IAEE WWW.IAEE.ORG International Association for Energy Economics

IAEE Newsletter

Fourth Quarter 2007 International Association for Energy Economics

President's Message

The IAEE family has grown again, with the addition of the Emirates Association for Energy Economics (EAEE). This new affiliate gives us representation in a key strategic area for the world oil market. On behalf of all IAEE members, I would like to welcome the new affiliate; I am certain that our new members will help us acquire a better understanding of the issues relevant to this vital part of the energy world.

The theme of the IAEE/USAEE North American conference, held in Houston this past September, remains much on my mind as crude oil prices reach record highs. "Developing and Delivering Affordable Energy in the 21st Century" indeed represent important challenges for both the energy industries and for policy-makers. Speakers in the various plenary sessions focused on key supply-side issues, from geopolitics security of supply, to the potential of sustainable energy forms, to the challenges of access to resources and of infrastructure development. Electricity issues continued to receive much attention from speakers in both plenary and concurrent sessions, as market structures and regulatory frameworks continue to evolve around the world and new challenges emerge that need to be addressed. Innovative features at this conference included professional development / training sessions, activities for Houston-area high school teachers, and an (early morning!) industry outlook breakfast session. Thanks to Peter Nance (USAEE President and General Conference Chair), Peter Hartley and Troy Thompson (Program Co-chairs), Wumi Iledare (Concurrent Session Chair), all the local organizers, and our headquarters team for putting together a great conference. I would also like to take this opportunity to thank all of our conference sponsors and all those of you who chose to come and spend a few days with us in Houston.

By the time you receive this issue of the Newsletter, the 1st IAEE Asian conference will have taken place in Taipei. This is an exciting event: not only is this the inaugural regional conference in the Asia-Pacific region, but it also marks the first time in IAEE history that the Association has sponsored four conferences in any given year: the international conference and three regional conferences. We could not offer this slate of high-quality conferences to our members without the dedicated effort of numerous volunteer participants in local organizing committees. Thank you, all of you – your hard work makes it possible for our conferences to be successful.

During the course of the year, IAEE Council members have discussed and approved a number of initiatives aimed at broadening and enhancing the quality of the services offered to members. Key examples include a revamped design and a search engine for the Newsletter; expanded, web-based conference proceedings; and increased financial support for student participation at conferences, among others. At its Houston meeting, Council approved funding for a re-design of the IAEE website, with a view of making it more user-friendly and easier to update and expand. Thanks to Jean-Philippe Cueille, Immediate Past President, and especially to Georg Erdmann, Vice President for Publications, for developing the proposal and seeing it through Council. Our "new look" website should be available to members within the next few months. If you have any suggestions of initiatives that Council could undertake on behalf of all members, please feel free to bring these to the attention of Council members or let IAEE headquarters know. We value your input – please help us serve you better.

In mid-October, it was announced that the Nobel Peace Prize for 2007 had been jointly awarded to the Intergovernmental Panel on Climate Change (IPCC) and former U.S. Vice President Al Gore. The award to IPCC is particularly meaningful to

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Editor: David L. Williams / Contributing Editors: Paul McArdle, Tony Scanlan and Marshall Thomas

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

the IAEE since the Chairman of the Panel is Dr. R.K. Pachauri, who was President of the Association in 1988. He is a leading international authority in energy and environmental policy analysis, and since 1981 has been in leadership positions with TERI (The Energy and Resources Institute, based in New Delhi), where he is now Director-General. From all your friends in the IAEE, congratulations Dr. Pachauri for a job well done!

Andre Plourde

Editor's Note

The theme of this issue is climate change/policy.

Victor Niemeyer writes that climate policy could hit electric power markets like a tidal wave, leading to dramatic increases in prices for consumers, but impacts on cash flows for CO2 intensive fossil generation may be surprisingly modest in the near term. Fossil asset values are more at risk to lower natural gas prices in the near term, and with a climate policy, to massive additions of non-emitting generation in the long-term.

Tom-Reiel Heggedal and Snorre Kverndokk survey the costs of greenhouse gas mitigation in Europe, focusing on cost savings of permit trade, the effects of U.S. rejection of the Kyoto Protocol, and how costs vary with different trade schemes.

Vlasis Oikonomou and Wytze van der Gaast discuss the issue of linking existing climate and energy policy instruments for the post Kyoto era, when the latter have similar targets. As an example we use Joint Implementation and White Certificates as a hybrid scheme.

Michael Schuetz, Michael Kilpper and Michael Fraas report that this year's Spring European Council adopted a comprehensive Energy Action Plan setting out the EU's priorities until 2009. They analysze the main issues and identify some unresolved questions to be dealt with in the areas of energy efficiency and renewable energies, internal market for electricity and gas, and international energy policy.

Ignacio Pérez-Arriaga, Pedro Linares, Carlos Batlle and Julián Barquín summarize briefly the major findings of the Madrid-2007 Forum on Global Climate Strategies beyond 2012, whose purpose was to exchange views among the major stakeholders on the future climate regime and to advance towards a suitable consensus.

Carole Nakhle notes the debate between those who put carbon reduction above everything else and those whose priority is plentiful, cheap energy has taken on a dangerous polarity. Yet the conflict is unnecessary and avoidable. Near term energy security and long-term climate security lie along the same path. Careful policy handling can ensure that the two work together rather than in opposition.

Ricardo Raineri reports on the challenges faced by the Chilean energy sector, which in a brief period found itself trapped in fossil-fuel dependency on neighbour countries in a politically unstable region. He further notes that currently the country's electric system is highly exposed to a double contingency: the ghost of a dry weather season and a lack of imported natural gas.

Atanas Georgiev and Natalia Aleksandrova discuss the Bulgarian energy situation including its strategic position between the East and the West, the redirection of its energy policies to conform to the EU and its dependence on nuclear power. They note that efficiency measures, stimulating renewable energy sources and nuclear energy are the basis for moving the country forward.

DLW

IAEE Mission Statement

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

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

We accomplish this through:
- Providing leading edge publications and electronic media
- Organizing international and regional conferences
- Building networks of energy concerned professionals

31st IAEE
INTERNATIONAL CONFERENCE
June 18-20, 2008, Istanbul

Bridging Energy Supply and Demand:
Logistics, Competition and Environment

CALL FOR PAPERS

Dear Energy Colleague;

We are pleased to announce the 31st IAEE Annual International Conference entitled ***Bridging Energy Supply and Demand: Logistics, Competition and Environment*** and invite you to the wonderful historical city of Istanbul. The conference is scheduled for 18-20 June 2008 at the Sheraton Istanbul Maslak Hotel, Turkey.

Turkey's geopolitical location provides a natural energy corridor bridging East and West, while at the same time linking Northern and Eastern Europe with the Mediterranean. It will serve as an appropriate backdrop for the conference's exploration of the most sensitive, controversial and strategic issues facing the global energy sector in the opening quarter of the 21st century. Among them: oil and gas economics, geopolitical dimensions of maintaining reliable supplies, and alternative supply sources and transportation routes.

We invite you to visit our Conference Website at **http://www.iaee08ist.org/** where you'll find all the latest information on the conference along with accommodation and travel details.

Please visit our Call for Papers announcement located at **http://www.iaee08ist.org/CallForPapers.htm**. There will be at least 2 major plenary sessions, 6 dual plenary sessions, and at least 49 concurrent sessions. We encourage you to submit your abstract early for presentation consideration. Papers are invited on a wide variety of topics listed at the conference web site. Authors who are interested in organizing special sessions are also encouraged to propose their topics, objectives, and possible speakers to the Program Chair by Nov.15, 2007. Abstract submissions on any other topics of likely interest to IAEE members are welcome. Extended abstracts of all papers, up to two pages in length, must be submitted electronically in Ms Word format via the conference web site **http://www.iaee08ist.org/**. The abstract submission form and a sample abstract are available under the Abstract Submission menu.

The Kyoto Protocol's first commitment period starts in 2008, and the conference will discuss emission certificate trading, pricing and post-Kyoto conditions. In order to highlight both this nice twist of fate, and Kyoto's flexibility mechanisms facilitating emission reductions, the organizing committee will initiate a study to reduce the environmental burden of the conference by establishing a fund to finance the reduction of an equal amount of emissions elsewhere. Our target is to organize a zero emission conference - for the first time in IAEE history. Accordingly, a voluntary emission offset fee will be charged during the conference registration process.

There will be a two-day pre-conference workshop on "Clean Cooking Fuels" to be held in conjunction with the 31st IAEE International Conference in Istanbul in June 2008. The key objective of the workshop is to increase understanding of barriers to the transition to cleaner, more efficient fuels and technologies for meeting the cooking needs of the poor and measures for enhancing access, affordability and supply.

We are looking forward to welcoming you for an unforgettable conference in Istanbul. Let's meet where continents and cultures converge.

Abstract Submission Deadline: **January 28, 2008**

To download the Call for Papers in pdf format, please visit **http://www.iaee08ist.org/CallForPapers.htm**.

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Alfa Fellowship Program

Alfa-Bank and CDS International are pleased to announce a call for applications for the Alfa Fellowship Program's 2008-09 Fellows. Now entering its sixth round, the Alfa Fellowship Program is a professional-level exchange designed to foster a new generation of American leaders and decision-makers with meaningful professional experience in Russia.

The Alfa Fellowship begins with language training in the U.S. followed by an intensive language course in Moscow. In October, Alfa Fellows will attend a two-week seminar program with key Russian government, public, and private sector officials to discuss current issues facing Russia. Fellows then undertake individualized professional assignments at leading Russian organizations including private companies, media outlets, think tanks, NGOs, and government institutions.

Eligible candidates must have a graduate degree and professional experience in business, economics, journalism, law, government, or public policy. Russian language proficiency is preferred. The Fellowship includes monthly stipends, related travel costs, housing, and insurance.

Promoting Understanding of Russia

Applications must be received by CDS International no later than December 15, 2007.

