vihma, Antto and Luta, Alex (2009). *Towards a new climate regime? Views of China, India, Japan, Russia and the United States on the road to Copenhagen*. FIIA report 19, the Finnish Institute of International Affairs.

Conclusion

The 2000s decoupling of emissions from the booming-oil-price-based GDP growth proved that applying optimistic GDP projections beyond realistic growth potential to estimate the emission trend is likely to generate inflated emission projections. Instead, the Russian government should separate this GDP growth factor from the GDP projection when estimating GHG emissions to support decision-making on emission limitation commitments. This would limit the emission-relevant growth expectation to some 4-5% per annum. Based on these arguments, and leaving space for error, the Russian government is unlikely to have problems complying with a pledge of about 30%, even in the absence of implementation of the announced energy efficiency and renewable energy targets; and about 35% should these targets be achieved.

In the light of the adopted energy policies illustrated above, the current pledge represents a significantly less ambitious commitment than the average of the industrialized country group Annex I. According to den Elzen et al. (2009, p. 63), the comparable effort of Russia in sharing an aggregate 30% reduction of emissions between the Annex I would be a reduction of emissions by 50% of the 1990 level by 2020[20].

In practice it seems unlikely that Moscow would agree on pledging beyond the business-as-usual emission path; the feeling of superiority as a reducer of emissions due to the freefall of the GHG trend as a result of the post-socialistic economic collapse is strong[21]. This is regardless of external observers highlighting the absence of focused and sustainable emission reduction policies.

The changes of heart with the Russian emission limitation pledge for the Copenhagen process may reflect internal political struggle. President Medvedev has clearly been more supportive of climate policy than Prime Minister Putin; he has even been linking international climate policy to domestic energy efficiency and modernization policies to be implemented even in the absence of emission limitation targets. The evolution of the Russian pledge suggests that conservative - or even climate skeptical - views in the government may be holding back these initiatives by Medvedev. Therefore, pledging beyond -25% of the 1990 level by 2020 may be unrealistic, regardless of the credibility of the GDP and policy projections used.

Footnotes

[1] The actual emission reductions by Annex I during 2008-2012 are in practice very much influenced by the US withdrawing from the Protocol, the expected non-compliance by Canada as well as the remaining impact on the aggregate reduction by the collapse of emissions in the post-socialistic countries in the 1990s.

[2] IPCC, 2007: Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the

Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)]. IPCC, Geneva, Switzerland.

[3] Ambition of only two developed countries sufficiently stringent for 2°C. http://www.climateactiontracker.org/. Accessed 11 March 2010.

[4] "Conversation between Dmitry Medvedev and Director of News Programmes at Russia's Channel One, Kirill Kleimenov". Available at http://www.kremlin.ru/eng/speeches/2009/06/18/1241_type82916_218210.shtml. Accessed 10 March 2010.

[5] President of Russia, Пресс-конференция по итогам 24-го саммита Россия–ЕС. Available at http://news.kremlin.ru/transcripts/6034. Accessed 10 March 2010.

[6] Russian submission to the UNFCCC, 29 January 2010. Available at http://unfccc.int/files/meetings/application/pdf/russiacphaccord_app1.pdf. Accessed 10 March 2010.

[7] Medvedev, Dmitry. Opening remarks at meeting on climate change, 18 February 2010. Available at http://eng.kremlin.ru/text/speeches/2010/02/18/1841_type82913_224384.shtml. Accessed 10 March 2010.

[8] Suni, Paavo (2007). Oil Prices and the Russian Economy: Some Simulation Studies with NiGEM, p.3.

[9] Rostat (2010). Национальные счета: валовой внутренний продукт. Available at http://www.gks.ru/free_doc/new_site/vvp/tab3.xls. Accessed 080310.

[10] The official GHG emission data typically lags behind some two years.

[11] о некоторых мерах по повышению энергетической и экологической эффективности российской экономики, Order of the President, N889, 4 June 2008.

[12] Novikova, Aleksandra; Anna Korppoo and Maria Sharmina (2009). 'Russian pledge vs. business-as-usual: Implementing energy efficiency policies can curb carbon emissions', UPI Working Paper 61, 4 December 2009. http://www.upi-fiia.fi/fi/publication/97/.

[13] Energy Strategy of the Russian Federation for 2030, 2007 (draft).

[14] Economies improve their energy efficiencies by some 1% per annum without targeted measures, mostly due to the improvement of the energy efficiency of new energy consuming appliances and production capacity.

[15] Growth potential consists of elements such as capital, labour, structural change and technical development.

[16] Deutsche Bank Research, Russia in the Financial Crisis and Beyond. 11 December 2009. p.12. Sutela, Pekka, Venäjä tuskin toipuu nopeasti at Venäjä ja kansainvälinen rahoituskriisi. BOFIT Online 2/2009.

[17] R. Beck, A. Kamps and E. Mileva (2007). Long-Term Growth Prospects of the Russian Economy. European Central Bank. Occasional Paper No 58.

[18] Ollus, Simon-Erik, "Natural resources – a blessing or a curse?", in *New conditions of growth in Russia*, by Seija Lainela, Simon-Erik Ollus, Jouko Rautava, Heli Simola, Pekka Sutela and Merja Tekoniemi. BOFIT Online: 2007 No. 7.

[19] Data: *IMF (Russian GDP), EIA (West Texas Intermediate, Brent Crude), IEA (Fatah Oman/Dubai Crude, Urals), OPEC (OPEC Reference Basket)*. The Russian GDP data for 1990 and 1991 consist of estimates by the Economist Intelligence Unit. At the end of 2007, the Urals Crude was supposed to be phased out by the newer Russian Export Blend Crude Oil REBCO (not reflected in this graph).

[20] den Elzen, Michel et al. "Pledges and Actions: A scenario analysis of mitigation costs and carbon market impacts for developed and developing countries", The Netherlands Environmental Assessment Agency, 2009. WAB 500102032.

[21] Korppoo, Anna (2009). The Russian debate on climate doctrine: Emerging issues on the road to Copenhagen. UPI Briefing Paper 33, 5 June 2009. Available at http://www.upi-fiia.fi/fi/publication/79/

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We look forward to your participation in these new initiatives.

EU-Russia Gas Relations: a View From Both Sides

By Vitaly Protasov*

EU-Russia Gas Interdependency

First of all to speak about EU – Russia gas relations we need to understand its role for each other in this sphere. In spite of widespread opinion, Russia is not a monopolist in the European gas market. Its share has fallen over last twenty years (Exhibit 1).

In 2009 the share of Russian gas in Europe decreased. This was caused by following:

* A 9 month lag in the price of gas in Gazprom's long-term contracts, which made Russian gas uncompetitive after oil prices dropped;
* A decrease of European gas demand because of the economic crisis;
* The Ukrainian gas crisis (it caused a 4.5 bcm reduction of exports from Russia to Europe);
* An increase in LNG supply in Europe because of new LNG terminals and plants.

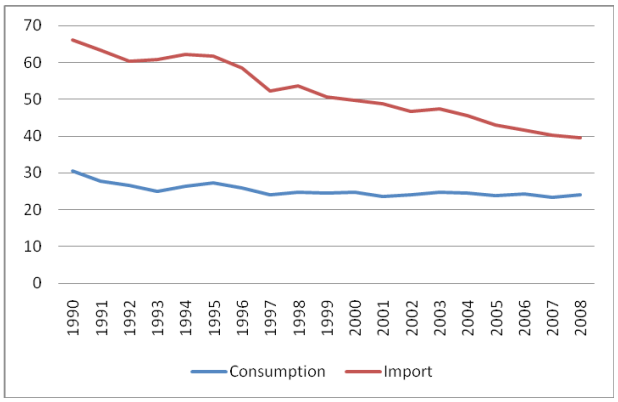

Exhibit 1. Shares of Russian Gas in EU-27 1990-2008, %.
Sources: Eurostat Database, OECD, Natural Gas Information 2009

The first three factors are temporary so the Russian share can be expected to rebound. However, much depends on the development of unconventional gas in Europe, EU energy policy, and activity of other suppliers (Norway, Algeria, Qatar, etc).

Despite the decrease in its share, Russia is the largest exporter of natural gas to Europe. A disruption of gas supply from Russia can cause huge damage to the European economy, especially Eastern and South-Eastern Europe and Finland. The 2009 Ukrainian gas crisis showed that such disruption is possible. It is one of the main arguments of European politicians for decreasing the role of Russia in the EU gas market.

Dependence on Russian gas is distributed disproportionally among European countries (Table 1). The most dependant countries are: Bulgaria, Finland, Slovakia, Romania, Lithuania, Estonia, and Latvia. The latter three imported 100% of their natural gas from Russia in prior years. The strong wish of most of these countries to diversify their gas imports is understandable.

On the other hand, to analyze the level of dependence on a supplier we should take into account problems with transit countries, reserves of natural gas, alternative fuels in storage, the share of interruptible consumers, the potential gas supply from other sources, seasonal volatility of gas consumption, cross-border and import capacities, gas pipeline bottle necks and a lot of other factors.[1] For example, Finland has no problems with transit countries and the biggest share of interruptible consumers in EU (93%).[2] It secures energy safety in its gas industry despite of 100% dependency on Russia and the lack of UGS. The real dependence on Russian gas is lower than shown in Table 1 because of these factors.

The Russian gas industry depends on the European gas market because it is a main source of cash for Gazprom and correspondingly for investments in the Russian gas industry. In 2009 Gazprom for the first time got a profit from the internal Russian market. CIS markets are also not very profitable for Gazprom because of discounts on gas prices for them. In 2008 the share of Gazprom revenue from EU-27 deliveries was about 59% (share of gas volumes was only 21.7%).[3] The oil and gas industry of Russia provides about 20% of GDP and 60% of Russian exports.[4]

EU-Russia Interdependence in Future

EU and Russia both depend substantially on each other. Nowadays the European Commission and governments of many EU members are trying to decrease the role of natural gas in the energy balance, limit the share of Russian gas imports and find new sources of gas. On the other hand, the Russian government has made a few statements about diversifying Russian gas exports through an increase of USA and Asia deliveries. Also a lot of Russian experts call for quick development of a gas-chemical industry which will provide additional consumption for Russian gas.

To understand the possibility of a decrease in EU-Russia gas interdependency it is necessary to analyze the sources of additional supply/demand, ways of

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See footnotes at end of text.

Country	Import	Consumption
Austria	66.7	77.5
Belgium	5.2	5.2
Czech Republic	78.3	86.0
Denmark	0.0	0.0
Finland	100.0	100.0
France	14.3	14.1
Germany	44.3	42.5
Greece	66.9	66.9
Hungary	76.9	66.9
Ireland	0.0	0.0
Italy	29.0	26.2
Luxembourg	0.0	0.0
Netherlands	0.0	0.0
Poland	69.5	47.0
Portugal	0.0	0.0
Slovak Republic	100.0	99.3
Spain	0.0	0.0
Sweden	0.0	0.0
UK	0.0	0.0
Slovenia	51.3	51.3
Bulgaria	100.0	98.7
Romania	99.2	30.7
Estonia	100.0	100.0
Latvia	100.0	100.0
Lithuania	100.0	100.0

Table 1. Dependence of EU countries on Russian Gas in 2008.
Source: IEA, Natural Gas Information 2009
Note: In several cases share of Russia in import is lower than in consumption because these countries also export gas. IEA data sometimes differs from Eurostat and Rosstat data and other sources.

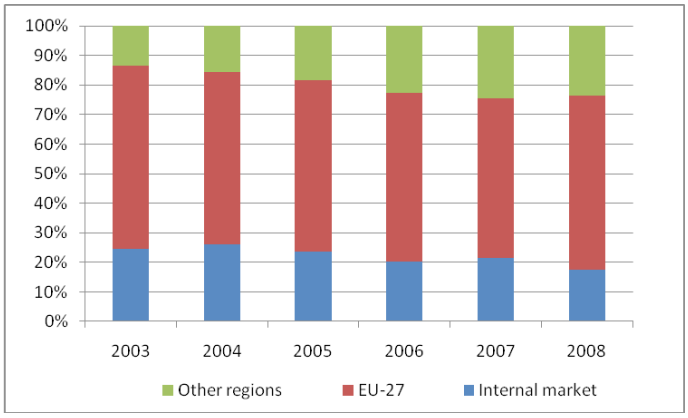

Exhibit 2. Structure of Gazprom revenues in 2003-2008
Sources: Gazprom Databook 2009, Gazprom Annual Report 2008

decreasing existing consumption and limitations caused by long-term contracts, infrastructure, and technological matters.

Natural gas is more ecological and efficient then coal and oil products and also it is cheaper and more available then renewables. Natural gas is a bridge[5] for a New Energy System with a high share of renewables and low carbon emissions (the second bridge is nuclear power). The EU has the ability to decrease the role of gas but it would probably not be efficient to do so in the long-term.