Program information and application forms can be downloaded from the CDS website at: www.cdsintl.org/fromusa/alfa.htm

For more information contact:

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Announcement

1st Joint IAEE/MEEA Session at ASSA Meeting

New Orleans, Louisiana, USA - January 4, 2008

Hilton Riverside Hotel, Meeting Room TBA – 2:30pm

Oil and Energy Issues

Presider: Serdar Sayan, TOBB University of Economics and Technology

Mohamed Abdelaziz, Georgios Chortareas and Andrea Cipollini, University of Essex - *Stock Prices, Exchange Rates, and Oil: Evidence from Oil Exporting Countries in the Middle East*

Shawkat Hammoudeh, Drexel University - *Do Oil-Rich GCC Countries Finance US Current Account Deficit?*

Joyce M. Dargay, University of Leeds, Dermot Gately, New York University, and Hillard G. Huntington, Stanford University - *Determinants of World Oil Demand, 1971-2006*

Peter Hartley and Ken Medlock, Department of Economics and James A. Baker III Institute for Public Policy, Rice University - *Empirical Evidence on the Operational Efficiency of National Oil Companies*

Nathan Balke, Southern Methodist University, Stephen Brown, Federal Reserve Bank of Dallas and Mine K. Yücel, Federal Reserve Bank of Dallas - *Globalization and Oil Prices: Demand versus Supply Shocks*

Discussants: **Riza Demirer**, Southern Illinois University-Edwardsville
Hadi Salehi Esfahani, University of Illinois at Urbana-Champaign
Gokhan Ozertan, Bogazici University
Ahmet Faruk Aysan, Bogazici University
Mehmet Serkan Tosun, University of Nevada, Reno

The meeting is part of the Allied Social Science Association meetings (ASSA).

For complete program information please visit http://www.vanderbilt.edu/AEA/Annual_Meeting/index.htm Also watch for the USAEE/IAEE Cocktail Party.

Climate Policy Risk to Generation Value in a Competitive Market

*By Victor Niemeyer**

Introduction

In the near term—through the year 2015 and, possibly, even beyond 2020—new efficient coal-fired generation investment is generally insulated from the effects of CO_2 policy, but less efficient coal-fired units, potential candidates for environmental retrofits to meet evolving restrictions on SO_2 and NO_X emissions, face greater exposure. These results are due to both the currently high level of natural gas prices and the lack of significant quantities of natural gas-fired generating capacity in the existing (and pending) mix that could be used to displace coal-based CO_2 emissions. The analysis also demonstrates the high sensitivity of generator net revenue to fluctuations in natural gas prices. Compared to likely near-term climate policy, a large and sustained reduction in natural gas prices poses a much greater risk to the cash flows of all base load generation assets, even gas-fired plants in some cases.

Analysis Approach

Either with emission trading or a tax, the result will be that CO_2 emissions will have a price, and putting a value on CO_2 can greatly increase the operating costs of fossil-fired generation. The increase will depend on the generation plant's fuel and its efficiency (i.e., heat rate). For a coal-fired power plant, a $1/ton value on CO_2 emissions will increase dispatch costs by approximately $1/MWh. For a gas-fired combined cycle generating unit, a $1/ton CO_2 value will increase dispatch costs by $0.40/MWh, while a less efficient gas-fired combustion turbine or gas boiler will see its dispatch costs rise by $0.60/MWh. These are typical values for power plants with no controls on CO_2 emissions. Higher efficiency units with lower heat rates will have correspondingly lower emission rates and vice versa. Hydro, nuclear, and wind generation have no incremental CO_2 emissions per MWh of generation.

Although placing a value on CO_2 raises the dispatch cost of gas-fired and coal-fired generation significantly, that is not the whole story. These higher dispatch costs will lead to higher bids into the power market and result in higher prices for wholesale power. From a cash flow perspective, what matters to generators is the increase in market prices vis-à-vis the increase in dispatch costs for these units. The net revenues to any individual generating unit will depend on the net balance of the cost impacts for its own operation against the revenue impacts from the higher market prices.

A schematic of the process for setting market prices and net revenues is presented in Figure 1. The figure shows three types of generation under two different CO_2 values. On the left side of the figure CO_2 has a value of zero, which means the highest cost generation needed to meet load is natural gas at a market price of $50/MWh. The dispatch cost for nuclear in this example is $5/MWh and its net revenues are the difference, $45, given the price set by gas. The dispatch costs of coal in this example are $25/MWh, and the net revenues are the difference ($25). On the right-half of the figure, a value of $20 on CO_2 raises the cost of both coal generation and natural gas generation, but the impact on coal generation's dispatch cost is greater. The market price set by gas rises from $50 to $60, allowing the net revenues for nuclear to increase by $10, since the value of CO_2 does not affect nuclear costs. The dispatch costs for coal, on the other hand, increase by $20, reflecting the increased value of CO_2. If market prices didn't change, its net revenues would be $20 lower because of the greater emissions cost; however, because market prices go up by $10, the overall effect of the $20/ton CO_2 price on its net revenues is a decline from $25 to $15. Since natural gas operates at the margin in both cases, the net revenues for the natural gas generation remain at zero.

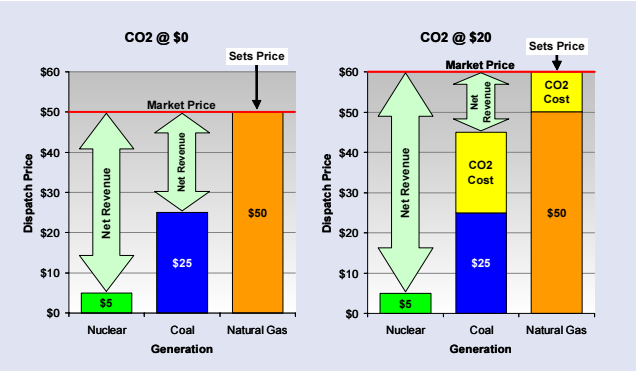

Figure 1: How a Value on CO_2 Affects Power Market Price and Net Revenues

While the simple example in Figure 1 illustrates the process, any power market will have a large number of generating units of varying efficiencies and

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See footnotes at end of text.

fuel types. The units will also have operating cost differences associated with design and age-related maintenance requirements and delivery costs for fuel. These differences are captured in the regional supply stack, shown in Figure 2, which presents the full distribution of generation costs in a market.

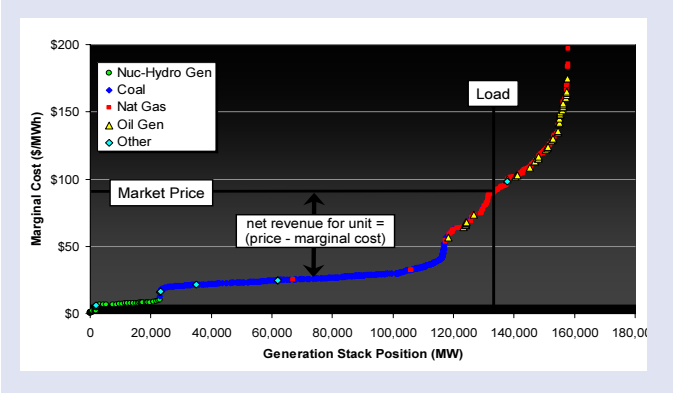

Figure 2: The Intersection of Load and the Supply Stack Sets Market Price

The generation supply stack provides a good representation of the competitive environment for generating units in a region. Specifically, it shows the units ranked in order of increasing dispatch costs by cumulative MW capacity. Marginal dispatch cost includes incremental costs for fuel, variable O&M, and environmental emission charges per MWh. Nuclear and renewables, such as hydro and wind, have the lowest marginal costs and are lowest on the stack, at the far left. Coal units, which have higher operating costs, come next and represent the largest single part of the stack in this example. Natural gas and oil generation have much higher costs and represent the rising portion of the stack on the right.

The market price at each hour in the year is determined by the point where system load (the MW of electricity demand for that hour) intersects the supply stack. Units to the left of that intersection will operate while the generating unit at the point of intersection is said to be on the margin and its dispatch cost determines the market price for all the generating units that are operating that hour. The units to the right do not operate. As the load varies over 8,760 hours of the year, the point of intersection with the supply stack changes, as does the market price.

All the units that are operating will receive the market price set by the marginal unit. Their dispatch costs will be less than the market price, and the difference will be their net revenue (i.e., price minus marginal cost).

For units that are low in a stack, which have the lowest dispatch costs, net revenues can be substantial. Over the year they will dispatch a large number hours, in many cases all of the hours of the year they are available; and when they operate, the margin between their costs and market prices will be the highest of any of the units in the stack. For units that are higher up in the stack, however, the net revenues over the year will be substantially less. There will be many hours when these units do not operate at all, and when they do operate, the market prices will not substantially exceed their own costs, leading to small net revenues over the year.

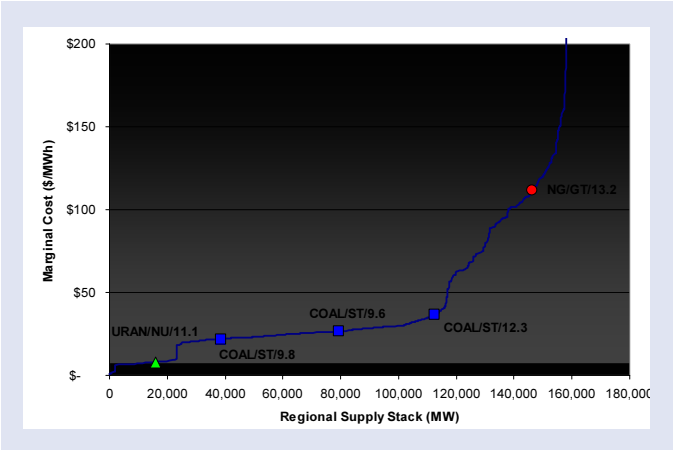

Figure 3: Five Prototypical Generating Units Used to Track CO_2 Policy Impacts

To understand how CO_2 policy would affect generating assets, we examine the effects across two regional markets – "Coal Land" and "Gas Land." These two power markets have contrasting generation mixes. Coal Land is represented by the NERC regions of ECAR-MAIN, while Gas Land is ERCOT.

In 2005, Coal Land had 22% of U.S. generating capacity but produced over 30% of electric power sector CO_2 emissions. Coal-fired generating units were on the margin about two-thirds of the time, while natural gas generation was on the margin the remaining third. The average price of wholesale power was approximately $53/MWh ($60 on peak, and $33 off peak). The generation stack for Coal Land was presented in Figure 2 above.