Europe also can decrease the Russian share in the gas balance by new LNG deliveries, new gas pipelines (Galsi, ITGI, TAP, Skanled, Nabucco) and probably an increase of unconventional gas production in EU. But decreasing the role of Russia does not mean reduction of risks of gas supply because most of the new gas sources are in politically unstable regions: Middle East-Persian Gulf and Africa. The high price volatility for spot LNG deliveries also should be taken into account. Unconventional gas is also not a panacea. Its future production potential in the EU is unknown due to poor exploration information on it. Furthermore unconventional gas has its own disadvantages: small period of well exploitation, high investments, and ecological risks.

On the contrary, transit risks which are the most important Russian gas supply risks will substantially decrease because of Nord Stream and South Stream. A decrease in the Russian share of the European market shouldn't be an end in itself. It should be based on extensive supply risk analysis.

The high share of Russian gas on the markets of Eastern Europe and Finland reflects geography. Nowadays Western Europe dependence on Russian gas is not so high. To make not paper but real diversification of imports in the most dependent regions, the European Union should construct several new gas pipelines which will transport gas from West to East (now the main direction is East-West) and LNG-terminals in eastern regions of Europe. It should also develop a net of interconnectors in Europe. This requires a huge investment and cannot be done quickly.

The Russian potential to diversify its exports of natural gas is low. There are three possibilities: pipeline deliveries to China and South Korea, LNG for the U.S. market and LNG for the Asian market. China asked for a very low gas price (it can be even lower than the internal Russian market) and also contracted for substantial volumes of gas from Turkmenistan and several LNG producers. During the economic crisis trends on LNG markets have changed. Redundant LNG capacities has caused an increase in competition in this market. Moreover, Russia has no strategic advantages in the LNG market but it has higher costs due to natural conditions. The opportunities for exports to the U.S. gas market have been reduced due to the substantial increase of shale gas production. From 2008 to 2009 IEA has lowered its 2030 forecast for net gas imports into North America from 143 to 61 bcm.[6] For the U.S., shale gas is more realistic then for EU.

The system of long-term contracts (LTC) between Gazprom and EU companies limits the possibilities of an interdependence decrease. If we assume that LTC's are not dissolved, then Gazporm will deliver to EU almost the same volumes as in previous years. Also it can prolong some old and sign new delivery contracts. Actual delivery volume could be lower because of minimum contractual obligations which are usually about 80% in Gazprom contracts. In the beginning of 2010 Gazprom temporarily decreased the level of minimum contractual obligations with EON Ruhrgas and Eni but after three years these should come back to previous levels.

Comparison of Russian, EU and International Organizations Views

The European Commission (EC) view on role of natural gas in Europe is the most pessimistic among

all organizations. For example, we can compare the last IEA Reference scenario and PRIMES model New Energy Policy (NEP) with high oil and gas price scenarios. Both scenarios assume an oil price of about $100/barrel. Shares of coal in the primary energy balance are the same, oil shares differs only 1.6 pct. But in the European Commission scenario the share of natural gas is 6.3 lower than in the IEA scenario. In absolute terms, consumption of natural gas in 2020 in the EC scenario is lower by 118 mtoe (34%) than the IEA forecast. Even in the IAE 450 scenario, which assumes an increase of renewables share, natural gas provides 25.7% of European energy consumption. One of the reasons for this difference is that the gas price for EC scenarios is 16% higher than for the IEA scenario at the same oil price. It seems very strange because gas prices in Europe are strongly correlated with oil prices. The IEA and European Commission have opposite opinions on the future share of natural gas in the EU energy balance. Moreover, industry associations, Eurogas and International Gas Union, think there could also be fast growth in the role of natural gas in the energy balance in the long-term.

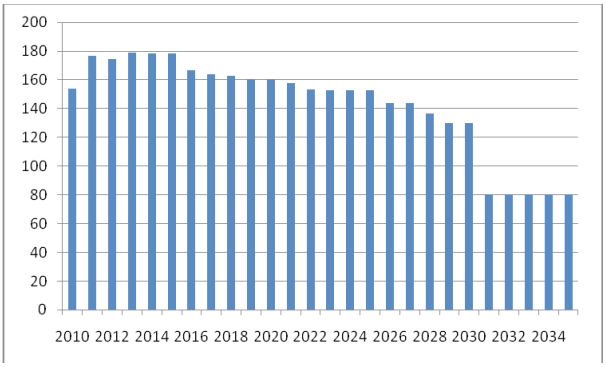

Exhibit 3. Volumes of Existing Long-term Contracts of Gazprom for EU-27 in 2010-2035, bcm.
Sources: Gazporm, author's estimates

The 2007 Baseline scenario of the PRIMES model projects EU-27 gas imports from Russia to be 105 mtoe in 2020 and 124 mtoe in 2030.[7] IEA in 2009 anticipated that gas imports from Russia in Europe (EU, OECD Europe, Southeast Europe) in 2020 will be 172 mtoe.[9] 8ENTSOG states that the potential supply from Russia (including straight deliveries from Russia and via Ukraine and Belarus) in 2019 will be 219 mtoe.[9] The new Russian Energy Strategy till 2030 (ES-2030) proposes that in 2020-2022 Russian gas exports in a western direction (it also includes Turkey) will be about 150-154 mtoe, in 2030 – 160 mtoe.[10]

	---------IEA--------			------European Commission------			
EU-27, 2020	2008, Reference	2009, Reference	2009, 450 scenario	2007, Baseline	2008, NEP	2008, NEP, high prices	Factual, 2007
PEC, mtoe	1903	1723	1668	1968	1712	1672	1757
Coal	308	260	204	342	216	253	330
Oil	630	557	512	702	608	567	607
Natural Gas	517	463	429	505	399	345	432
Nuclear Energy	206	202	257	221	218	233	244
Renewables	241	241	267	197	270	274	144
Structure of PEC, %	100,0	100,0	100,0	100	100	100	100
Coal	16,2	15,1	12,2	17,4	12,6	15,1	18,8
Oil	33,1	32,3	30,7	35,7	35,5	33,9	34,5
Natural Gas	27,2	26,9	25,7	25,7	23,3	20,6	24,6
Nuclear Energy	10,8	11,7	15,4	11,2	12,7	13,9	13,9
Renewables	12,7	14,0	16,0	10,0	15,8	16,4	8,2

Table 2. Comparison of EU and IEA Forecasts on EU-27 Energy Balance in 2020.
Sources: IEA, World Energy Outlooks 2008, 2009. Second Strategic Energy Review: an EU energy security and solidarity action plan, European Energy and Transport Trends to 2030 – update 2007.
Note: NEP – New Energy Policy

The Russian government states that its Energy Strategy has conservative forecasts but it is more optimistic on gas production in Russia than IEA. The IEA reference scenario production forecast is lower by 15% than the low scenario of Russian Energy Strategy. The difference between the high scenario of ES-2030 and the 450 scenario of WEO-2009 increases from 27% in 2020 to 60% in 2030.

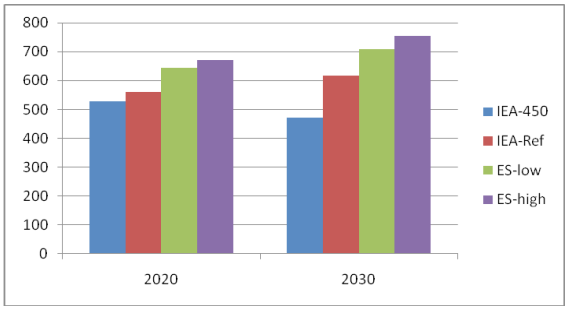

Exhibit 4. Forecasts of Russian Natural Gas Production in 2020-2030, mtoe
Sources: IEA, World Energy Outlook 2009; Russian Energy Strategy till 2030

The maximum difference in the consumption forecast equals 18% in 2020 and 48% in 2030 (Exhbit 5).

One of the main factors of the internal Russian gas market development is the date of issuing of export parity price (price on internal markets equals export price in Europe minus transportation costs and export duty) because it will substantially increase the profitability of the Russian gas market and investment opportunities. IEA assumes that it will be issued in 2020. ES-2030 is based on the assumption of issuing export parity in 2011 (now not possible). Gazprom wants to get export parity in 2014, IEF estimates that it will be possible only after 2016.

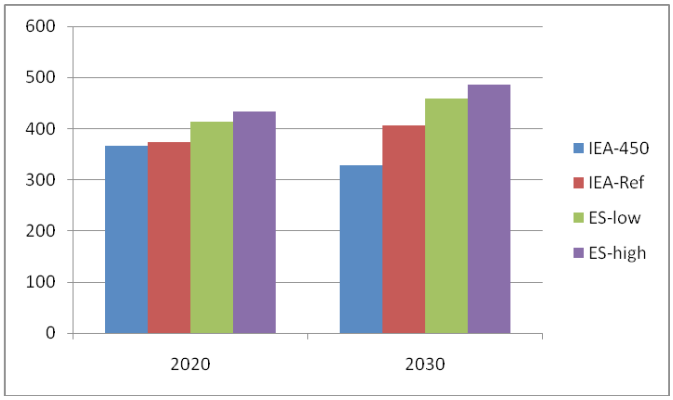

Exhibit 5. Forecasts of Russian Natural Gas Consumption in 2020-2030, mtoe

Sources: IEA, World Energy Outlook 2009; Russian Energy Strategy till 2030

Conclusion

Both EU and Russia have substantial gas industry dependence on each other. Because of this it is wrong to speak only about dependence of one side on another (for example, EU from Russia). In each case we should use the term interdependence.

Nowadays the level of EU-Russia gas interdependence is rather high. It can be reduced only by both sides working together. But even when this is the case dependence on gas from one partner to the other will remain substantial in the mid-to long term. Therefore, both EU and Russia should cooperate in the gas sphere. The first step to cooperation is realization of the position and views of the opposite side.

Forecasts of the future development of the gas industry in Russia and EU differ substantially from each other. Furthermore, scenarios of each side vary in a very wide range. It has been caused by a high degree of uncertainty in energy, too high a role of politics in gas relations and misunderstandings between Russia and EU.

Such misunderstanding is a self-reproducing process which can induce huge losses for Russian and European companies and governments. Misunderstanding makes possible a mechanism of scenario spiral. For example, pessimistic forecasts of EU and international organizations on the role of natural gas in Europe may cause a decrease in Gazprom's investment program.[11] Lower perspectives on Russian gas production may stimulate the EU to adjust its forecast about Russian imports and so on. The decrease of supply from Russia leads to a reduction in competition and price increases in compliance with the market theory which is used by the European Commission in its forecasts. The final result of this scenario will be a sudden increase of energy prices for EU end-user consumers and a reduction of its energy security.

To decrease the level of difference between scenarios of EU-Russia gas relations, a more active EU-Russia Energy Dialog in needed together with a more thorough analysis of existing scenarios. Some steps in this direction were already taken by the Institute for Energy and Finance in the network of activity of the Subgroup on energy economics of the Thematic Group on strategies, forecasts and scenarios. The second step should be creating a permanent association of experts on forecasts and modeling. Convergence of the Russian and EU position in the energy sphere (e.g., harmonization of forecasts) should lay a base for EU-Russia cooperation.

Footnotes

[1] Protasov V., Long-term modeling of resilience and flexibility of European gas transportation system: integrated factors//materials of Enerday conference, 2009.

[2] CEER, paper on TPA to storage and flexibility – Annex, 2003

[3] Gazprom Databook 2009, Gazprom Annual Report 2008,

[4] Russian Energy Strategy till 2030

[5] International Gas Union, Meeting the Global Energy Challenge, 2009; ExxonMobil, Outlook for energy: a view to 2030, 2009.

[6] IEA, World Energy Outlooks 2008, 2009.

[7] Capros P., Overview of Energy Economic Analysis for the EC, 2009; European Energy and Transport Trends to 2030 – update 2007.

[8] IEA, World Energy Outlook 2009

[9] ENTSOG, European ten year network development plan 2010-2019.

[10] Russian Energy Strategy till 2030

[11] In 2009 due to low demand on Russian gas Gazprom decreased its investment program, postponed Bovanenkovskoye field at 1 year (planned production 115 bcm/year) and Shtokmanovskoye field at 3 years (planned production 70 bcm/year).

The Crucial Role for Competition in the Russian Gas Market: Implications for Russia and Europe

By David G. Tarr*

Introduction

During the negotiations between the European Union (EU) and the Russian Federation on Russia's bilateral market access agreement with the EU for accession to the World Trade Organization (WTO), the EU pressed Russia to charge the same price for the exports of its natural gas as it charges to its domestic industrial consumers. The Russian Federation grants an export monopoly to Gazprom, allowing Gazprom to charge profit maximizing prices on its exports. The domestic price of natural gas, however, is regulated by the Russian Federation, resulting in dual pricing of natural gas, where export prices have far exceeded domestic prices in Russia. This issue was bitterly controversial in Russia, and then President Vladimir Putin declared that Russia would not join the WTO if forced to unify its gas prices. In a paper that reportedly was highly influential in resolving this dispute, Peter Thomson and I (Tarr and Thomson, 2004), concluded that it was in Russia's interest to exploit its monopoly power on gas sales in Europe—this implies that dual pricing of natural gas was in Russia's interest. We estimated Russia gained substantially from dual pricing—by about two percent per year of its GDP.