The analysis simulated the effect of CO_2 prices and natural gas prices on the existing generation fleets for these regions as of 2005. The operations in the simulations were calibrated to the market prices observed in that same year.

The Impact of CO_2 Price on Net Revenue

The effect of climate policy in Coal Land is modeled over a wide range of CO_2 prices. Five prototypical generating units, representing a range of positions in the generating stack, help us show the effects of climate policy. These units correspond to 10, 25, 50, 75, and 90 percentile points on the generation stack,

as shown in Figure 3. The unit at the low cost end of the stack is designated as Uran/NU/11.1 (fuel is uranium, prime mover is nuclear, and heat rate is 11.1 MMBtu/MWh), followed by three coal plants—Coal/ST/9.8 (coal steam plant with a 9.8 MMBtu/MWh heat rate), Coal/ST/9.6, and Coal/ST/12.3—and, lastly, NG/GT/13.2 (natural gas fired gas turbine with a 13.2 MMBtu/MWh heat rate).[1]

Figure 4 shows the effect on net revenues of placing a value on CO_2 emissions of zero to $50/ton for these five prototypical generating units. It shows the dramatic increase in net revenues for the non-emitting nuclear generating unit, which double at a CO_2 value of $50/ton. The revenues to the two efficient coal units (Coal/ST/9.8 and Coal/ST/9.6) decline only marginally, even at a value of CO_2 of $50/ton that increases their dispatch costs by almost $50/MWh. High CO_2 values do not reduce their annual dispatch hours and most of their higher costs are recovered in higher power market prices.

In contrast, the low-efficiency, high heat rate coal unit sees its net revenue drop by two-thirds. Its dispatch cost is rising more than 20% faster per dollar of CO_2 value than the costs of the efficient units so it runs fewer hours and earns lower net revenues for the hours it runs. The potential returns to retrofit investments for units with high heat rates are highly sensitive to a value on CO_2.

The remarkable stability of net revenues for the coal plants is due to the rapid increase in power prices. For every dollar rise in CO_2 value, average power prices rise by about $0.85/MWh. Peak prices—mostly fueled with gas on the margin—do not rise quite as much as off-peak prices when coal is predominantly the marginal fuel source.

Given the volatility of natural gas markets, we explored the impact of different gas prices on net revenues for the five prototypical generating units. The results are presented in Figure 5 for a wide range of natural gas prices. The sloped lines show that the net revenues for the nuclear and coal units in Coal Land are highly sensitive to the price of natural gas. As gas is on the margin approximately a third of the hours, the price of gas will directly impact the price of power and net revenues for that fraction of time. The high volatility of gas prices thus creates a high level of uncertainty in net revenues.

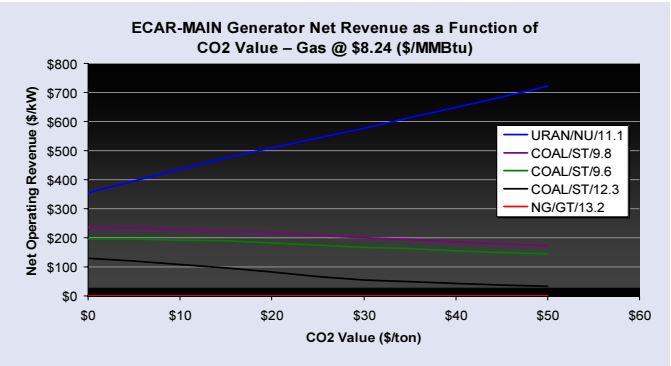

Figure 4: Impact of CO_2 Value on Generator Net Revenues for Coal Land

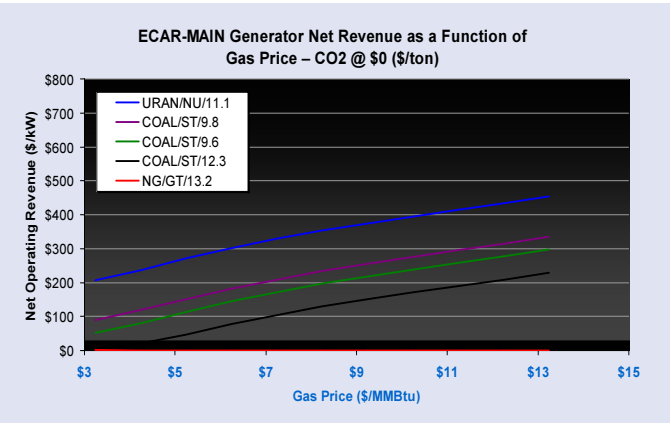

Figure 5: Sensitivity of Net Revenues to Natural Gas Price for Coal Land

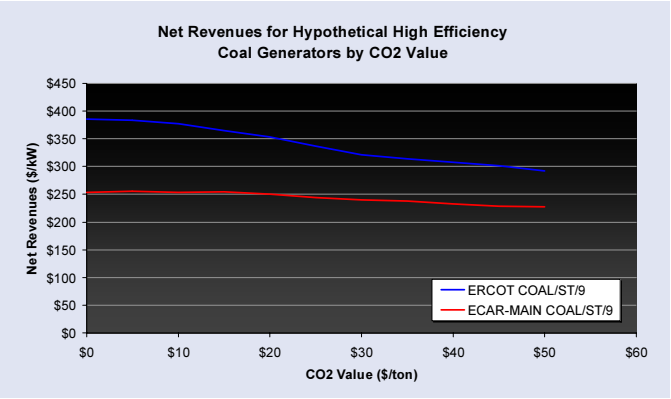

Figure 6: Comparison of Net Revenues for a Highly-Efficient Coal-Fired Plant in Coal Land and Gas Land

Sensitivity Analysis

To get a sense of the importance of regional differences we applied the same analysis to a different region, Gas Land (represented by the ERCOT NERC region), which has about half the generation of Coal Land, and emits a quarter of the CO_2. Gas-fired generating units were on the margin in Gas Land approximately two-thirds of the time in 2005, while coal-fired generating units were on the margin the remaining third. Given the higher cost of gas, the average price of wholesale power is more than a third higher than in Coal Land – $74/MWh ($82 on peak and $49 off peak) versus an average price of $53/MWh in Coal Land.

The analysis compared net revenue sensitivity to CO_2 value for identical hypothetical generating units that we placed in each region. The units have a heat rate of 9 MMBtu/MWh, and pay the average delivered cost of coal in their respective regions. The plots of net revenues versus CO_2 value are presented in Figure 6. They show a much higher cash flow to coal generation in Gas Land, but also greater sensitivity to CO_2 value.

The comparison in Figure 6 is based on the average price of natural gas observed in 2005, $8.24/MMBtu. The figure below shows the sensitivity of these net revenues to this assumption. Figure 7 repeats the above figure (on the left) and places it next to the same plot of net revenue based on a price of natural gas that is $4 lower. While the plot on the left at $8.24 gas shows high net revenues, the plot on the right with $4.24 gas shows net revenues well below financial viability thresholds for both regions.

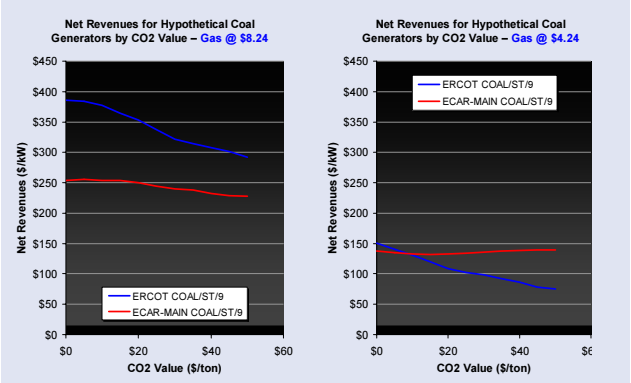

Figure 7: Comparative Sensitivity of Net Revenues to Natural Gas Prices and CO_2 Value by Region

For the Coal Land location, the effect on net revenues from CO_2 value is small, but the sensitivity to natural gas price is dramatic. For the Gas Land location, net revenues for the efficient coal plant drop markedly with increased CO_2 value, but the effect of lower natural gas prices is even greater. Clearly, the cash flows for these units are much more sensitive to the price of natural gas than to CO_2 value.

It is important to be clear that the plots and analyses presented above are from simulations of the regional generation existing in 2005. By the time any climate policy comes into effect the generation mixes will have had time to change. However, the trends in additions are increasing coal generation, with some gas, and modest additions of renewables (compared to the total capacity now existing). This means that generation mixes will be if anything more coal intensive by the time a policy became effective. As a consequence, coal generation will not face be competing with more non-emitting nuclear or hydro generation. Given the long lead times this will remain the case for many years. However, a price on CO_2 provides a very strong incentive to investors to add new generation that is non-emitting. As this new capacity comes online it will go to the top of the dispatch order and start to displace fossil generation. How soon Coal Land or Gas Land will see 20GW of new nuclear generation, or new coal with CO_2 capture and storage, is a matter of conjecture, but beyond 2020 seems reasonable at this point.

Conclusions

From a methodological perspective, this analysis shows the importance of considering the power market impacts of climate policy, rather than just the impact of rising CO_2 value on production costs. It is clear that higher production costs resulting from CO_2 value do not necessarily imply lower net revenues, due to the important role played by plant costs throughout the generation stack in determining wholesale power market prices.

The exposure of coal generation to climate policy is highly dependent on the regional generation mix and the level of natural gas prices. Regions with little gas generating capacity have few opportunities for gas to displace coal. In addition, high gas prices make it very expensive for gas generation to do so as well. Under these circumstances, a value on CO_2 emissions does little to affect the dispatch and CO_2 emissions, and the higher costs due to a CO_2 policy are passed on to the wholesale market. Only under the combined circumstances of available gas-fired generation capacity and low gas prices does a value on CO_2 significantly impact the net cash flows of efficient coal plants. However, low gas prices alone are sufficient to reduce the net revenues for new coal generation well below the net revenues needed to stimulate investment.

The impact of CO_2 value on wholesale electricity prices is quite dramatic. In Gas Land, the price of electricity rises $0.70 for each dollar of CO_2 value; while in Coal Land, the increase is $0.85 on the dollar. In time, these wholesale price increases will be transmitted to retail customers.