As part of its strategy to diversify its energy sources, the European Union has sought competition in the Russian natural gas market. This has also been a long standing recommendation of the World Bank.[1] Due to the very low level of investment by Gazprom and resulting lack of development of new gas supplies, the introduction of competition in the Russian market has become even more crucial during the past decade. Due to lack of supplies, Gazprom is relying increasingly on purchases of central Asian gas supplies, at ever increasing prices. Ironically, after winning its bitter battle for the right to impose dual pricing of natural gas, the Russian Federation has announced plans to raise prices to its domestic industrial users to European levels in 2011, less transportation costs and export taxes.

Competition among multiple gas suppliers from Russia would erode or eliminate the monopoly profits of the Russian Federation on gas exports. Thus, if competition were introduced, the Russian government would be expected to grant exclusive exporting rights to a single entity (as it presently does with Gazprom) or impose export taxes. Thus, Europe should not expect to achieve cheaper Russian gas though competition within Russia. A more promising avenue for European energy diversification is new pipeline construction to open up new sources of supply independent of Russia (especially the Nabucco and Trans-Caspian pipelines) and liquefied natural gas purchases.[2]

Optimal Export Prices

Russia's proved natural gas reserves at the end of 2008 were 43.3 trillion cubic meters, which constitute 23.4 percent of the world's proven reserves.[3] Its 2008 production of 602 billion cubic meters (BCM) constituted 19.6 percent of world production. Its reserves to production ratio in 2008 of 72 years, is higher than any other significant producer except Saudi Arabia. Russia is also by far the world's largest exporter of natural gas. In 2008, Gazprom exported about 154 BCM to Europe (including Turkey). Russia, in 2008, had a market share of approximately 28 percent of natural gas sales in Europe. In the year 2008, Europe including Turkey consumed about 547 billion cubic meters (BCM) of natural gas, while importing 154 BCM from Russia.

It is in Russia's interest to try to maximize its profits from exports of natural gas. Given the need to ship natural gas from Russia to Europe through a pipeline, Russia is able to "segment" the European market from the Russian market, and competes in Europe only with pipeline supplied gas subject to an upper limit on its price equal to the price of delivered liquefied natural gas. The Russian government has given Gazprom exclusive right to use the pipelines for the export of natural gas to Europe.[4] Given its market share, this implies Gazprom has some market power in Europe.[5]

Russian domestic consumption in 2008 of 420 BCM was 2.7 times Russia's sales in Europe. The key point is that to sell significantly more of its gas in Europe, Gazprom would have to accept a lower price, i.e., it faces a downward sloping demand curve. This means that there is no "world price" of gas that Russia faces. In this situation, it is optimal for Gazprom to set marginal revenue equal to marginal costs on exports to exploit this market power, which implies its price will exceed its long run marginal costs.

* David Tarr is a Consultant and Former Lead Economist, The World Bank and Adjunct Professor, New Economic School, Moscow. He thanks the Centre for Energy Policy and Economics at ETH-Zurich for providing an environment conducive to the research in this paper. This paper is based on a working paper (Tarr, 2010), which was supported by the OECD. The views expressed are his own. See footnotes at end of text.

Tarr and Thomson (2003) estimated that uniform pricing of Russian natural gas would be extremely costly to Russia.[6] If Gazprom were to sell its gas in Europe at long run marginal costs (including transportation costs), its lost profits would equal about two percent of Russian GDP.

Russia's Domestic Gas Market

Gazprom had a virtual monopoly on domestic gas sales for many years after independence, but the price of gas sales in Russia is regulated by the Federal Tariff Service of the Russian Federation. Moreover, Gazprom controls the gas pipeline within Russia. Legally, "Third Party Access" to the pipelines is granted in Russian law to Russia's independent gas producers (who are both vertically integrated oil companies and specialized gas companies). In fact, independent gas producers frequently complain about their access.[7] Nonetheless, the share of the Russian market captured by independent gas producers in Russia has grown steadily since 2002, and reached an estimated 12-15 percent of the Russian market in 2008.[8] Moreover, independent gas producers control about 30 percent of the natural gas reserves.

Gazprom, however, while not a monopoly in Russia's domestic market, is clearly a very dominant firm with considerable monopoly power. Until more effective competition is introduced into the Russian market, efficient regulation requires constraining the exercise of that monopoly power by allowing price to be equal to long run marginal costs. While domestic natural gas prices in Russia were only $15-$20 per thousand cubic meters, by 2007 they had had increased to between $64 and $72.[9] I estimate (see Tarr, 2010) that with the substantial increase in the price of natural gas to producers in Russia, prices were equal to or above long run marginal costs in 2007. Moreover, with its decree #333 in May 2007, the Government of Russia announced plans to increase the price of natural gas to industrial users to international levels by 2011, less transportation costs and export taxes. In early 2008, prices on exports to Europe were about $378 per TCM. With transportation costs of about $35 per TCM and export taxes at 30 percent, to implement this plan today, prices in Russia would have to rise to about $225 per TCM. Thus, Russian domestic market prices would have to increase more than three times from their levels in 2007. These high prices would induce very significant inefficient reductions in Russian demand, since the value to Russian consumers would be considerably greater than the long run marginal costs of production. Russia fought a bitter battle at the WTO and won the right to have dual pricing of natural gas. However, except for the 30 percent export tax difference and the transportation fees, Russian announced plans call for it to unify natural gas prices for its industrial users.

Restructuring of the Natural Gas Industry in Russia

Why is Russia planning to allow domestic prices of natural gas to rise to such high apparently inefficient levels? Two insiders, Nemtsov and Milov (2008), have argued that Gazprom is an inefficient company and that Russian consumers and taxpayers are being forced to pay for that inefficiency. As Russia's existing gas fields are being exhausted, a significant portion of the newer discoveries are available in more difficult places that require greater investment costs. The World Bank (2010) estimates that Gazprom would have to invest $15 billion per year to maintain production levels and $20 billion per year to meet projected demand increases. But between 2001 and 2008, Gazprom has invested a total of only $36 billion in gas exploration and development. Nemtsov and Milov explain that Gazprom has failed to develop the key gas fields. For example, the gas deposits of the Yamal peninsula region, with an estimated $200 billion in required investment costs, remain undeveloped. Gazprom's production has remained stagnant since 2003, and it has made up the gap between its supplies and demand by ever increasing purchases from central Asia. But these purchases are coming at increased costs. In 2008, the presidents of the gas companies of Kazakhstan, Turkmenistan and Uzbekistan announced that Gazprom would have to pay prices tied to European levels beginning in 2009.

The Russian domestic market would be best served if Russia were to fully introduce competition. Competition in Russian gas would be best accomplished by breaking up the production and distribution segments of Gazprom into separate independent companies and effectively enforce third party access to the pipelines. The pipelines could be operated as regulated monopolies. Licenses that Gazprom has failed to use to develop gas fields under the terms of the licenses could be provided to independent companies. This would result in significant additional production, and competition among the producers will hold down the costs of natural gas in Russia.

If the additional Russian producers were allowed to export natural gas, competition among Russian firms would erode Russian monopoly profits on European sales. That is, unconstrained access to export markets would result in unified pricing through structural reform of the Russian market. In the absence of the Gazprom monopoly, however, in order to extract the available monopoly profits on its exports of

gas to Europe, it would be in Russia's interest to impose export taxes on Russian gas exporters or to use a state trading monopoly as a marketing arm of Russian natural gas exports. Compared with the Gazprom monopoly, such a system would result in higher profits for Russia as a whole, since gas would then come from the most efficient Russian supplier.

Energy Diversification for Europe

Diversification of Russian Supplies

If additional Russian producers were allowed to compete and export natural gas, in order to extract the available monopoly profits on its exports of gas to Europe,[10] it would be in Russia's interest to impose export taxes on Russian gas exporters or to use a state trading monopoly as a marketing arm of Russian natural gas exports. A more promising avenue for European energy diversification is new pipeline construction to open up new sources of supply independent of Russia, and liquefied natural gas purchases.[11]

Several new pipelines are proposed or under construction between Russia, central Asia and Europe. The most important are: Nord Stream, South Stream, Nabucco and the Trans-Caspian pipelines. Since the former two traverse Russia, they do not offer energy diversification for Europe; Russia already supplies central Asian gas to Europe through its pipelines based on contracts with central Asian suppliers. The latter two offer real diversification of natural gas supplies.

Nord Stream. Russia and Germany agreed to construct the "Nord Stream" project through the Baltic Sea to Germany at an estimated cost of construction of $15 billion. EU officials forecast a beginning to the construction in 2010.[12] The alternate project is a second pipeline adjacent to the existing Yamal-Europe route at a cost of about $2.5 billion. The considerably higher transportation tariffs of the Nord Stream project will allow the gas to by-pass Belarus and Poland, which is seen as an advantage from Russia's perspective. But it must traverse either the Finnish or Estonian seabed and then the Swedish seabed before reaching Germany, so other intermediary countries remain involved in the transportation route.

South Stream. On May 15, 2009, the gas companies of Russia, Italy, Bulgaria, Serbia and Greece signed an agreement on construction of the South Stream pipeline with a capacity of about 30 BCM per year The pipeline would travel from Russia through the Black Sea and through Bulgaria. Although the exact route is not finally determined, the Southwestern portion should travel through Greece and the Ionian Sea to Italy, while the Northwestern portion would travel through Serbia and Hungary to Austria. The estimated cost of construction of the pipeline is about $20 billion.

From Russia's perspective, the idea is to by-pass Ukraine and Turkey, but the existing pipeline through Ukraine transports 130 BCM, so Ukraine will retain its dominant position. Moreover, maritime rights with either Urkaine or Turkey will have to be agreed, thereby negating a least part of the key advantage of this project from Russia's perspective.

Nabucco. The Nabucco pipeline is a planned natural gas pipeline from Erzurum, Turkey through Bulgaria, Romania, Hungary to a major natural gas hub at Baumgarten an der March, Austria. It is a partnership of five companies, with one company from each of the five countries through which the pipeline runs. Construction is expected to begin in 2010 and be completed in 2014. It is a significant part of the European strategy for diversification of energy sources. The initial source of natural gas for the pipeline would be gas from Azerbaijan through existing pipelines that link Azerbaijan gas to Turkey. There are estimates, however, that Azeri gas supplies are inadequate to justify construction of the pipeline, so additional supplies are sought. Turkmenistan is expected to feed the pipeline also, either through pipelines in Iran or through the proposed complicated Trans-Caspian pipeline across the Caspian Sea. If the Trans-Caspian pipeline were constructed, Kazakhstan could also become a supplier to the pipeline. Egypt and Iraq could supply the pipeline through the Arab Gas Pipeline. Finally, Iran could also supply the pipeline, but this is opposed politically by the European Union and the United States.[13]

Trans-Caspian Pipeline. The proposed Trans-Caspian gas pipeline would run under the Caspian Sea from Türkmenbaşy in Turkmenistan to the Sangachal Terminal in Baku Azerbaijan. From Baku it would connect with the existing South Caucusus pipeline through Tbilisi to Erzurum in Turkey, where in turn it would be connected to the Nabucco pipeline, thus taking natural gas from Turkmenistan to Central Europe. According to some proposals it would also include a connection from the Tengiz field in Kazakhstan to Türkmenbaşy. Thus, the Trans-Caspian pipeline would link Turkmen and possibly Kazakh gas with central Europe through a route independent of both Russia and Iran. The estimated construction cost is $5 billion.

In 2008, a German and Austrian company set up a joint venture named the Caspian Energy Company, to carry out exploration for a gas pipeline across the Caspian Sea that would feed into the Nabucco pipeline. Based on exploration outcomes the company plans to build and operate a gas transport system

across the Caspian Sea. Both Russia and Iran, however, oppose the Trans-Caspian pipeline project and have objected on environmental grounds. Both nations maintain that any pipeline built under the Caspian Sea would require the approval of all five countries that border the Sea.

Footnotes

[1] See, e.g., Tarr and Thomson (2004) and the European Commission (2006).

[2] See Aslund (2008) for a similar view. Aslund also suggests liquefied natural gas projects for the European Union.

[3] See British Petroleum, Statistical Review of World Petroleum, various years. Russia's proved reserves are down from 47.6 trillion cubic meters and more than 30% of the world's proved reserves in 2001; production is up from 2001 production of 542 billion cubic meters.

[4] Gazprom paid 685 billion rubles to the Russian government in taxes in 2008. At an average exchange rate of 25 rubles to the dollar for 2008, this was $27 billion. See http://eng.gazpromquestions.ru/?id=12#c337. Nemtsov and Milov (2008) argue, however, that due to gross inefficiency of Gazprom, Russia would be much better served with a state monopoly on exports, but competitive purchases by the state monopoly among competitive producers in Russia.

[5] The largest importers of Russian natural gas are Germany (36 BCM), Italy, (25 BCM) and Turkey (24 BCM). The next largest importers are Poland, Hungary, France and the Czech Republic, all of whom imported about 7-9 BCM in 2008. The other principal suppliers of gas to the European market are Algeria (through a pipeline across the Mediterranean), Norway, the Netherlands and the UK. See British Petroleum (2009).

[6] Although the data have changed since 2001, the principles remain the same. In 2001, Gazprom sold its gas in Europe at between $79 and $99 per thousand cubic meters plus $27 transportation costs. Gazprom president Alexei Miller reported on March 14, 2008 that "the price [of Russian gas] in Europe now exceeds $370. We believe the average price in 2008 could be $378 and could even reach $400 per 1,000 cubic meters." Regarding demand in Russia, he noted that the rise of national industries, such as producers of cement, building materials, and fertilizers and gas refineries, is also pushing up Russian gas demands. Miller said that Gazprom plans to introduce market gas prices for Russian industrial consumers in 2011. See Johnson's Russia List, http://www.cdi.org/russia/johnson/2008-56-39.cfm.

In 2009, however, the price collapsed to an estimated $280 for 2009. Moreover, Gazprom in its zeal to control natural gas sales to Europe, entered into long term contracts with central Asian suppliers Uzbekistan and Turkmenistan. Gazprom reportedly is paying $340 per thousand cubic meters to Uzbekistan in 2009. But in 2009, due to a decline in world demand, Gazprom has been forced to close down its own wells that produce gas at much lower costs than it pays to central Asian suppliers. Gazprom has acknowledged losses on central Asian purchases in 2009, but argues they will be profitable contracts in the long term. See "Falling Gas Prices Deny Russia a Lever of Power," *New York Times*, May 15, 2009. www.nytimes.com/2009/05/16/world/europe/16gazprom.html.

[7] See Baranov (2008) and "Deputy Prime Minister Instructs Gazprom to Ease Pipeline Access for Russian Gas Producers," Global Insight, July 7, 2008. www.globalinsight.com/SDA/SDADetail13190.htm.

[8] The largest independent seller of natural gas in Russia is the specialized gas company Novatek, followed by Rosneft. Other important independent sellers are Lukoil, Surgutneftegaz, TNK-BP and the Itera Group. See "Gazprom is Not the Only Player in the Russian Fields," Oil and Gas—Eurasia. August 2008. http://www.oilandgaseurasia.com/articles/p/80/articles/684

[9] Estimates based on Rosstat and Ministry of Economy data. According to Gazprom, in 2008, the average price excluding VAT and excise taxes was 1653 rubles per MCM, or about $66 per MCM at 25 rubles to the dollar. See http://old.gazprom.ru/documents/Background_09.06.09.pdf

[10] Some press reports have indicated that Russia agreed to limit its export taxes as part of its bilateral agreement on WTO accession with the EU.

[11] For example, Qatargas and Polish gas monopoly PGNiG signed an agreement in which PGNiG will import the equivalent of 1.5 BCM annually of liquefied natural gas from 2014 to 2034. Poland's consumption in 2008 was 13.9 BCM. PGNiG will construct a regasification terminal in time for the deliveries.

[12] See "Nord Stream Gas Pipeline on right track," Euractiv.com, March 11, 2009. http://www.euractiv.com/en/energy/official-nord-stream-gas-pipeline-right-track/article-180127. Smith (2008) estimates that the costs would have been only $2.8 billion for an alternate pipeline—an enlargement of the Yamal pipeline that runs through Poland.

[13] For further details on the Nabucco pipeline see the Wikipedia article at http://en.wikipedia.org/wiki/Nabucco_Pipeline

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Italian Affiliate Activities in 2009

Editor's Note: We're pleased to provide the following summary of the activities of the IAEE Italian Affiliate in 2009.

20 YEARS OF AIEE

AIEE – the Italian Association of Energy Economists, and the second largest affiliate of the IAEE after the US Chapter – celebrated on April 27 2009 its twentieth anniversary, with the presence of IAEE President, Georg Erdmann.

TYPES OF ACTIVITY

1. Organization of Seminars, Conferences and Workshops
2. Studies
3. Publications
4. Training courses and university Master courses
5. Awards in the field of sustainable energy.

1. Organization of Seminars, Conferences and Workshops

- AIEE organized in 2009, 12 national seminars in Rome, Milan and other cities and participated in various other national and international events with presentations, sessions chairing etc.
- Workshop - Roundtable "Energy prices in Italy: analysis and proposals" - January 28, 2009 in Rome - This workshop discussed the deep and rapid changes in the energy market, the collapse of oil prices and possible effects of global economic crisis on sustainable energy. It had more than one hundred participants and many newspapers and specialized websites wrote about it.
- Conference on "Prospects for a sustainable energy system in Italy: the role of energy efficiency and renewables" Date: February 12, 2009. Location: Rome - This conference was organized on the occasion of the EU Sustainable Energy Week and was directed to a large audience, not only to energy specialists.
- Seminar on "The energy sector in 2008: Situation and Prospects" - Date: March 9, 2009 in Rome This is a traditional meeting sponsored by the AIEE at the beginning of each year to summarize what happened in the energy field during the previous year and examine short and medium term trends.
- Seminar on "Tools for promoting the dissemination of renewable energy in Italy" - Date: April 7, 2009. Location: Rome.It discussed the Government initiatives in the energy field.
- Seminar on "Sustainable Mobility and Hybrid Cars" -Date: April 27, 2009. Location: Rome, with the participation of Georg Erdmann, who presented the results of his ongoing research on possible contribution of hybrid cars in reducing greenhouse gas emissions.
- Seminar on "The accounting requirements of energy companies in light of the decision of the Energy Authority ('the Robin Hood tax') - Date: June 9, 2009. Location: Rome - This seminar was organized on the basis of specific requests made by energy companies, which encountered serious difficulties in implementing the resolution of the Authority. The event was cosponsored by Pricewaterhouse.
- Seminar on "Policies to promote energy efficiency in Italy" : June 11, 2009. Location: Rome. This seminar presented a study made by the AIEE on the legislative instruments used to promote the efficiency in the energy final uses .
- Workshop "Developing renewable energy and the adjustment of the electric grids" Date: October 8, Location: Rome, This workshop was organized in collaboration with ISES (Solar Energy Association). It has a large attendance and stimulated a very lively debate in the specialized press
- Seminar on "Initiatives of industrial research in energy efficiency" Date: October 30, 2009. The seminar discussed various aspects of the program in particular Industry 2015 - energy efficiency of the Ministry of Economic Development.
- Workshop "Fourth Day on energy efficiency in industry" - Date: November 24, 2009. Location: Milan, Maggiore House FAST - Presented the concrete results of the industry producing systems and energy-efficient devices.
- Conference "Research on end-use energy: situation and prospects" Date: December 15, 2009, Rome, The conference highlighted the richness of ideas and opportunities in the end-use efficiency field, but also the weakness of research on this subject (in Italy as well as in other countries) with respect to research on energy supply.
- Participation in events organized mainly by others. We cite, for co-sponsorship:
  a) Conference "BRIC countries", May 15, 2009, Rome, organized by AIESEC
  b) Conference "Building for the quality of life" June 10, 2009, Milan, organized by Megalia
  c) Conference on "Electricity Market: short term deadlines and future prospects", 14 October 2009, Rome
  d) Seminar "Is there a future for nuclear power in Italy?" Oct. 28 or ganized by QualEnergia in Rimini
  e) Roundtable on Energy Efficiency, October 30, 2009, organized by the WEC (World Energy Council) in Rimini
- AIEE representatives participated also in conferences, seminars, and workshops , with presentations or chair

of sessions, roundtable discussions etc.
- 32nd IAEE International Conference "The Global View", San Francisco, 21-24 June 2009
- 0th IAEE European Conference "Energy, Policies and Technologies for Sustainable Economies, Vienna, 7-10 September 009
- Economic and Social Commission for Europe, "Overshoot Day", Brussels, September 25, 2009
  IEA (International Energy Agency) Workshop "From Roadmaps to Implementation" and the IEA meeting of the Expert Group on Assessment and Priorities in Energy Research, Paris, 2-4 November 2009…. and many others

2. Studies and models

- Several studies were carried out by AIEE in collaboration with various partners (generally AIEE Associate members). Examples:
- The development of the MARKAL-TIMES model and its applications
- AIEE continued the development of the technological-economic model MARKAL-TIMES adapted to Italy already used in previous years with various applications: the comparison of different scenarios to reduce emissions, increase energy efficiency and develop renewable sources (known as 20/20/20).
- Regulatory policy instruments to promote energy efficiency in Italy: a comparative analysis
  This is an analysis of the effectiveness of legislation adopted in Italy to promote end-use efficiency, with particular reference to the building sector. It studied the mechanisms used in other countries (particularly European) compared to Italy. It drew some suggestions for improving the instruments used in Italy, with particular reference to the system of the Energy Efficiency Certificates.
- Plans for the development of renewable energy and energy efficiency in some Italian regions - Campania Region
- Requested by ENEA and the Campania Region. It followed a similar study for the Lazio Region the previous year, but the Campania Region required a more detailed analysis on the territory to arrive at some concrete proposals. This was also done on the basis of a series of site visits and interviews with entrepreneurs.
  The natural gas market in Italy, with particular reference to LNG
- Requested by Sorgenia. The Italian energy balance has come to depend more and more on the natural gas and this has led to positive results of the environment and reducing emissions of greenhouse gases but it raised some concerns about security of energy supply, as was shown by the consequences of crisis between Russia and Ukraine. A security factor is the presence of regasification plants for liquefied natural gas, which add flexibility to the system. The study examined some alternative strategies in this area.
- The impact of incentives for renewable sources in Italy
- The system of incentives regarding renewableenergy sources in Italy (particularly green certificates and feed-in tariffs) has helped the development of our country in this field, especially for electricity production but the costs are higher than in other European countries. The study shows that it should be possible to further improve the position of renewable and gradually decrease the costs.

3. Publications

- Volume on "Electricity from the Sun". The text of a new volume of the AIEE collection covering PV and solar thermodynamic technologies was completed. It includes three parts: a presentation and discussion of technologies, a market analysis, and a collection and explanation of the incentive mechanisms. The book was published in 2010.
- Articles and reviews for various energy periodicals.
- The presence in the media was very intense throughout the year. The daily newspapers "Staffetta Quotidiana" and Quotidiano Energia" issued a total of fifty contributions of the AIEE on issues of sustainable energy and about thirty articles and interviews have appeared in magazines and other periodicals, among which the bimonthly Nuova Energia (New Energy).
- TV and radio speeches
- Many AIEE representatives were invited to participate in radio and television round tables, debates, interviews concerning energy etc..
- AIEE continued the publication of its monthly Newsletter "Energy and Economy" and of the "Letter on Energy" which has become a monthly publication instead of quarterly and is publishing the articles of the AIEE Student members.
- The A.I.E.E has continued producing a report called: the Energy Monitoring and Forecasting Service. The Service (published only in Italian) provides a quarterly report on the evolution of international and national markets containing also short and medium term forecasts. It also informs on the price situation of the main energy products (oil, petroleum products, gas, coal, electricity) and their evolution during the months to follow (up to 24 months) with estimates of the fuel and of the electricity and gas tariffs.

4. Education and Training courses

- AIEE continued the successful organisation of the Master in Energy and Environmental Management together with the University of Rome - Department of Engineering that arrived at its 6th edition .
- Our educational activity is now very well known and much appreciated in Italy and abroad and the AIEE

teachers are often asked to contribute to other special training courses in energy, organized by various institutions.

- AIEE together with the Link Campus - University of Malta organised a new Master course, an International MBA in Management of Energy and Environment, for Mediterranean countries.
- The Master was an annual course, in English, with intensive teaching. The formal courses (for about 450 hours) lasted about six months. Classes were held at the Link Campus facilities and partly also at EMUNI University in Slovenia (in the frame of a EU collaboration). The teaching period was followed by 4 to 6 months of working stages at energy companies and institutions and to the preparation of a thesis. The Master was directed to University graduates from Mediterranean countries; some of its modules were opened to personnel from institutions and companies of the energy sector who wished to update and specialise in certain specific fields.
- Many important Italian and foreign companies have shown great interest in the initiative.

5. Prizes and Awards

- Awards in the field of sustainable energy:
- Man of the Year 2008 for energy in Italy. The award was made in conjunction with a seminar on energy prices in Italy Prize "Sustainable Energy 2008".
- The Energy Foundation Sustainable Energy Award, sponsored by the IAEA, was given only in the second half of 2009, and went to Prof. Carlo Carraro, professor of environmental economics and rector of the University of Venice.