Footnote

[1] Note that the lowest cost coal unit, Coal/ST/9.8, does not have the lowest heat rate, but its low delivered fuel cost causes it to be dispatched before the more efficient Coal/ST/9.6 unit.

The Cost of Greenhouse Gas Mitigation in Europe – Kyoto and Beyond

By Tom-Reiel Heggedal and Snorre Kverndokk*

Introduction

The Intergovernmental Panel on Climate Change (IPCC) has currently finalized its Fourth Assessment Report (AR4). AR4 consists of three working groups and Working Group III assesses options for limiting greenhouse gas emissions (GHG) and otherwise mitigating climate change (IPCC, 2007).

Chapter 11 in the report from Working Group III presents issues of mitigation from a cross-sectoral perspective, among them the macroeconomic costs. As there is substantial literature on these issues, the review necessarily had to be relatively short. Therefore, this paper provides some more information on the costs of abating GHG emissions in Europe based on studies assessed in chapter 11. We focus on how these costs vary across countries, how they depend on U.S. rejection of the Kyoto Protocol and how they vary under different emissions trading schemes. Our review is based on macroeconomic studies (top-down approaches), and gives costs in the short and medium term, i.e., for the Kyoto period (2008-12) and beyond (up to 2030). Note that we do not focus on induced technological change, pre-tax levels or double dividend in this survey, but we refer to AR4 for such considerations.

While the Third Assessment Report (TAR) of the IPCC (IPCC, 2001) also gave cost estimates for Europe, there have been several developments in mitigation studies since then. Modeling of events such as the U.S. and Australian rejection of the Kyoto Protocol are included, and there has also been an evolution of models and modeling leading to more refined estimates of mitigation costs.

Abatement Costs

An important development since TAR has been additional detailed studies of abatement costs for individual countries in Europe within consistent models. Viguier et al. (2003) provides a comparison of four model estimates of the costs of meeting Kyoto targets without trading based on the 1998 burden sharing agreement. Two of the models, EPPA and GTEM, are CGE models, while the two others, POLES and PRIMES, are partial equilibrium models with considerable energy sector detail. In EPPA, the Scandinavian countries and Netherlands have the highest domestic permit prices, ranging from 385US$/tC to 217US$/tC. Italy and France have permit prices of about 140US$/tC, while the lowest prices are in Germany and the United Kingdom, 119US$/tC and 91US$/tC. The domestic carbon price and costs of abatement vary across the models. Viguier et al. (2003) explain differences among model results in terms of baseline forecasts and estimates of abatement costs. Germany, for example, has lower baseline emission forecasts in both POLES and PRIMES, but at the same time higher abatement costs. The net effect is that domestic carbon prices are estimated to be lowest in Germany in POLES and PRIMES while EPPA and GTEM find lower costs in the United Kingdom. Overall, the two general equilibrium models find similar EU-wide costs, in between the estimates of POLES and PRIMES.

Viguier et al. (2003) continue to discuss the differential consequences across European countries. They find that other measures of cost—welfare and GDP losses—generally follow the pattern of domestic carbon prices. The welfare effects of meeting Kyoto are lowest for Germany and highest for Netherlands. Terms of trade generally improve for European countries, except for the United Kingdom and Denmark, the former owing to its position as a net exporter of oil and the latter owing to its very low share of fuels and energy-intensive goods in its basket of imports. The results presented are for no trade, and, therefore, gives some indication on which country may sell or buy permits in a system of tradable permits.

While the former study did not focus on permit trading, tradable permits and costs of CO_2 abatement are studied in Böhringer and Löschel (2002). They use a large-scale static CGE model of the world economy to analyse the costs of Kyoto in different scenarios. Emission reductions in 2010, compared to a baseline scenario, is found to be 16.6 % for the EUR region (EU15+EFTA). For the CEA region (Eastern Europe without former Soviet Union) it is -4.21%. With no emission trading, the welfare change for EUR is -0.18% relative to the baseline. The CEA experiences a significant increase in welfare, of 0.29%, due to improvements in terms of trade. Welfare improves when trade in emission rights are introduced between Annex B countries; for EUR to -0.11%, for CEA to 0.87%. However, welfare in both regions goes down if the U.S. does not participate and there is no trade in emission

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rights. Higher fossil fuel demand in the U.S. due to non-participation has important implications for spillovers from international energy markets, leading to a worsening of the terms of trade for energy importing countries. In this case - without trade in emissions - the welfare change relative to the baseline is -0.22% for EUR and 0.16% for CEA.

The impact on compliance costs from the U.S. rejection of the Kyoto Protocol is analysed further by Manne and Richels (2004). They use the MERGE model, which is an intertemporal general equilibrium model of the world economy with endogenous technology diffusion. 2010 is the first commitment period, and it is assumed that Annex B countries reduce emissions by an additional 10% per decade starting in 2020. For the U.S., the constraint in 2020 is assumed to be the same as if it had adopted the Protocol. Emission permits are tradable. For Western Europe the percentage GDP loss of the Kyoto Protocol in 2010 is about 0.4%. Mitigation costs during the first commitment period appear to be slightly lower than they would be with U.S. ratification, due to lower permit prices, but not as low as they would be in the absence of banking. Banking means that hot air is deferred for later use, which gives a higher permit price.

The importance of alternative emissions trading schemes on macroeconomic costs is analyzed in Capros and Mantzos (2000). Costs for the EU15 are studied using the PRIMES model. The Kyoto Protocol target of 8% emissions reduction for the EU15 is implemented in 2010. Each member state has an operational domestic trading scheme and achieves individually its specific target under the Burden Sharing Agreement. Three cases considering different sets of sectors engaged in EU-wide emissions trading are analyzed; energy suppliers, energy suppliers and energy intensive industries, and all sectors. The study also includes a case with full emissions trade between Annex B countries and an international permit price of €17.7/tCO_2.

In a reference case without EU-wide trading, the total compliance costs for the EU is about €9 billion yearly in 2010 (1999 prices), or 0.075% of GDP. In the EU-wide trading cases the price of emission permits is about €3/tCO_2 and the compliance costs falls the more sectors included in the trading scheme. The lowest cost of about €1.6 billion is found in the Annex B trading case. Costs and gains from trading for individual member states vary greatly over the scenarios according to the states' specific targets and marginal abatement costs. Belgium, Finland and the Netherlands have the highest marginal abatement costs, while France and Germany have the lowest.

Emissions trade in the EU is regulated by the European Emissions Trading Scheme (ETS). Using the DART model Klepper and Peterson (2004) finds that savings from introducing the ETS can only be achieved if the cap on emissions is distributed between the ETS sectors and the rest of the economy in such a way that the different abatement costs are taken into account. This implies a relatively small allocation of the total reductions to the ETS sectors. Also, even if the accession countries do not supply hot air in the ETS market, they contribute substantially to the cost savings by offering low-cost abatement options.

The authors study this further in Klepper and Peterson (2006), and examine the implications of the current National Allocation Plan (NAP) under different assumptions about CDM and JI. There are strong distortions having the ETS exist parallel to other policy measures in the non-ETS sectors. The NAPs drive a large wedge between the allowance price in the ETS and the implicit tax necessary for reaching the Kyoto targets in the non-ETS sectors. While the use of CDM and JI drives down the allowance price in the ETS by one third and reduces the wedge between implicit tax outside the ETS and the allowance price, the distortions created by NAP cannot be eliminated. This has implications for welfare costs. Also the supplementary condition that requires that the major part of the emission reductions be realized domestically, has large implications for the efficiency of the EU climate strategy. Whereas the current policies will give a welfare loss of close to 1% in 2012 relative to "business as usual", an unrestricted trading in project credits and allowances would result in an allocation where the Kyoto target can be met with hardly any welfare costs.

Reduction in emissions beyond the Kyoto Protocol is analyzed in Bollen et al. (2004). They assess possible macroeconomic consequences of a 30% reduction in GHG emissions for industrialized nations in 2020, compared to 1990 levels, using an applied general equilibrium model called WorldScan. It is assumed that in 2010 all countries form a global policy coalition. The emission quota allocation is initially based on 2010 levels, but converges to equal emission levels per capita in 2025. This gives a joint emissions-reduction target for the industrialized nations of 30% in 2020. Compared to no climate agreements this gives emission reductions for the industrialized nations of just over 50% from 2020 levels. A global unrestricted emission trading system is used to achieve the targets. In the post-Kyoto scenario the reduction in national income for EU25 is 0.6% compared to the baseline in 2020. The majority of this loss is due to imports of emission permits with a price of €17/tCO_2. The costs of implementing the

Kyoto Protocol in 2010 are found to be a 0.3% reduction in national income for the EU25. The reason that the costs in the two scenarios do not differ more is that in the Kyoto Protocol scenario Russia uses its market power as a major supplier of emission rights, while in the post-Kyoto scenario emissions trading is assumed to be competitive. The costs of the post-Kyoto scenario depend heavily on the size of the coalition. In two alternative scenarios, one without the participation of Africa and Asia, and one with only Annex I countries, the national income reductions are 1.8% and 3.1%, respectively.

Marginal Abatement Costs and Permit Prices

There have been several studies calibrating a permit price in a European market for tradable permits. This price will be the same as the equalised marginal abatement cost for the trading countries if there are no restrictions on trade. An early study is IPTS (2000), which calculates the clearing price in the EU market in 2010 to be 49 €/tCO_2 using the POLES model. Trading reduces the EU abatement costs by 25%, or 0.05% of the Union's 2010 GDP, however, the authors note that this is an underestimation of the gains because the non-trading case already assumes that the countries/regions (six in the model) already have reduction in greenhouse gas emissions in an optimal manner. All countries/regions gain from trading, and the main sellers of quotas are Germany and the UK, while the region "Rest of EU North" (Austria, Belgium, Denmark, Finland, Ireland. Luxemburg, Netherlands, and Sweden) is the major buyer.

A more recent study using the POLES model is Criqui and Kitous (2003) who analyse the effect of the ETS on costs of meeting the Kyoto Protocol for Europe, given that the U.S. stays out of the Protocol. Given the Kyoto targets and no emission trading within Europe, marginal abatement costs (MAC) vary substantially between countries, from $4 to $253, with the highest MAC in Sweden, Denmark and Austria, and with the lowest MAC in Germany, UK, Belgium, Luxemburg and Finland. With trading, the MAC's equalize and there is an allowance price of 26 €/tCO_2, and the total compliance costs are reduced by almost 60%. Including JI and CDM credits in the European trading scheme reduces the allowance price. The lower the level of competition for JI and CDM credits from other countries, the greater is the volume of credits purchased by the trading European countries and the lower is the price of the corresponding allowances. Without any competition from non trading European countries and the other Annex B countries on the JI and CDM credits market, the allowance price collapses from 26 €/tCO_2 to less than 5 €/tCO_2, and the annual compliance costs are reduced by another 60%. If other participating Annex B countries carry out JI and CDM projects, the allowance price increases to 10.5 €/tCO_2, and the compliance costs doubles.

Holtsmark and Mæstad (2002) study permit prices for GHG emissions under three alternative trading regimes with a static partial equilibrium model, given a U.S. ratification of the Kyoto Protocol. Particular attention is devoted to the EU proposal on how much hot air a country can sell and on how much of the abatement a country must conduct domestically. In 2010 the Annex B countries meet the Kyoto Protocol, implementing national tradable permit systems. With free trade, marginal abatement costs across regions are equal to the international permit price of 16US$/tC. With limits to trade, the price rises to 26US$/tC. For most countries this is the marginal abatement cost, as they are not restricted by the trading limits. Countries that are restricted on the export (import) side will have lower (higher) marginal abatement costs. Most Eastern European countries, as well as Greece and Spain, have zero marginal abatement costs. When there are no emissions trading, marginal abatement costs differ substantially among countries. Countries with zero abatement cost in the limits to trade case also have zero costs with no trade. Net importers, such as USA, Canada, Japan and most countries in Western Europe, experience marginal abatement costs above 26US$/tC, while countries like Germany and France face costs around 18-19US$/tC.

The effects on the permit market after the U.S. withdrawal from the Kyoto Protocol are followed up by Holtsmark (2003), who also studies the role of Russia. Russia is a strategic player as a dominant seller of permits. It is also a major supplier of oil and gas, and a high permit price will reduce the demand for fossil fuels. Thus Russia faces a dilemma with the respect to its two roles. The analysis applies a static partial equilibrium model that emphasizes the links between the fossil fuel market and a market for emission permits under the Kyoto Protocol. With a fully competitive permit market, excess supply over demand drives prices down to zero. Permit prices rise to 9.6€/tC when Former Soviet Union (FSU) acts as a cartel in the permit market. By including CDM the supply of permits increases and gives a price fall from 9.6 to 3.4€/tC. When the FSU maximizes its total profits by taking into consideration the effect permit price has on oil and gas prices, permit price drops from 3.4 to 2.3€/tC.

Conclusions

Even if the actual cost numbers from the policy analysis differ among the studies, due to different models and different assumptions, there are still some qualitative lessons to be learned. The costs of committing to the Kyoto Protocol may not be very high in Europe. A U.S. rejection of the Kyoto Protocol may increase the cost of commitment in Europe if there were no emissions trade or other flexible mechanisms, due to terms of trade effects. The costs will also vary across countries, with France, the United Kingdom, and Germany facing lower costs and Scandinavian countries and the Netherlands generally facing higher costs. However, with international emissions trading, the U.S. rejection may actually lower costs for Europe due to a lower permit price. However, the permit price and also the costs will depend on restrictions to trade and the possible exercise of market power in the emission permit market.

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Linking Policy Instruments for the Post 2012 Era: Joint Implementation and White Certificates as a Hybrid Scheme

*By Vlasis Oikonomou and Wytze van der Gaast**

Background

Recent trends in climate change and energy policies tend to support market-oriented schemes due to their high efficiency and market acceptance. Within the context of the Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC), several energy and climate policy instruments have evolved. Nowadays, policy preparations are ongoing for future climate and energy policy regimes. At the level of the UN a new climate policy regime is planned for the period after the Kyoto Protocol (i.e., after 2012) and recently, the European Council adopted ambitious climate and energy policies for the short to medium term. As part of the increasingly integrated treatment of climate and energy issues, new instruments are being proposed in several countries, which both address energy efficiency and renewable energy targets, and climate change issues. As these instruments are designed and implemented in an already policy crowded environment, complementary, competitive or self-exclusive interactions take place. With a view to policy design it is crucial that different policy regimes are compatible with each other. On the one hand limited compatibility of instrument could negatively affect the achievement of energy and climate policy targets, while, on the other hand, a well-designed mix of policy instruments could create synergy effects which could lower the costs of meeting targets and objectives. This could play a vital role in climate policy negotiations for a post-2012 regime.

Energy efficiency is one of the core policies in most countries' GHG abatement targets. One instrument for energy efficiency improvement that could play a role in the post-Kyoto era is that of White Certificates (WhC), which has been implemented in the UK, Italy, and France, while other countries are considering it (e.g., the Netherlands). Its basic idea is that specific energy saving targets set for energy suppliers or distributors must be fulfilled by implementing energy efficiency measures towards their clients within a specific time frame. Such fulfilment is acknowledged by means of (white) certificates. Energy suppliers or distributors that save more energy than their targets can sell their surpluses as energy efficiency equivalents in the form of WhC to suppliers/distributors that cannot fulfill their targets. In the EU context, WhC are also supported in the EU Directive on the promotion of efficiency in energy end-use and energy services (2006): "the Commission considers this to be a possible next step in a few years time and may then come forward with a proposal based on the experiences in some Member States currently developing and implementing such certification schemes". In this Directive, a non-binding 9% energy efficiency improvement spread over 9 years is suggested. Furthermore, the EU Action Plan for energy efficiency sets much higher targets at the level of 20% energy efficiency improvement by 2020, almost 390 Mtoe (million tonnes of oil equivalent) saved, given the existing potentials for such actions (2006).

A typical market-based instrument used for climate policy is the concept of Joint Implementation (JI), which has been at the centre of climate policy making since its inclusion in the UNFCCC in 1992. The basic idea of JI is that industrialized countries can achieve their greenhouse gas (GHG) emission reduction commitments partly via emission reduction projects on the territory of other countries where marginal abatement costs are relatively low. Originally, JI was meant to be included in the Kyoto Protocol to enable project-based co-operation on GHG emission reduction among industrialised countries. As a result of Kyoto Protocol negotiations, this type of co-operation was extended towards projects between industrialised and developing countries. The latter is arranged under the Clean Development Mechanism (CDM). What the precise role of JI and the CDM will look like in a future climate policy regime is still unclear, but based on the several scientific and policy proposals for a post-2012 climate regime it is likely that this type of market-based instrument will continue to play a role in climate policy making.

Little attention has been paid to how JI's potential could be enhanced if it were combined with other policy mechanisms which envisage trading a product (credit, certificate) that is directly or indirectly comparable to the reduction of a ton CO_2-equivalent (such as energy efficiency). In case of WhC and JI, both mechanisms are basically comparable because they share the same policy targets (energy efficiency improvements and GHG emission reduction). They may even imply that JI credits might be convertible into WhC. Although it should be noted that there is no blueprint

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See footnotes at end of text.

in policymaking in linking different policy instruments, still some general guidelines and methods can be employed for this.

This article explores possibilities to integrate WhC and JI into one policy instrument. The example is particularly interesting, next to the fact that they represent energy and climate policy instruments, respectively, because WhC is part of mandatory scheme whereas JI is an example of a voluntary policy. Such a hybrid scheme could be an interesting candidate for mitigating a fragment of emissions originating from end-use sectors (e.g., transport, buildings) and achieving energy efficiency improvement. An in-depth analysis of this hybrid scheme can be found in Oikonomou and van der Gaast (2007)[1], where it has been illustrated for possible WhC/JI activities in the built environment.

Interactions of White Certificates with Joint Implementation

Interactions between WhC and JI can be classified according to: their scope (level of governance and policy context), interacting function (trading, time sequencing), and degree of integration (fungibility or stand-alone measures). In Table 1 we present different interactions between WhC and JI, as well as a proposed integrated scheme based on: regional impact (national or international), the objectives addressed (same or different policy context), timing of start and end of each policy (sequencing), and conversion of their trading commodities (separation, one way and double fungibility).

Types of interaction	WhC	JI	WhC/JI
National (horizontal)	√		√
International (vertical)		√	
Same policy context (internal)	√	√	√
Different policy context (external)			
Sequencing			
Trading	√	√	√
Separation (stand-alone measures)			
One way fungibility	√	√	√
Double fungibility			

Table 1: Interactions of White Certificates with Joint Implementation and a Hybrid Scheme

We can deduce from Table 1 that an integrated WhC/JI scheme for energy efficiency projects in the built environment can be complementary, provided that JI credits are fungible with WhC. Furthermore, since both instruments refer to the same policy context, they could have a common design in terms of target setting and could both be used as a trading mechanism. This would imply, for instance, that JI emission reduction units (expressed in tonnes CO_2) could be converted into WhC under a pre-specified conversion rate.

Hybrid Policy

Initially, JI was expected to have a big potential in Central and Eastern Europe due to their relatively inefficient energy supply and consumption systems and relatively low investment costs. In the meantime, however, most of these countries have become EU Member States and consequently have had to upgrade their energy and environmental standards to EU levels. In addition, the largest CO_2 emitters in these countries have now become part of the EU emissions trading scheme (ETS). Consequently, the main remaining JI potential in Central and Eastern Europe nowadays seems to be in those sectors that are not covered by the ETS and where energy performance improvements are feasible beyond the EU standards (Acquis Communautaire) (Van der Gaast 2005)[2].