Membership

- The number of the AIEE members remained almost unchanged in 2009 as compared with 2008, (around 400), the number of withdrawn members and new members being almost the same.
- The "Student Section" has now almost 50 members. A lot of young people interested in energy enjoyed the opportunity to take part in the AIEE activities and were happy to join the association.
- This group was very active in the association activity in 2009 under the leadership of its new organising committee, created its own page on Facebook, interacting and exchanging information with many other national and international organizations.
- The General Assembly of the AIEE May, 2009 confirmed Edgardo Curcio as President and C.A. Bollino as Vice President.

Sustainable Energy Europe

- In 2007 AIEE became a partner of the project Sustainable Energy Europe, a European campaign to raise awareness and change the landscape of energy.
- The objectives of the Sustainable Energy Europe Campaign are to raise the awareness of decision-makers (at local, regional, national and European level), spread best-practice, ensure a strong level of public awareness, understanding and support, and stimulate the necessary trends towards an increase in private investment in sustainable energy technologies by encouraging the commitment of Partners from local to European levels.
- In 2009 many of the AIEE activities and projects were connected to the Sustainable Energy Europe Campaign contributing to the achievement of EU energy policy goals and targets in the fields of renewable energy sources, energy efficiency, and clean transport and alternative fuels.

Edgado Curcio

Edgardo Curcio, second from right, at a recent AIEE meeting.

Energy Policy of Lithuania in 1990-2010 and Projections for the Future

By Jurgis Vilemas*

Introduction

Following the collapse of the Soviet Union, Lithuania inherited a very strong energy sector. Energy capacities substantially exceeded domestic needs: power plant capacity totalled 5.5 million kilowatts, the refinery was able to process up to 10 million tons of oil per year, a gas network was developed and more than half of the population was supplied with heat from district heating systems. In addition, Lithuania has also inherited grid connections with the power systems of its neighbours - the former republics of the Soviet Union. This is the positive part of the inheritance. However, at the same time the country inherited a consumer that had no concern about energy costs, and all the buildings and technologies had been designed reflecting cheap energy. All the energy sectors were managed by state monopolies with very conservative administrative staffs, that did not recognize the need for any reforms. The situation was complicated by the fact that Lithuania has almost no primary energy resources with almost all resources: oil, gas, nuclear fuel (except for small amounts of coal) imported from one country - Russia. The share of indigenous renewable energy sources at this time was only about 3%. In such circumstances the inexperienced political leadership of the country faced some difficult tasks in the field of energy policy.

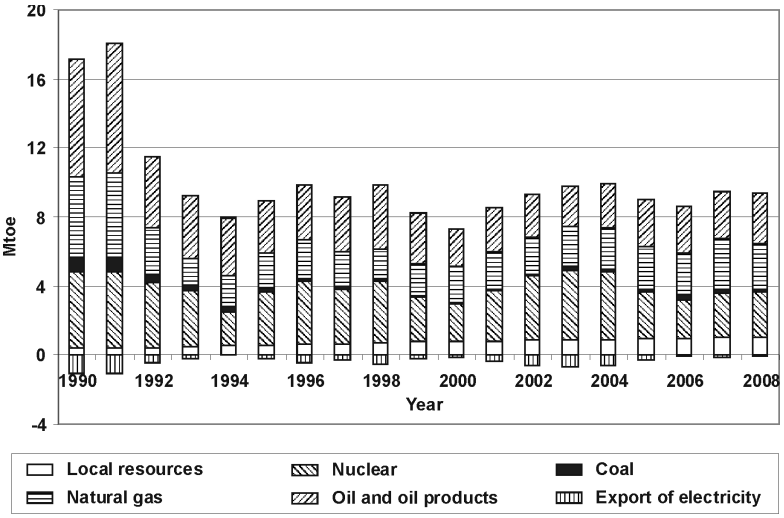

Figure 1
Total Consumption of Energy in Lithuania

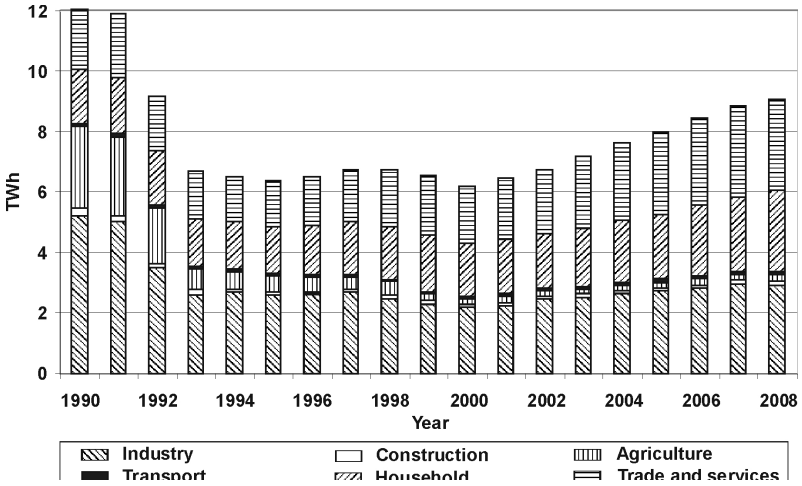

Figure 2
Electricity Consumption in Lithuania

First Years after Liberation

One of the main tasks of political and economic institutions of the country was to stabilize the supply of energy to all consumers: industry, transport and households. The formation of energy policy and strategy for the next 10-20 years has become a priority, but a very difficult task as conditions were changing rapidly in the country and abroad. A sharp reduction in energy demand occurred due to fundamental changes in the structure of the economy and the breakdown of economic relations with former partners followed by the deep economic crisis. Thus, primary energy consumption of the republic, which in 1991 amounted to 17.5 million toe, has decreased to 8 million toe, i.e., more than two times (Figure 1). Electricity consumption (Figure 2) and district heat supply decreased at about the same degree.

The major energy installations in Lithuania include a few large thermal plants, a nuclear power plant, and a refinery designed not only for the needs of Lithuania, but to supply a significant proportion of its production to Lithuania's nearest neighbours, which after 1991 were in the same economic decline and experiencing a reduction consumption of all types of energy. Therefore, the total capacity of the power plants exceeded domestic and export demand by almost three times. The refinery has suffered from a very irregular supply of oil from Russia. Naturally this excess energy sector wasn't

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effective and in some way was a burden for the economy.

Amidst all of these difficulties has come the unexpected demand of the European Union to develop a program of rapid closure of the Ignalina Nuclear Power Plant (INPP) - the cheapest source of electricity throughout the region. The main argument for this demand is that these reactors are the same type as in the Chernobyl NPP, and according to western experts cannot be considered safe. The opinion of Lithuanian and Russian experts who were familiar with all the features of these reactors and the actual condition of INPP was not taken into account. For Lithuania the most important political priority has been entry into the European Union and, therefore, none of the political leaders have been able to resist the unconditional requirement that membership in the EU is possible only if the Ignalina nuclear power plant is closed within a predetermined period of time. After lengthy negotiations deadlines were set as follows: first unit would have to close by the end of 2004 and the second block by the end of 2009.

Towards Professional Energy Policy and Strategy

The foregoing describes the main range of the constantly changing external and internal circumstances in which the Lithuanian government has had to develop energy policy and strategy. The first Energy Strategy of Lithuania was prepared with the help of Western experts and was approved by the Government in early 1994. In this strategy a gradual de-monopolization of the energy sector was set along with the desire to diversify energy supply and to forecast energy needs for the period to 2015. In real life the necessary reforms proceeded very slowly. Only in 1997 did the government finally decide to start dismantling the vertically integrated monopoly by transferring the management of district heating sectors to the municipalities. In the first strategy a very modest increase in consumption, not exceeding 3% per year over the next 10 years was forecast In Actuality total energy consumption declined. The first strategy correctly predicted that Lithuania would need no new electricity generation capacity until 2015.

The second (1999) Strategy sets out the main ideas of restructuring and privatization of the electricity and gas supply sectors. The basic idea in the electricity sector is to separate production, transmission (high voltage network) and distribution by creating independent companies. The electricity transmission sector and nuclear power plant was scheduled to remain as the property of the State and the remaining sectors were to be privatized. In the end half of the distribution network and nearly all the heat supply (generating units), gas supply sector and oil refinery were privatized. In this strategy the deadline for decommissioning of the Ignalina NPP Unit 1 set as 31 December 2004.

Today it can be said that the separation of the district heating sector and the privatization of large segments of this very complex and socially sensitive sector protected it from total collapse, especially in the small towns. Despite the continuing stagnation on the side of consumers (very slow renovation of buildings) the district heating systems in Lithuania not only maintained their performance, but in recent years have been effectively modernized and are gradually more and more oriented toward local renewable energy sources.

A major impact on energy policy in Lithuania had preparation for accession to the European Union. It was necessary to harmonize the energy policy of Lithuania with EU policy and a number of binding directives. The 1999 Strategy had not provided a decommissioning date for INPP Unit II. Following discussion with the EU this date was fixed in the renewed III Strategy, which was approved by the Seimas in 2002. It was determined the latest decommissioning date was still acceptable to the EU – December, 2009. Undoubtedly, the fate of the Ignalina nuclear power plant, the source of the cheapest electricity and which provided nearly 80% of the country electricity supply, will have a special impact on future of the electricity sector in Lithuania. In order to prepare a more or less reliable and realistic strategy for the period after shutdown of INPP, it was necessary to conduct a thorough modelling of the most probable scenarios for the future development of the energy sector, taking into account not only the closure of the Ignalina NPP, but also possible developments in international energy markets, actions and plans of Lithuania's neighbours, and to forecast the overall development of the economy and thus the future demand for energy resources. The analysis of all possible scenarios was carried out by the experts of the Lithuanian Energy Institute, starting from the second Strategy and constantly updating the analysis for each new version of the Strategy. Actual developments in the Lithuanian energy sector fully confirmed the results of the analytical forecasts of Lithuania's energy future (with the exception of the growth rate of prices for imported energy resources). The most important results and conclusions of these analyses are:

1. Even after shutdown of both units at IAE, Lithuania can satisfy all its electricity needs until 2015 using its existing generating capacity, on the basis of the most probable growth in the electricity consumption (4-5% per year);
2. The import of electricity can possibly compete with local production and postpone the need to

construct new capacities.

3. In the case where consumption growth exceeds 5% per year, the most cost-effective way to compensate for a shortage in capacity would be construction of new small cogeneration power plants in the small towns with district heating systems and to construct new combined cycle power plant of moderate capacity (400 MW);
4. In the longer term beyond 2020, in case of the significant price increases for fossil fuels (which has actually happened) and with a substantial tax on CO_2 emissions, a new nuclear power station becomes the most economically attractive source of electricity.

Without attempting to provide a detailed description of all strategic goals of the current Strategy (2007), some of the most important strategic objectives outlined in this document should be noted. They are: 1. Energy security, 2.Efficient use of energy; 3.Introduction of competitive principles in the energy sector; 4.Gradual integration into the energy systems of the European Union; 5.Diversification of primary energy sources and ways of their imports, the rapid increase of renewable and local energy resources, and reducing the share of natural gas in the energy mix in Lithuania.

In order to achieve these objectives, the most important following activities were identified:

1. Fully implement the EU directives related to the liberalization of electricity and natural gas markets;
2. Create a common electricity market of the Baltic countries and continue to integrate with the EU markets;
3. Ensure continuity in the use of nuclear energy by building a new nuclear power plant capable of ensuring the needs of all three Baltic republics and the region by 2015;
4. Connect the electrical transmission network of Lithuania with the networks of the Nordic countries and Poland no later than 2012;
5. Ensure compliance with EU directives related to the accumulation of reserves of oil (90 days) and natural gas (60 days);
6. Increase the share of renewables in the primary energy balance up to 20% by 2025. Increase the share of electricity produced at cogeneration power plants up to 35% by this time.
7. Build a new 400 MW combined-cycle unit at the Lithuanian thermal power plant in 2010;
8. Continuously improve the consumption efficiency of all types of energy, so that by 2025 it would be possible to achieve the efficiency levels of developed countries of the European Union.

Achievements and Projections for the Future

From the perspective of 2010, we should assess the reality of some objectives of the current Strategy adopted in 2007. First of all, it should be noted that some of these tasks were formulated during a very specific, not standard, economic and political circumstances. Primarily, in late 2006 and early 2007 the issues of energy security were the focus of attention of the public and politicians. The main reason for this - the conflicts between Russia, Ukraine and Belarus on gas and oil transit to European countries, together with an inevitable, significant rise in consumption (as it seemed at this time). The fact that Russia would use the strong dependence of Europe (including Lithuania) on gas supply for political purposes, was a very strong factor in determining the political atmosphere during the formation of energy policy in Lithuania.

In addition, during this period of general economic boom, it seemed that problems related to difficulties in ensuring the global economy with fossil fuels together with the inevitable increase in fuel prices (as actually has happened in 2008) would occur. In addition to all this, it was expected that at least in Europe would soon introduce heavy taxes on greenhouse gas emissions, which would have an affect on the attractiveness of fuel types. Nuclear fuel and renewable energy sources would have been winners under these circumstances.

The foregoing created favourable conditions for speculation about the security of energy supply and resulted in Strategy (2007) including a number unreal objectives, First of all was the construction of the new nuclear power plant by 2015. At present, all hopes rely on foreign investors and there is little hope that this power plant could be built until 2020.

Also the idea of building powerful high-voltage lines connecting the grid systems of Lithuania with Poland and Sweden by 2012 was not real. At this time these projects are just beginning and the expected completion date is 2016. The construction of these lines with minimal costs will radically improve the energy security of Lithuania and neighbouring countries; it will help the Baltic countries join the common Nordic energy market and will be the first important step in a future unified energy system of all

Europe. Therefore, the construction of these connections is a major strategic priority at present.

The closure of the Ignalina nuclear power plant greatly accelerates the creation of a common electricity market of the Baltic countries and apparently it will be created as planned, i.e., by 2015-2016. The Lithuanian Electricity Exchange has been in operation since January 2010.

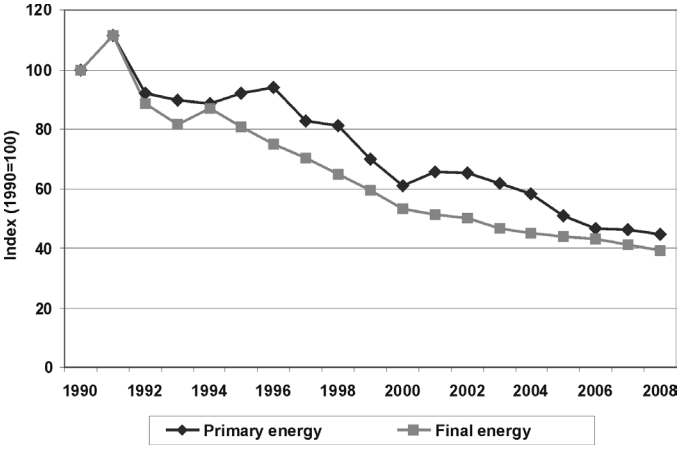

Figure 3
Energy Intensity of Lithuanian Economy

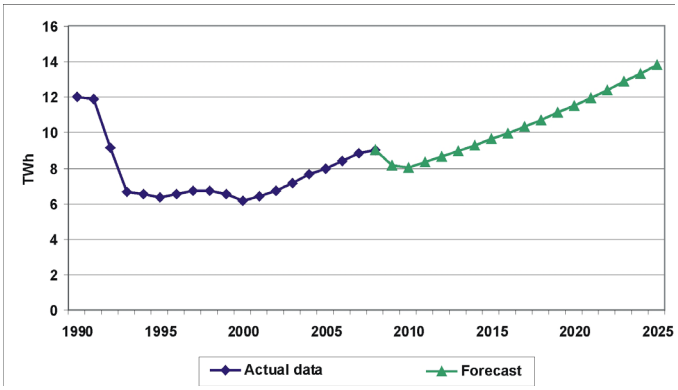

Figure 4
Forecast of Final Electricity Consumption

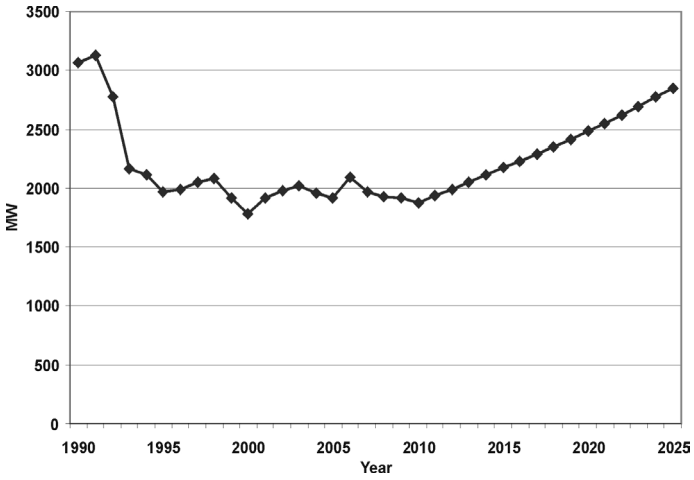

Figure 5
Demand of the Maximum Peak Capacity for the needs of Lithuania

The issues related to the increase in use of renewable energy are in good progress. Apparently Lithuania will be able to fulfil its obligation to the EU to get 23% of its energy needs from renewable sources by 2020. The new law on the use of renewable sources will be adopted in 2010 which should significantly stimulate the activity in this sector.

Since 1993 Lithuania has continuously decreased energy intensity per GDP (Figure.3) and will be able to fulfil another obligation by 2020: to lower energy consumption per unit of GDP by 20% compared with 2005.

Construction of a new combined cycle unit with a capacity of 450 MW at the Lithuanian thermal power plant has been started and it should be put into operation in 2012.

As already mentioned, Lithuania has seen a sharp reduction in the consumption of all types of energy since 1991, consequently emissions of carbon dioxide and other greenhouse gases in the atmosphere have been sharply reduced as well. Therefore, even after the closure of Ignalina NPP, Lithuania has fulfilled the obligations arising from the Kyoto Protocol: to reduce its emissions by 8% in 2010 compared to 1990.

Recent forecasts of electricity consumption growth and peak power demand for needs of the country (Figures 4, 5), show that only approaching the year 2025 will these figures be close to their 1991 values. Taking into account the necessity of constructing at least 500 MW of wind power plants in coming years, the availability of a new CCGT unit of 450 MW in 2012 and availability of interconnectors for import, it is clear that there is no need for construction of new large power plants, at least until 2025.

In conclusion, it can be stated that Lithuania is successfully using its heritage of energy infrastructure, its favourable geographic location and membership in the European Union and the professionalism of its energy engineers to reliably provide for all consumers the kinds of energy at an acceptable cost and with minimal impact on the environment.

Impact of Azerbaijan's Energy Policy on the Development of theOil Sector

By Aitor Ciarreta and Shahriyar Nasirov*

Azerbaijan is richly endowed with oil and gas resources and has recently experienced a temporary oil production boom. Azeri oil production reached 23.5 million (mln) tons in 1991 and accounted for 71.4 % percent of total oil output in the former Soviet Union. However, after the break-up of the Soviet Union, production fell significantly between 1991-1997, due to outdated technology, poor planning and lack of investment in new drilling and rehabilitation of existing wells. Since passage of the "Contract of the Century" in 1994, 29 "Production Sharing Agreement" contracts have been signed between the Azerbaijan government and the Azerbaijan International Operating Company (AIOC). According to the Trend Agency, in the 14 years since the signing of the contract, Azerbaijan has received $40 billion in foreign investment in this sector. The oil and gas sector share in total foreign investment today accounts for 80-90 %. Oil production peaked at 45.5 mln tons with record capacity in Azerbaijan in 2008. State oil fund revenues reached $ 11.4 billion and the State Budget received $ 6 billion at the end of 2008. The oil and gas revenues of the country are expected to be $ 200 billion by 2024.

Over recent years, Azerbaijan has signed several very important energy contracts in accordance with Production Sharing Agreements (PSAs) that helped the inflow of foreign investment into the oil sector. As an outcome of the successful energy policy, Azerbaijan is currently enjoying huge oil revenues. However, uncertainty over the legal status of the Caspian Sea and the lack of basic modern rules and procedures to regulate oil and gas operations still remain a significant challenge for the development of the oil sector. In addition, the Nagorno-Karabakh conflict, high levels of bureaucracy, regulatory burden, corruption and the rapid pace of change in the economy continues to threaten business operations in the country. This article reviews the oil industry in Azerbaijan and describes the main policy incentives provided by the government to attract foreign investment in the oil industry.

Background

Azerbaijan is located in the South Caucasus region, bordering on Russia, Iran, Georgia, Armenia and Turkey. It covers an area of 86.6 thousand square kilometers. According to the International Monetary Fund, GDP per capita on PPP was around $ 9,500 in 2009. Its strategic location on the Caspian Sea provides great potential regarding oil and natural gas resources. Azerbaijan is an important oil exporter, abundant with fertile agriculture lands and a well educated labor force. It acts as a transport corridor between Europe and Central Asia.

After independence, the conflict with Armenia over Nagorno-Karabakh and fighting in neighboring Chechnya led to the decline of oil exports and domestic output and to high inflation. GDP decreased by about 63 % in total due to agriculture output falling by about 43% and industrial output by about 60 % during 1989–1994.

Since 1994, thanks to the contracts entered into with oil companies, the country has welcomed a huge amount of foreign investment to the oil and gas sector. The GDP subsequently rose by 6% in 1997, 11% in 2000, 34.5 % in 2006, 25 % in 2007 and 10.8% in 2008. The government started to implement economic programs with World Bank and IMF backing. Inflation fell from 1,664 % to 1 % by the end of 1997 and 2008 saw 20-22 % inflation.

Oil Industry

Sector Organization

The State Oil Company of the Azerbaijan Republic (SOCAR) is a state owned oil and gas company and is responsible for all aspects of offshore and onshore exploration of oil and gas fields in the country, the pipeline system, oil and gas imports and exports, processing, refining and sale of oil and gas products. SOCAR was founded on 13th September 1992 following the merger of two state oil companies, Azerneft and Azneftkimiya.

Since 1994, SOCAR has signed a total of 29 Production Sharing Agreements, including contacts to explore the Azeri-Chirag-Guneshli fields. The most recent contract in 2009 envisages exploring the Bahar and Gum Deniz offshore oil fields. Thanks to these agreements, the Azerbaijani government will reap approximately 80% of the total profits from a combination of royalties and SOCAR's share. The remaining 20% of profits will be divided among the Azerbaijan In-

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See footnotes at end of text.

ternational Operating Company (AIOC): BP (operator – 34.1%), Chevron (10.2%), SOCAR (10%), INPEX (10%), Statoil (8.6%), ExxonMobil (8%), TPAO (6.8%), Devon (5.6%), ITOCHU (3.9%) and Hess (2.7%) (www.bp.com/caspian).

BP is the largest foreign investor among them and it has been a single AIOC operator since June 1997.

Oil Production and Consumption

Azerbaijan is recognized as one of the oldest oil producers in the world. The first oil wells in the world were drilled in Baku in 1847. In 1910, Azerbaijan became the number one oil producer in the world with production of 11.5 mln tons of oil.

In 2008, Azerbaijan had an estimated 7 billion barrels of crude oil and 1.37 trillion cubic metres of gas reserves[1] . The main oil reserves are located offshore in the Caspian Sea, particularly the Azeri-Chirag-Guneshli (ACG) field which is estimated to have accounted for over 80 percent of total oil output in Azerbaijan in 2008. The joint development of these three biggest oil deposits; ¨Azeri ¨, ¨Chirag¨ and ¨Guneshli¨ began on September 20 1994, when the "Contract of the Century¨ was signed with major oil companies representing eight countries. This contract is considered to have been of exceptional importance in the protection and development of Azerbaijan.

After independence, oil production in Azerbaijan fell sharply between 1992 and 1997. Production hit a low of 9.1 mln tons in 1997. By 2000, production had reached 14 mln tons per year. It stood at 22.4 mln tons per year in 2005 and had almost reached 44.3 mln tons by 2008.

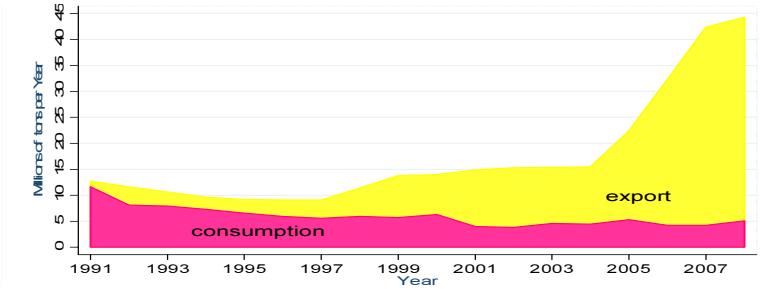

Figure 1 Azerbaijan Oil Exports and Consumption, 1991-2008
Source: EIA and own construction

Figure 1 plots crude oil and natural gas production and oil demand from 1991 to 2007.

Oil demand is mainly driven by economic activity, consumer preferences and conservation factors. After the break-up of the Soviet Union, demand for oil in Azerbaijan fell from 12 mln tons in 1991 to 5.07 mln tons in 2007 (Figure 1). This shows that significant amounts of oil were available for export. According to the Energy Information Agency, Azerbaijan exported a net of about 749,000 bbl/d of oil in 2008.