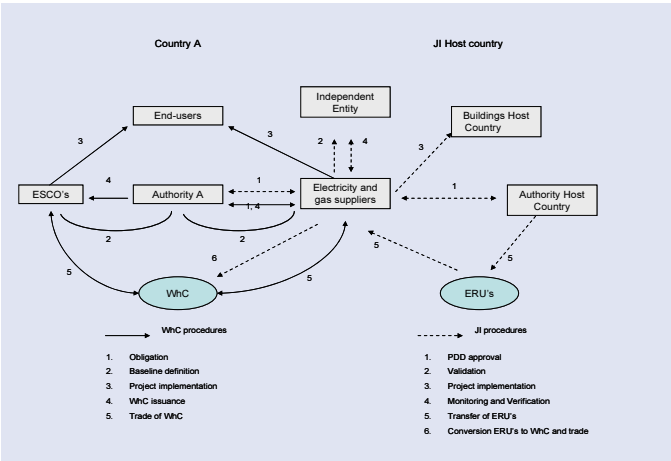

Figure 1: Market Functioning Under a Hybrid Scheme

Departing from the current situation of WhC and JI mechanisms, we demonstrate in Fig. 1 a hybrid scheme of WhC and JI: the WhC scheme is implemented domestically in Country A and JI projects (Track-I)[3] for energy efficiency improvement take place in other countries. Basic players are electricity and gas suppliers, ESCO's (including other market participants that can implement energy efficiency projects), end users in country A, and end users in the JI host country (building owners, tenants, or users). Institutional players are authorities in both countries and an independent entity for JI, while two trading platforms exist, one for ERU's and one for WhC.

Initially, authorities from country A assign energy efficiency targets to electricity and gas suppliers, who, for their compliance, face three options: implement energy saving projects focused on domestic end-users, purchase WhC, and implement energy saving projects in a JI host country. The eventual choice depends on marginal costs and timing of delivery of each option, since costs per specific technol-

ogy differ from country to country and WhC and JI credits may not be delivered at the same time (i.e., ERU's could either be contracted through a forward contract with future delivery after realisation of the emission reduction, or transferred on a spot-market basis when realized).

If suppliers opt for fulfilling their obligations through domestic actions (with country A end users), they present their envisaged energy savings from projects to country A's authorities and, if approved, they can implement the projects. Subsequently, they receive WhC, which they can use for their compliance or sell to other parties. ESCO's and other market participants can also implement energy saving projects, following the same procedure as suppliers, but with a main difference that they do not have commitments and would only participate on a voluntary basis; they would be able to sell their realized energy efficiency gains in the WhC market.

When electricity and gas suppliers opt for a JI energy saving project in e.g., built environment, they must follow the project preparation and implementation procedures of the Kyoto Protocol. When the project is approved, electricity and gas suppliers in collaboration with domestic or host country ESCO's and other market parties can proceed with project implementation. After an agreed period, an accredited independent entity verifies the actual GHG emission reductions (or energy use improvement of the building) on the basis of which the host country's authorities can issue emission reduction units (ERU's) to the partners. These units compensate for the energy efficiency improvement not taking place in country A as the project is carried out in host country. Electricity and gas suppliers can hence import ERU's and convert them to WhC under a conversion rate (which would have to be a good reflection of the difference between investing in energy efficiency improvement domestically -in terms of WhC - or in a foreign country where the investment costs are lower -through JI).

Assessment

Based on an ex-ante theoretical assessment, a hybrid WhC/JI scheme could be an effective contribution to climate and energy policy making. First, it offers geographical investment flexibility so that energy suppliers can choose an investment in another country where marginal investment costs are relatively low. Second, in the host countries, innovation will be stimulated and energy security of supply enhanced with the transfer of new energy technologies through JI projects. Nonetheless, effects on innovation are rather difficult to estimate since (local and foreign) market demand, competitiveness between technologies, existing energy saving potential, and transaction costs will determine the overall situation. Third, the underlying legally-binding target in the investor country implies a stronger guarantee that energy efficiency targets be met.

It should be noted though that the system would imply transaction costs, which could increase with a more complex design of the system. Oikonomou and van der Gaast (2007) provide suggestions for standardisation of procedures to reduce transaction costs and increase system transparency. Finally, such a hybrid scheme would be compatible with energy market liberalization trends and would increase the competitiveness of specific 'cleaner' technologies.

This paper has shown the fundamentals of a hybrid system, so that political considerations have been left out for now. Such illustrative examples can serve as food for thought for policymakers when facing the options of introducing new policy instruments in the post-Kyoto era. An overall outcome can be that interactions matter and sometimes, under several preconditions, an interesting option is to examine linking existing instruments that address similar targets.

Footnotes

[1] Oikonomou, V. and van der Gaast, W., 2007, Integrating Joint Implementation projects for energy efficiency on the built environment with White Certificates in the Netherlands, Journal of Mitigation and Adaptation Strategies for Global Change, Springer Netherlands, ISSN 1381-2386 (Print) 1573-1596 (Online).

[2] Van der Gaast, W. 2005, Baseline standardization in JI Track-I and Green Investment Schemes. In: JI Track-I workshop, Prague, Czech Republic.

[3] JI Track-I refers to the simplified accounting procedures included in the Marrakech Accords (2001) which Annex I Parties may apply if they meet minimum system requirements in terms of GHG inventories, National Communications, etc. The main simplification under Track-I is that Parties may bilaterally agree on JI projects and the GHG accounting procedures, without validation and verification involvement of accredited third party entities.

Issues and Questions: The European Council's Energy Action Plan

*By Michael Schuetz, Michael Kilpper and Michael Fraas**

On 8-9 March 2007, the European Council debated energy and climate policy as one of the key challenges in the years ahead. The Council set ambitious goals for reducing greenhouse gases with firm targets that underpin Europe's leadership in global climate protection. In order to help achieve a global agreement for the period after 2012, the European Council adopted a 2-step approach to setting future EU climate goals. By 2020, the EU will cut its greenhouse gas emissions by 30% as against 1990, provided that other developed countries make comparable emission reduction pledges. Otherwise, the EU will pursue a binding unilateral reduction target of at least 20% by 2020.

The European Council also agreed on a comprehensive European Energy Action Plan[1]. In the following we will focus on three of the five areas of this Action Plan: energy efficiency and renewable energies, internal market for electricity and gas and finally international energy policy. Two areas, energy technologies and security of supply, are omitted due to lack of space but also due to the fact that they are not part of the specific areas of expertise of the authors. The aim of this article is to identify the main issues, problems and questions to be solved in these three fields.

Energy Efficiency and Renewable Energies

Given the importance the Spring European Council put on climate change combined with the disaccord on the role of nuclear energy, it is logical that the EU pursues an ambitious energy efficiency and renewable energy policy.

The European Council made tangible progress in relation to energy efficiency and renewable energies. The member states agreed to meet the 20% target of prospective savings identified by the Commission as measured against the forecasts for 2020. Next to combating climate change, it is considered important to counteract price risks and over-dependency on supply sources by improving energy efficiency. It requires action in the five priority fields identified in the Council conclusions of 23 November 2006[2] and also supports the EU Commission in its plan to develop a proposal for an international agreement on energy efficiency.

European leaders also want to create incentives and reliable conditions for renewable energies in order to keep and extend Europe's technological lead in this area. The member states have consequently agreed to a binding target of a 20% share of renewable energies in the overall EU energy mix by 2020. Biofuels will be required to make up10 % of petrol and diesel consumption in the transport sector of the member states by 2020.

The strongest part seems to be energy efficiency. It is at the heart of a strategy that tries to combine energy security, environmental protection and economic competitiveness in a single approach. The problems that come along with a 20% target refer to the economics behind any energy efficiency policy as well as to the issue of viable policy instruments.

As rebound effects cannot be ignored, and not easily (if at all) be quantified, it is absolutely sensible to refrain – as the Council has done – from setting binding targets. Energy efficiency (or better: energy productivity) is the result of human actions, an aggregate of uncountable individual decisions. It is here, where the problems can be found: how do we get people to save energy and employ more efficient means?

The EU has decided to use targets as the primary instrument to increase energy efficiency. However, targets themselves do not increase energy efficiency. There is the risk that setting targets may lead to neglecting the necessary next step: implementing concrete measures to achieve the targets.

Whereas this point can be made for targets for renewable electricity production or biofuels, too, energy efficiency targets are also difficult for another reason: In order for targets to be viable, they need to be measurable. However, progress in energy efficiency is difficult to quantify. This leads to the partial transfers of political influence from legislators to statisticians. Furthermore, there is the risk that a considerable amount of administrative capacity is absorbed by developing and negotiating methodologies instead of being used for implementing relevant policy instruments. The slow-going implementation of the European Eco-Design-Directive may be an example in this respect.

The situation is different for renewables. As it refers solely to the inputs

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See footnotes at end of text.

of energy production, a binding target can be achieved. Criticism might address the need for directly subsidizing renewables once emission trading for fossil fuels changes the relative prices of these technologies to their benefit. However, the policy now adopted will lead to more pragmatic questions: how should the burdens be shared among EU member states? And how can such a system be made efficient? Much will depend on the flexibility of the approach in the short-run. In the long run, Europe might wish to think about harmonization of its support schemes for renewables in order to make full use of comparative advantages of natural differences.

Internal Market for Gas and Electricity

The Commission's sector inquiry on the gas and electricity markets[3] has identified deficiencies in implementing liberalised electricity and gas markets in the EU. Two issues will be most prominent in the future discussion on improving this situation: unbundling and the EU's influence on national regulators.

In its report of January 2007[4] the European Commission suggested Ownership Unbundling or - alternatively - system operation separated from ownership of the assets ("Independent System Operator", ISO). The European Commission clearly prefers the former.

There is mutual consent among Member States to make unbundling more effective. Hence the European Council's Energy Action Plan emphasizes the need of effective unbundling, based on "independently run and adequately regulated network operation systems which guarantee equal and open access to transport infrastructures and independence of decisions on investment in infrastructure"[5].

However the means for achieving more effective unbundling are controversially discussed. What are the shortfalls of the existing unbundling rules? What is ownership unbundling useful for? Is it a "panacea" to solve all problems with regard to gas and electricity networks?

Current EU rules require legal, functional and informational unbundling as well as unbundling of accounts. Although not required by European law, 11 Member States already have adopted ownership unbundling, as contended in a European Commission's statement[6]. There are Member States where the transmission networks are privately-owned (e.g., in Germany), and there are others where such networks are owned by public sector bodies such as the state, regions or local authorities (e.g., in the Netherlands or Sweden).

From the European Commission's viewpoint legal unbundling does not suppress the conflict of interest that stems from vertical integration. In particular, the European Commission stresses insufficiencies with regard to non-discriminatory access to information, third party access and investment incentives. According to the European Commission's report[7], economic evidence shows that Ownership Unbundling is the most effective means to ensure choice for energy users and to encourage investments in networks.

Ownership Unbundling is the most effective, clearest and "easiest" means to prevent discriminations in the network. However, it does not make regulation redundant. An "unbundled" grid operator has to be controlled, too, in particular with respect to grid fees. Ownership Unbundling does not necessarily and not automatically encourage investments. The "unbundled" grid operator pursues at first its own interests that are not always identical with grid users' interests.

The ownership structure regarding the networks differs in each Member State. Networks are owned in some Member States by public sector bodies (e.g., state agencies, regional or local authorities), in other Member States by private companies. In 7 of the 11 Member States where, according to the Commission's statement, ownership unbundling of the electricity transmission networks is already practised, the State is owner of the networks as well as of generation or supply companies. It is arguable if such a situation can be qualified as Ownership Unbundling stricto sensu, even though the respective entities are under control of different government authorities. And the question must be raised, why state ownership in networks shall be privileged compared to private ownership.

Not all "pros" and "cons" can be discussed here. Nevertheless Ownership Unbundling can be a solution. But it is not the only one. Other solutions such as the creation of an ISO or improving the existing requirements shall not be excluded.

Aside from strengthening national regulators' competences and independence, the European Commission suggested strengthening the co-ordination of regulators at the EU-level with regard to cross-border matters. To this end it proposed (i) to reinforce the current co-operation, (ii) to introduce a formalised network of European regulators (ERGEG plus) which shall be vested with the power to make binding decisions or (iii) to create a European regulatory authority.

In its European Energy Action Plan the European Council favoured the establishment of an inde-

pendent mechanism for national regulators to co-operate and take decisions on important cross-border issues.

However, when designing the institutional structure of an EU-wide co-operation mechanism it should be considered that such a mechanism has to be independent from industry, national governments as well as the European Commission. This mechanism should implement rules. It should not be vested with legislative powers. The rules to be applied by the mechanism shall be made by the appropriate legislative bodies. The mechanism shall apply law with regard to cross-border regulatory matters, but not competition law. The application of the latter should remain in the hands of the cartel authorities.

International Energy Policy

The March 2006 Commission Green Paper, "A European Strategy for Sustainable, Competitive and Secure Energy", followed by the so called "Solana-paper" published jointly by the High Representative of the Council and the European Commission[8] were the first approaches to describe and define roles and ambitions of the EU in this field in a comprehensive way. However, many initiatives already existed. What was new was the outright claim, that "the need for a coherent and coordinated external policy for energy in Europe is imperative"[9]. Out of a patchwork of initiatives a comprehensive although not coherent new EU policy is in the making.

The International Energy Policy section of the Energy Action Plan is based on the core document, "An Energy Policy for Europe", of the Commission's "energy package" published in January[10]. However, in contrast to the ambitious rhetoric on the importance of an EU external energy policy, the international section of the Energy Action Plan is rather frugal. Next to codifying the goal of developing a "common voice" it contains a list of the most important existing and projected initiatives and areas for action, thereby giving a good overview on the scope and character of the EU's external energy policy. The building blocks of this policy can be roughly classified into four groups:

Firstly, the EU has numerous bilateral relations with non-EU-countries, where energy issues play an increasing part. The most important and most conflict prone is the one with Russia. Other partnerships and dialogues take place with big consumer countries like the USA or emerging economies like China, India or Brazil. They normally take the form of yearly summits supplemented by working groups.

Secondly, the EU is involved in several regional initiatives in its "Hinterland". Among them are Euro-Med for the Mediterranean and the Baku-initiative for Central Asia and the Caspian and Black Sea region. The advantage of regional initiatives is, that next to increasing the dialogue of the EU with its neighbours, they could also help to facilitate cooperation between the countries of the respective region. The envisaged partnership with Africa is difficult to label. Whereas the above mentioned regional initiatives assemble neighbouring areas which share at least some common features, this new endeavour has its aim at a whole and diverse continent. The decisive question will be, if the African Union will be able to act as the EU's counterpart in the new partnership.

Thirdly, there is the relatively new European Neighbourhood Policy (ENP). Its objective is to develop a comprehensive and coherent approach for the EU towards its neighbouring countries and regions. Up to now, its main role is the provision of an umbrella for the provision of financial aid. However, a thematic dimension of the ENP is developing. It remains to be seen if it will merely be a sum of existing initiatives or if something genuinely new will develop.

Lastly, there is the Energy Community, initially designed for South East Europe, but now developing steadily into a model on how to expand the EU's approach of a common energy market. It is distinct from the other initiatives above, in the sense that its approach is the legally binding inclusion of certain countries (and Kosovo) into the EU's energy market (which includes the implementation of certain parts of the aquis communautaire) underpinned by a secretariat and decision making bodies modelled alongside the EU bodies including a rotating presidency[11]. Up to now this approach is not in question, since all countries involved are, at least potentially, candidate countries for EU membership, hence they have an interest in implementing EU rules. However, it is questionable if this rather rigid approach could be suitable for other neighbouring regions of the EU.

In contrast to other policy areas, this rather random structure stems from the fact that the EU's external energy policy is developing within an institutional framework distinct from other domains of EU energy policy.

The European Community has no explicit competence on energy; the necessary legal basis has to be drawn from the legal basis of other policy areas, which are interlinked with energy issues. The EU's policy on electricity and gas markets for example stems from the Communities' competence for creating the common market. The environment articles provide the basis for many other energy initiatives. To

conclude, most internal energy policies have a clear legal basis, which leads to clear procedures.

For external energy policy, as for the EU's foreign affairs in general, Member States retain their prerogative. Therefore, a comprehensive and coherent external energy policy would require prolonged unanimity by all 27 Member States, which is unrealistic. Therefore, the EU's external energy policy consists of piecemeal initiatives and fora, in areas where a legal basis exists or for which step by step an agreement among the Member States can be reached.

This incoherence is also reflected in the various actors involved. The rotating EU presidencies play an important role. Since Member States differ with respect to their experiences, priorities and interests, every presidency can give a new impetus. This helps to avoid that certain aspects are neglected and it facilitates new initiatives. However, it may lead to a patchwork approach to policy. The existing plethora of often overlapping activities and initiatives may stem from the system of rotating presidencies. Additionally, although presidencies see themselves as representatives of the Member States, this is often not reciprocated by every individual Member State. Existing rivalries or lack of trust can decrease the role of the respective presidency as a sole negotiator for the EU in external affairs.

The Council has appointed a High Representative to coordinate and act as spokesperson in foreign and security policy. However, his concern mainly is the "classic foreign and security policy" – world conflicts. He also lacks the necessary resources – staff and expertise – for a specialist policy like energy.

Finally, the Commission plays an ever-increasing role in the EU's external energy policy. This stems from the fact that the Commission is the only institution, which combines resources and consistency. The presidency may draft and negotiate a summit paper, but the Commission's services will be the ones who will do the follow up. However, the Commission services are not a monolithic block. Although the Commissioner for Energy and the Directorate General for Energy and Transport (DG TREN) are the most active Commission actors in the field of external energy policy, the Commissioner and DG for External Relations (DG RELEX) have identified energy as one of their priorities. Whereas TREN has its emphasis on sectoral (energy) fora and initiatives, RELEX has its focus on bilateral relations with non-EU-countries and on the European Neighbourhood Policy.

The envisaged constitutional treaty will only partially streamline this institutional framework. According to the conclusions of the June European Council[12], there will be a specific competence for energy policy. The merging of the office of the High Representative with the one of the Commissioner for external relations will decrease the number of actors, the new position of President of the European Council will improve continuity. What remains to be seen, is the share of roles between the Energy Commissioner and the future holders of these two new offices.

Although a more clearly defined legal basis and streamlined institutions will increase transparency and smoothness of the policy process, political factors will likely remain more important than legal considerations. Most notably, Member States will remain strong in foreign policy. Given the different interests but also different traditions of Member States (e.g., on the role of government in the energy sector and in infrastructure development) it will remain difficult to achieve a coherent external energy policy. However, the EU surely will further increase its activities in this field. Since external energy relations are more based on dialogue and funding in contrast to regulation, the lack of a clear transfer of competence from Member States to the EU will not be a hindrance for further initiatives. Therefore, the likely outcome will be a dual foreign policy: both the EU and the Member States are active, with periodic attempts for coordination. The resulting unavoidable incoherence can also be seen as strength, since, given a minimum of coordination to avoid gross contradictions, it would increase the ability of the EU and its Member States to react adequately to external challenges. The EU as well as the individual Member States can concentrate on what they are best equipped for and common objectives could be pursued via different channels.

Footnotes

[1] Brussels European Council 8/9 March 2007 – Presidency Conclusions, Annex I (Council document 7224/1/07).

[2] Council conclusions on the Commission's Action Plan on Energy Efficiency (Council document 15210/06).

[3] http://ec.europa.eu/comm/competition/sectors/energy/inquiry/index.html

[4] Communication from the Commission to the Council and the European Parliament: Prospects for the Internal Gas and Electricity Market. COM(2006) 841 final (cf. http://ec.europa.eu/energy/electricity/report_2006/index_en.htm).

[5] Cf. footnote 1.

[6] Communication from the Commission to the Council and the European Parliament: An Energy Policy for

Europe. COM(2007) 1 final (cf. http://ec.europa.eu/energy/energy_policy/documents_en.htm).

[7] Cf. footnote 4.

[8] An External Policy to Serve Europe's Energy Interest. Paper from Commission/SG/HR to the European Council. (cf. http://ec.europa.eu/external_relations/energy/index.htm).

[9] The website on External Energy Policy of the European Commission's DG External Relations starts with this claim (http://ec.europa.eu/external_relations/energy/index.htm).

[10] Cf. footnote 6.

[11] http://www.energy-community.org/

[12] European Council 21/22 June 2007 – Presidency Conclusions, Annex I (Council document 11177/1/07).