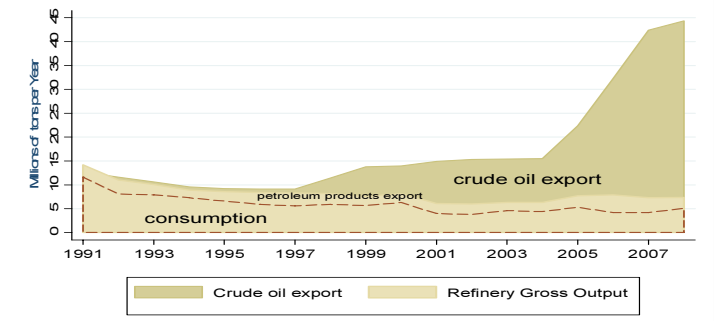

Figure 2 Crude and Refinery Exports
Source: EIA and own contruction

Refined Petroleum Production and Consumption

After 1991, production of oil products in the country decreased significantly. For instance, refinery gross output was 14.2 mln tons in 1991 but fell by almost a half to 7.3 mln tons in 2008. Several factors were behind this decline in production: failure to replace worn and outdated technology, a falling domestic market in the country, a breakdown in consumer relations and, in particular, the lack of capital investment which the government estimates will cost between $600 million and $700 million. Figure 2 plots refinery and exports of petroleum products for the same period.

Azerbaijan has two oil refineries: the Baku Oil and Azerneftyagh refineries located in Baku. Both are run by SOCAR. The Azerineftyag refinery was established with a capacity of 230,000 bpd and the Baku Oil refinery with a capacity of 212,000 bpd. In total, both refinery plants produced approximately 25 mln tons of oil products. See Figure 3.

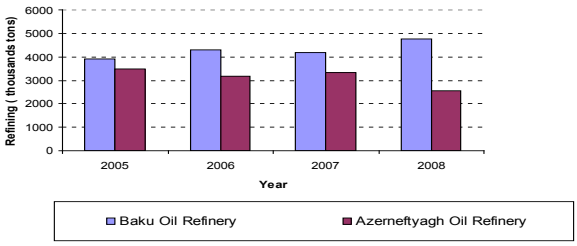

Figure 3 Oil Refining in Azerbaijan (2005-2008)
Source: SOCAR and own construction

In 2008, 7.3 mln tons refinery oil products were produced: 4.8 mln tons by Baku Oil refinery and the other 2.5 mln tons by the Azerineftyag refinery. This shows that the two refineries were operating well below capacity and with overall utilization rates as low as 40%.

Consumption of oil products changes between the countries or regions depending on the use of oil as transportation fuel, such as gasoline or diesel, or as fuel oil for residential consumption and industry. Figure 4 shows the output of the major oil products (gasoline, fuel oil and diesel) produced in the country.

Transportation Infrastructure

Most of Azerbaijan's oil is exported via pipeline. However, small amounts are shipped by railway and truck. Azerbaijan has 3 main pipelines to export its oil: Baku-Tbilisi-Ceyhan (BTC), Baku-Novorossiysk and Baku-Supsa. See Table 1.

The majority of Azeri oil exports are shipped via the Baku-Tbilisi-Ceyhan (BTC) pipeline which was designed to deliver up to one million barrels per day of crude oil and runs 1055 miles from the Sangachal terminal near Baku in Azerbaijan, via Georgia, to the Ceyhan Terminal in Turkey. The oil is then shipped by tankers to European markets. The pipeline started operations in July 2006. According to EIA, 653,300 bbl/d of oil were exported in 2008. The pipeline is run by BP and owned by AIOC members.

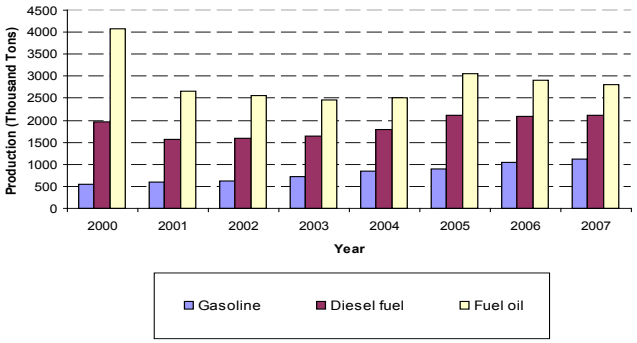

Figure 4 Refined Product Output by Fuel Type (2000-2007)
Source: SSCA, State of Statistics Committee of Azerbaijan and own construction

On October 2, 2009 the Azerbaijan and Kazakhstan governments signed various contracts to increase Kazakh oil exports via BTC. According to EIA, 100, 000 bbl/d of Kazakh oil is currently shipped via BTC and by rail.

	Operator	Length (miles)	Capacity mb/d	Market
The Baku–Novorossiysk	SOCAR Transneft	830	0.10	European
Baku – Supsa	BP	518	0.15	European
Baku-Tbilisi-Ceyhan	BP	1055	1.00	European

Table 1 Azerbaijan"s Export Routes

The Baku-Novorossiysk oil pipeline is 830 miles long and starts from the Sangachal Terminal near Baku and finishes at the Novorossiysk terminal on the Black Sea coast in Russia. The Azerbaijan part of the pipeline is operated by SOCAR and the Russian part is operated by Transneft. The pipeline capacity is 100,000 bbl/d and 29.000 bbl/d and 45,000 bbl/d of Azeri oil was shipped via this pipeline in 2008 and 2009, respectively.

The Baku-Supsa pipeline runs 518 miles from the Sangachal Terminal (Baku) to Supsa (Georgia). The pipeline transports oil from the Azeri-Chirag-Guneshly field and is run by BP. It has a total capacity of 145,000 bbl/d. According to of the Argus report, only 13,000 bbl/d were transported via this pipeline in 2008.

Government Policy to Attract Foreign Investment

The oil and gas sector has dominated the economy of Azerbaijan for several years and still continues to grow. Table 2 summarizes the importance of the oil and gas sector in Azerbaijan between 2003 and 2008.

Table 2 shows that in 2008 the oil sector accounted for 54.14% of total GDP, for 93.1% of total gross exports and for 83.9% of total foreign investment. In 2008, the gross exports of goods in the country amounted to $30.6 billion, and petroleum products accounted for 93.1% of that total. Out of total exported petroleum products ($28.5 billion), the export of petroleum products accounted for $2.2 billion and crude oil exports for $26.3 billion. In the same year, foreign direct investment was close to $4 billion which was mainly used to finance large scale oil and gas projects, such as the BP exploration (Shakhdeniz) project and operations at the Azeri-Chirag-Guneshly field.

	2003	**2004**	**2005**	**2006**	**2007**	**2008**
GDP growth rate (%)	11.2	10.2	26.4	34.	25	10.8
Share of oil & gas sector in GDP (%)	30.1	31.3	44.1	53.8	55.9	54.1
Share of oil & gas sector in industrial output (%)	62.1	61.6	75	82.8	85.7	89
Share of petroleum in gross export (%)	85.7	82.7	86.5	92.2	94.2	93.1
Share of oil & gas sector in FDI (%)	98.5	97.5	94.2	90.3	90.1	83.9

Table 2 The Oil and Gas Sector in Azerbaijan, 2003-2008
Source: IMF, Central Bank of Azerbaijan and SSCA

Pursuant to the Protection of Foreign Investment legislation, foreign investors can be involved in any activity open to national investors with exception of prohibited areas such as national security and defense. In order to encourage foreign investment, the President of Azerbaijan signed several treaties to protect the rights of foreign investors. The privatization law was ratified by parliament (Milli Meclis) and two thirds of state assets were sold off in 2000. The government introduced several laws to regulate real

property rights, including the Mortgage Law (2005), Land Code of the Republic of Azerbaijan (1999), Land Reform Law (1996), Land Leasing Law (1999) and Land Market Law (1999).

After the policy change regarding the development of the oil sector, investors started to work through Production Sharing Contracts (PSCs) and traditional joint ventures (JVs). According to the JV agreement, a foreign company can hold a maximum share of 49 % and has to pay eight different taxes. However, in comparison to a JV, a PSC allows an investor to have a greater share than SOCAR and only has to pay tax on profits.

Azerbaijan has created a new model to attract foreign investment in the oil and gas sector by providing Production Sharing Agreements (PSA). PSAs are a common type of contractual arrangements signed between SOCAR as a government agency and the foreign partner, AIOC. Each PSA contract passes through different processes before coming into force. The first foreign partner, AIOC, negotiates the PSA terms with SOCAR. The latter then submits the contract to several government departments who may make some amendments. The contract then has to be ratified by parliament and the final step is its being confirmed by the president.

Its structure is to keep the PSC benefits and principles and it allows an investor to avoid the unfavorable taxes of a joint venture. The following key features make a PSA more attractive to foreign investors: exemption from Value Added Tax, non-taxable dividends, elimination of restrictions on banking issues including no restriction on foreign bank accounts, payroll currency and dollar withdrawals, implementation of the international accounting system, elimination of various governmental audits and application of international practices on labor laws.

Under PSA agreements, the AIOC does not make royalty payments, but it is required to pay taxes on profits. The AIOC assumes all the exploitation risks and, therefore, does not receive any compensation if no oil is found. The Azerbaijani government owns the resource and the entire installation. The main features of a PSA are: 1) before any profit distribution, repayment of all loan and costs by all contract partners to the operator, 2) after repayment of all loans and costs, the profits are distributed among contract partners based on the PSA agreement, 3) with regard to new capital, the PSA is a flexible agreement whereby if the Azerbaijani and international partners mutually agree, a new participant can enter the PSA, 4) the PSA provides investors with protection against changes in laws (CEE[2]).

In short, the regulatory reforms in the energy sector, the promotion of PSA agreements in oil contracts, the materialization of the "Contract of the Century" project and the Baku-Tbilisi-Ceyhan (BTC) pipeline have been among the biggest achievement of the Azerbaijani government regarding its strategy to develop the oil and gas sector. Thanks to these achievements, Azerbaijan is currently enjoying huge oil revenues (expected to reach $ 200 billion in 2024).

Despite the signing of several oil and gas contracts and the general foreign investment protection laws and regulations introduced by the government, Azerbaijan still lacks independent regulatory institutions, rehabilitation of petroleum refinery plants, resolution of the legal status of the Caspian Sea, laws and regulations such as petroleum law, pipeline law, environmental law to administer oil and gas operations. These issues are now the main challenges facing Azerbaijan in order to develop its oil industry in the future.

Footnotes

[1] Energy Information Agency.

[2] "Oil Monetization in Azerbaijan" by Center for Energy Economics, The University of Texas at Austin.

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Report from the 11th IAEE European Conference in Vilnius

Energy Economy, Policies and Supply Security: Surviving the Global Economic Crisis

The 11th European Conference of the International Association for Energy Economics with the theme, "Energy Economy, Policies and Supply Security: Surviving the Global Economic Crisis" took place in Vilnius, Lithuania at the Radisson Blu Hotel Lietuva on the 25-28 August, 2010. This is a traditional event, which is organized in different European countries in the years when the World Conference of the International Association for Energy Economics (IAEE) is held on other continents. This year the conference was organized in Lithuania for the first time. The involvement of our countries energy economy experts with the international scientific cooperation networks has granted it the right to organize such a high-level conference in Lithuania. The main organizers of this conference were the Lithuanian Energy Institute and the Association for Energy Economics (Lithuanian IAEE affiliate). Conference chair, prof. Jurgis Vilemas, believes this event was an opportunity for worldwide experts to learn more about the Baltic countries' energy development specifics and problems. This is a significant event, which provides a good opportunity to promote new ideas, and a knowledge and experience exchange between energy economics experts and the general public.

The main goal of the conference was to convene for common discussion global energy experts, scientists, politicians, representatives of major energy companies, who have presented to the members of association and other participants relevant problems of the energy sector, related with the developments in energy sector and economy in recent years.

This year's conference was an event of very wide range, taking into account a variety of topics and number of participants, represented institutions and countries. More than 230 presentations in the 8 plenary and 46 concurrent sessions were made, which summarized the latest research results carried out in the various countries. The conference attracted visitors from 38 countries around the world - Germany, Italy, Norway, France, Switzerland, G. Britain, Mexico, Brazil, USA, Australia, South Africa, Russia, etc. The total number of conference participants was about 350 representing various scientific, industrial, energy sectors and institutions.

In the opening plenary session the greeting speeches for participants were made by prof. Jurgis Vilemas, President of the Lithuanian IAEE affiliate, Arvydas Sekmokas Lithuanian Minister of Energy, Lubov Kotzeva the Director of the investment bank, NM Rothschild & Sons (this bank has prepared the business model and financing plan for the new Visaginas nuclear power plant), Gintautas Babravičius the Deputy Mayor of Vilnius and prof. Einar Hope, the President of the International Association for Energy Economics.

In the plenary session on European energy policy within the global crisis, presentations were made by Christoph Frei, the Secretary General of World Energy Council; Stephan Kamphues, the President of the European Transmission System Operators (ENTSOG); prof. David Newbery from University of Cambridge; and Wolfgang Straßburg, Vice president of German energy company RWE Power AG.

European renewable energy policy features and trends in a separate plenary session were overviewed by the Hans van Steen, the Head of Regulatory Policy and Promotion of Renewable Energy Sources unit, EC Directorate General for Energy and Transport; prof. Richard Green from the University of Birmingham; Charles Nielsen, Eurelectric Chairman of Working Group Renewables and Distributed Generation and Prof. Einar Hope, President of IAEE.

European energy security issues were discussed by Leonard Coburn (Coburn Energy International), Dr. Tatiana Mitrova (Energy Research Institute of Russian Academy of Sciences), Benjamin Schlesinger (Benjamin Schlesinger and Associates) and Manfred Hafner (Fondazione Eni Enrico Mattei).

One of the plenary sessions was devoted to climate change issues. In this session presentations were made by Hans Jørgen Koch (Danish Ministry of Climate and Energy), Hans ten Berge (Eurelectric), Manfred Fischedick (Wuppertal Institute for Climate, Environment and Energy) and Nils Lannefors (Alstom Power).

The future guidelines of liberalized energy markets were presented by Gunnar Lundberg (Vattenfall AB), Jean-Michel Glachant (Florence School of Regulation), Michael Pollitt (University of Cambridge), Fedor Veselov (Energy Research Institute of Russian Academy of Sciences), Mikael Lundin (CEO Nord Pool Spot).

The conference was closed by two parallel plenary sessions: nuclear energy economics and energy efficiency in new economical environment. Competitiveness of nuclear power in global energy markets,

(continued on page 50)

Scenes from the 2010 IAEE European Conference (August 25-28, 2010)


11th IAEE EUROPEAN CONFERENCE
Energy Economy, Policies and Supply Security:
Surviving the Global Economic Crisis
25-28 August 2010 in Vilnius, Lithuania
General Sponsors
Radisson
Jurgis Vilemas

its development trends and issues were analyzed by prof. John Parsons from the Massachusetts Institute of Technology; Tim Büscher, representative from one of the most important energy companies, RWE Technology GmbH; Irina Borysova, Project Manager of World Nuclear Association and Prof. Eugenijus Uspuras, Director of Lithuanian Energy Institute. Energy efficiency issues were discussed by prof. Anders Larsen (Roskilde University), prof. Reinhard Madlener (RWTH Aachen University), Ugo Farinelli (Italian Association for Energy Economics) and Peter Bach (ECEEE).

Topics discussed in the conference concurrent sessions were very broad and comprehensive. Participants of the conference made presentations on the following topics:

- Energy supply security
- Sustainable energy development, climate change mitigation
- The role of renewables and biofuels
- Energy analysis and modeling
- Energy supply geopolitics
- Market liberalization and integration
- Environment
- Nuclear Energy
- Energy demand forecasting
- Energy policy
- Energy Efficiency
- Energy sector risk analysis

The special session was designed in order to review the Central and Eastern European countries' energy sector problems. The participants have showed high interest in sessions analyzing the problems of renewable energy sources (biomass, wind, hydro, solar) and evaluating its development trends.

The IAEE focus on young scientists and takes various measures to promote the active participation of young energy economists at the conferences. This conference convened more than 70 students from around the world to present their research results. One-third of all students and PhD students were invited to present their research findings by exempting them from the conference participant fee. In this way, young scientists can meet their colleagues and energy experts and to learn about their scientific work.

As every year, the best student paper award competition organized by IAEE attracted significant interest. Applications to participate in this competition were presented by a considerable number of young scientists. For IAEE best student paper award competition was selected four presentations: Florentine Schwark from Swiss Federal Institute of Technology (Zurich, Switzerland), Lurion De Mello from Macquarie University (Australia), Nadia Ameli from University of Berkeley (California, USA) and Vidas Lekavičiaus, representative of the Lithuanian Energy Institute.

In addition to the scientific program, the conference organizers invited the participants to communicate with each other in an informal setting. This provided the opportunity to make new contacts, to further discuss ongoing research, to develop new projects that will help to solve today's most widely discussed problems. For those who wished to explore Vilnius, its surroundings and culture sightseeing tours of the city and the ancient capitals of Lithuania - Kernavė and Trakai were organized.

This conference will have long-term benefits for education of energy experts in Lithuania since the conference proceedings are available not only at the website (www.iaee2010.org), but also at the libraries in Lithuanian scientific institutions and universities.

President of IAEE prof. Einar Hope, in the final conference speech, acknowledged the conference held in Vilnius as one of the most successful IAEE conferences held in European countries in recent years. It should also be mentioned that considering the number of participants and the number of institutions represented in this conference, it was the largest conference on energy issues in the Baltic States since independence.

Inga Konstantinavičiūtė
Viktorija Bobinaitė
Lithuanian Energy Institute

Member Get A Member Campaign Continues Success

Zacchaeus Kunemoemi Wins Complimentary Registration to the Calgary USAEE/IAEE North American Conference

IAEE's Member Get a Member campaign was a grand success in the third quarter with 30 new members added in that period as a direct result of this program.

Members had their membership expiration date advanced three months for each new member referred. Zacchaeus Kunemoemi, with the University of Dundee, referred the most new members – 6! He won a complimentary registration to the coming Calgary North American Meeting.

Welcome New Members!

The following individuals joined IAEE from 7/1/10 to 9/30/10

Ibrahim Abdool
Univ of the West Indies
Trinidad & Tobago

Teslim Abdul-Kareem
University of Dundee
United Kingdom

Isiyaku Umar Abdullahi
NNPG Napias
Nigeria

Abaka Ahmed Umar
Energy Commission of Nigeria

Franklin Ajaegbu
University of Surrey
United Kingdom

Alexandr Akimov
Griffith University
Australia

David Albin
Natural Gas Partner
USA

Ariana Alisjahbana
USA

Abdulkareem O Aliyu
Energy Commission of Nigeria
Nigeria

Sultan Almohnna
Middleeastoil.net
Saudi Arabia

Badr Al-Rumaih
OPEC/Saudi Aramco
Saudi Arabia

Mary O Anavhe
Nigerian Electricity Regulatory Com
Nigeria

John Anyanwu
African Development Bank
Tunisia

Oscar Arnedillo Blanco
NERA Economic Consulting
Spain

Kentaka Aruga
Inst for Global Env Strategies
Japan

Osigne C Augustine
Univ of Ibadan
Nigeria

Umar Auwal
ABU Zaria
Nigeria

Fernando Avellar
Brazil

Adaobi Ayaeji
Otis Engineering
Nigeria

Laure-Anne Badey
EDF Inc
USA

Dahiru Bagudu
NNPC
Nigeria

Ricardo Baitelo
University of Sao Paulo
Brazil

Ross Baldick
University of Texas
USA

Anastacio Baleva
ConocoPhillips
USA

Ardeth Barnhart
Arizona Research Institute for Solar
USA

Francisca Bauer
WU Vienna Inst for Reg Econ
Austria

Frederik Beelitz
Economic Consulting Associates
United Kingdom

Maryam Bello
Gombe State Univ Nigeria
Nigeria

Kelly Bennett
USA

Francis A Binuyo
Centre for Mgt Development
Nigeria

Maria Bofill
Trade Commissioner
USA

David O Bolarinwa
NNPC
Nigeria

Mark Borsuk
Thayer School of Engineering
USA

Luiz Brandao
PUC Rio
Brazil

Christoph Bremberger
WU Vienna
Austria

Ricardo Buratini
CPFL
Brazil

Paul Burke
Australian National University
Australia

Daniel Burt
Suncor
Canada

Heather Campbell
ARC Resource Ltd
Canada

Julie Carey
USA

Mileno Cavalcante
Petrobras SA
Brazil

Katherine Cell
Kate Cell Consulting
USA

Azuka Chionuma
CEPMLP Univ of Dundee
United Kingdom

Nicolas Choquette-Levy
University of Calgary
Canada

Christine Cruden
ConocoPhillips Canada
Canada

Alexander Cruz
USA

Rafique Daruwalla
University of Alberta
Canada

Elizabeth Dinan
USA

Ralf Dyllick
EPFL Energy Center
Switzerland

Chikam Ekeh
MRA
Nigeria

Patterson C Ekeocha
Policy Analysis and Res Project
Nigeria

Rani El Khatib
Ernst and Young
Saudi Arabia

Russell Fairbanks
USA

Nikolay Filchev
SAIS Johns Hopkins University
USA

Cory Forgrave
USA

David Fornari
Deloitte Consulting LLP
USA

Isabel Galiana
McGill University
Canada

Villamor Gamponia
Puget Sound Energy
USA

Juan Miguel Garcia Sierra
Spain

Michael Gerst
Dartmouth collage
USA

Alfonso Gonzalez Aparicio
Ministerio de Industria
Spain

Emily Grubert
USA

Piotr Hajdecki
Ministry of Economy WPHI
Poland

Muhammad Hamisu
Media Trust Limited
Nigeria

Han Hao
Tsinghua University
China

Blaine Hawkins
Alberta Innovates
Canada

William Helton III
USA

David Hill
Cass Business School
United Kingdom

Sebastien Houde
Stanford University
USA

Vladimir Ivanenko
Natural Resources Canada
Canada

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United Kingdom

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HFK Whonheim

GerTom Hans Jansen
CEED International
USA

Christian Kaas
Hong Kong

Zahid Karakaya
Turkey

Karlis Ketners
Riga Technical University
Latvia

Elena Landau
Brazil

Jefferson Laplante
ConocoPhillips
Canada

Mohammed Lawal
Energy Commission of Nigeria
Nigeria

Ngoc Anh Le
CEPMLP
United Kingdom

Olivier Le Sang
Integro
Laos

Angelo Leonelli
E ON Italia SpA
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IAEE/Affiliate Master Calendar of Events

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

Date	Event, Event Title and Language	Location	Supporting Organizations(s)	Contact
2010				
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
January 20-21	6th Spanish Association for Energy Economics Conference	Barcelona, Spain	AEEE	Laura Fernández laura.fernandez@ub.edu
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
April 25-26	4th Annual NAEE/IAEE International Conference *Green Energy and Energy Security: Assessing the Options for Africa in a Global Energy Market*	Abuja, Nigeria	NAEE	Adeola Adenikinju akiniwayemi@hotmail.com
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 Forward*	Perth, Australia	AAEE/IAEE	Ron Ripple r.ripple@curtin.edu.au
September 9-12	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

Calendar

8-9 November 2010, 2010 Advanced Energy Conference at New York Hilton, New York, NY, USA. Contact: Jim Smith, Director of Industrial Outreach, AERTC and Assistant Vice President, Economic Development Stony Brook University, Stony Brook University, Stony Brook, New York, USA Email: Jim.smith@stonybrook.edu URL: http://www.aertc.org/conference2010/

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: http://www.smi-online.co.uk/10finmodel13.asp

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: http://www.supplychainperformance.co.uk

6-10 December 2010, International Gas Value Chain Course at Hampshire Hotel. Contact: Rik Cents, Account Manager, Energy Delta Institute, Laan Corpus den Hoorn 300, Groningen, Netherlands. Phone: +31 50 524 8319. Fax: +31 50 524 8301 Email: cents@energydelta.nl URL: http://www.energydelta.org/en/mainmenu/edi-programmes/introduction-programmes/international-gas-value-chain

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: http://www.americancoalcouncil.org

10-21 January 2011, 29th International Training Program on Utility Regulation and Strategy at Hilton Hotel, Gainesville, Florida. Contact: Melissa Stevens, Coordinator of Research Programs and Events, Public Utility Research Center, P.O Box 117142, 205 Matherly Hall, University of Florida, Gainesville, FL, 32611, USA. Phone: 352-392-6148. Fax: 352-392-7796 Email: melissa.stevens@warrington.ufl.edu URL: http://www.purc.ufl.edu

19-21 January 2011, Synergistic SuperGrid for Transmitting Energy Overseas 2011 at London, UK. Contact: Sarah Adams, Slovakia (Slovak Republic) Email: sarah.adams@inno-qube.com URL: http://worldconferences.co.uk/conferences/super-grid-fosg-eu-utilities-renewable-energy-wind-solar-tso-hvdc-hvac-smart-grid-regu

16-18 February 2011, 7. Internationale Energiewirtschaftstagung an der TU Wien - Märkte um des Marktes Willen: Bleibt die Technik auf der Strecke at Vienna University of Technology. Contact: Conference Secretariat, Vienna University of Technology, Gusshausstraße 25-29 / E373-2, Vienna, 1040, Austria. Phone: +4315880137303. Fax: +4315880137397 Email: iewt2011@eeg.tuwien.ac.at URL: http://eeg.tuwien.ac.at/iewt2011

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: http://www.nanotechinsight.net/conf/nanoinsight/11/

3-25 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: conference@omc.it URL: http://www.OMC.IT

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

9-12 October 2011, Redefining the Energy Economy: Changing Roles of Industry, Government and Research at Washington, DC. Contact: David Williams, Executive Director, USAEE, 28790 Chagrin Blvd Ste 350, Cleveland, OH, 44122, USA. Phone: 216-464-2785 Email: usaee@usaee.org URL: http://www.usaee.org

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