Announcement

10th Annual IAEE/USAEE Session at ASSA Meeting

New Orleans, Louisiana, USA - January 4, 2008

Hilton Riverside Hotel, Chequero Room – 10:15am

Hot Topics in Energy Modeling

Presiding: Carol Dahl, Colorado School of Mines

Reid W. Click and Robert J. Weiner, George Washington University – *Resource Nationalism Meets the Market: Modeling Political Risk and the Value of Petroleum Reserves*

Erin Baker, University of Massachusetts, Haewon Chon, University of Maryland, Leon Clarke, Joint Global Change Research Institute, and Jeffrey Keisler, University of Massachusetts – *Uncertainty, Climate Change, and Advanced Solar R&D*

Thomas K. Lee, Marymount University and John Zyren, U. S. Energy Information Administration – *The Source and Transmission of Volatility in Petroleum Markets*

Cynthia Lin - University of California, Davis -- *Do Firms Interact Strategically?: A Structural Model of the Multi-Stage Investment Timing Game in Offshore Petroleum Production*

Discussants: **Douglas Reynolds,** University of Alaska-Fairbanks
James L. Smith, Southern Methodist University
Frederick L. Joutz, George Washington University
Wumi Iledare, Louisiana State University

Abstracts will be posted soon at http://www.iaee.org/en/conferences/

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The meeting is part of the Allied Social Science Association meetings (ASSA).
For complete program information please visit http://www.vanderbilt.edu/AEA/Annual_Meeting/index.htm

Also, please watch for the IAEE/USAEE Cocktail Party.

The Major Elements for a Global Climate Strategy Beyond 2012

*By Ignacio Pérez-Arriaga, Pedro Linares, Carlos Batlle, and Julián Barquín**

Introduction

The current negotiations on a future climate regime still have a missing centerpiece: All nations have to jointly address climate change, in order to respond to this global challenge. And, therefore, we need to identify the best architecture for agreement among the different nations to do it. This is what is usually called the future global climate regime. The principal challenge for the future climate regime is to identify the nature and level of commitment that will provide sufficient incentives for all parties, especially the largest emitters, to join a global agreement and achieve sufficient reductions in GHG emissions so that we comply with art. 2 of the UN Framework Convention on Climate Change, that is, "To stabilize GHG concentrations at a level that would prevent dangerous anthropogenic interference with the climate system… allow ecosystems to adapt… food production is not threatened… enable economic development…".

Dialogue of the key international partners to explore global climate strategies is already being conducted in various international forums: formally under the UNFCCC, but also within the G8 and other multilateral and bilateral meetings. Identification, analysis and proposal of alternatives are also taking place, with support by industrial or financial institutions, in high-quality workshops run by universities and NGOs. The Madrid Forum has adopted as its starting point the valuable knowledge that has been already gathered by some of these previous meetings and related publications (see http://www.iit.upcomillas.es/gcs2012/ for some of these documents).

This paper presents the major items identified by one of these dialogues, the one held in the Forum for Global Climate Strategies Beyond 2012, which took place in Madrid in April 11-13th, 2007, organized by the Florence School of Regulation and Universidad Pontificia Comillas. The purpose of the Forum has been to facilitate an exchange of views among the major stakeholders on the general nature and scope of both long- and short-term international climate change actions, in order to contribute to the identification of a suitable consensus about the best possible global climate regime, to be agreed as soon as possible. Participants of the Forum included policy makers, academics, think tanks & NGOs, industrial companies and financial institutions.

A Framework for a Global Agreement

Top-down and Bottom-up Approaches

Although top-down are usually confronted with bottom-up approaches as alternative ways of achieving an agreement, the common view of the Forum is that they should be combined.

A top-down agreement is still required, and still attainable. It is required because countries need a common long-term aim, both for policy and market reasons. And it is still attainable because, in spite of the many difficulties which Kyoto has met when trying to distribute mitigation efforts among countries, there are still many grounds for an agreement on other issues: for example, energy efficiency promotion policies can more easily be accepted as a basic component of the future climate regime. Adaptation will draw developing countries to search for common schemes. And finally, the fact is that nobody wants to stay out of a global agreement: as was reminded in the introduction of the Forum, there have been instances in recent history, such as the Marshall Plan or the NATO, when agreements were signed based on name calling or public shaming, and in spite of the lack of a feasible economic consensus point.

However, as said before, this top-down approach should not preclude other bottom-up, fragmented markets or systems. A climate agreement should provide a common framework, but unity of action does not necessarily imply unanimity. The future agreement should be flexible enough to accomodate diverse national and regional circumstances. The post-2012 regime should/will be more differentiated than hitherto, and this points directly to decentralized systems. In fact, it is very possible that mitigation efforts should have to be dealt with by this type of agreements.

Bottom-up approaches present many advantages: they allow for variable geometries of participation, they better allow for the incorporation of domestic policies, and finally, they are much easier to negotiate.

However, these decentralized approaches require some degree of coordination in order to be fair and effective, since they imply more avenues for

* The authors are with the Instituto de Investigación Tecnológica, Escuela Técnica Superior de Ingeniería ICAI, Universidad Pontificia Comillas. They would like to thank the contribution of all attendees to the Forum, and also the support of many firms: the reference sponsors BP, Endesa, Iberia and FC2E; and the collaborating sponsors: ENEL, ENI, ICO, Mitsubishi Corporation and Unión Fenosa. They would also like to thank the Spanish Energy Commission, the Council of European Energy Regulators, the Spanish Ministry of Environment, IETA, and the Spanish Energy Club. The Forum was organized by the Florence School of Regulation and Universidad Pontificia Comillas. More information about the Forum can be obtained at: http://www.iit.upcomillas.es/gcs2012/.

participation. Although the issue of competitiveness may have been overplayed, there is still the need to ensure a minimum integrity and fairness of the contributions to such a fragmented regime. The key issues here are accountability and comparability of efforts: Comparability of methods and measurements, a common metric which may run across the different agreements; and transparency, monitoring and accountability of what is being done.

The Need for Targets

The question of whether there have to be targets or not associated to a global climate regime is usually a very controversial one, and this was reflected by the lengthy discussions held in the Forum around this issue, and the diversity of viewpoints that were presented, which are summarized below:

- Targets are good benchmarks against which to measure progress and success. Targets help to know whether we are moving in the right direction. Given the need for comparability of efforts and accountability implied in the most plausible agreement framework, targets are a must.
- However, these advantages of targets are realized even if they are non-binding. So setting a target does not necessarily imply that it has to be enforced, what, as we all know, is strongly contested by many developing countries. Moreover, negotiation of concentration targets in the long term might be divisive and detrimental, given the scientific uncertainties linking emissions and impacts.
- Therefore, assuming that binding and non-binding commitments may co-exist, and the large differences between countries, an expected scenario would consist of different groups of countries with different commitments, set up jointly or by national governments, perhaps subject to some coordination scheme, which may later on get linked.
- This should not prevent that, at least within the developed countries, this target setting is carried out according to the comparability of efforts previously mentioned and that the commitments are mandatory.

The Institutional Framework

There was some discussion about the appropriate institutional framework under which the future climate regime should be placed. Given the general guidelines for the agreement presented before, there is a need for an effective coordinating agent at the global scale. And there is also a need for that institution to be solid, so that people will trust it (and firms will have the required investment certainty). It was recognized that such a solid institution does not exist for Kyoto, so it will probably have to be built anew.

Regarding the role of the Kyoto Protocol and the UNFCCC, it was argued that, since there may be more than one agreement under the latter, it might be better to move the market mechanisms under the UNFCCC rather than keeping them under Kyoto.

Of course, Kyoto presents several weaknesses and shortcomings. But it would be foolish not to build on the existing experience, on what we have learned.

Finally, regarding the participation of countries, it was remarked that differences both within Annex I and non-Annex I countries are becoming more prominent, so it would possibly be helpful to create differentiated groups within them.

The Contribution from Developed and Developing Countries

It has become clear that developed countries have to lead this process. Although many developing countries are already acting, historical responsibility, financial and technical capacity still pertains to developed countries.

But developing countries have to be incorporated in a global climate regime, and must play a larger role in it. Both more players, and more efforts, are required from these countries. However, this will require better understanding and attending to their needs.

First, it has to be acknowledged the right of developing countries to pursue further development. This development is an opportunity to create a more sustainable society, it allows developing countries to adapt better to the threats of climate change, as well as to help mitigating it. Therefore, it is important to pose the correct question: to look for complementarity between development and climate change policies. With the financial and technical support of developed countries, developing countries should change as soon as possible their development patterns, avoiding business-as-usual scenarios, and heading for a more sustainable growth, which will also make them more resilient against climate change impacts. More specifically, there has to be integration between energy security, development and climate policies.

Second, but not less important, is the need to mainstream and scale up adaptation efforts. Adaptation poses huge challenges, but it has to be included into an eventual agreement if a larger contribution from

developing countries is expected.

Finally, there is a large need for financing this contribution, as a part of the developed countries leadership. Many parties have expressed the need to upscale the financial effort, by ensuring additional funds, and to correct the existing imbalance between mitigation and adaptation also in terms of financing. Financing mitigation efforts and technology transfer seems to be possible, provided the regulatory framework is set adequately, so the challenge lies on financing the integration of climate policies within sustainable development ones, and the adaptation efforts. A sensitive issue is to avoid the perception that financing climate change activities detract funds from the current or future estimated financial effort for international cooperation for development.

Provided these needs are taken care of, developing countries should be ready to take their part in mitigation efforts. In fact, some developing countries are already willing to discuss voluntary commitments. As mentioned before, a new annex would be needed for a meaningful participation of these countries in the process. It is critical and necessary, although difficult, to differentiate the G77, to allow those countries ready to take voluntary pledges to do so.

The Elements for the Agreement

Going beyond the general framework for agreement, the Forum also touched upon the major elements which should be contained within. These elements are: adaptation, market mechanisms, technology, and deforestation.

Adaptation

Adaptation has been placed in first place since it was generally acknowledged that there has been a wide imbalance between mitigation and adaptation, and that this imbalance should be corrected, especially if developing countries are to be taken onboard. Therefore, adaptation should come to the forefront in the future climate regime negotiations. Future agreements should give equal weight to adaptation and mitigation. This would also help acknowledge that many developing countries are already working in this field.

Market Mechanisms for Mitigation

Market mechanisms are very powerful instruments for achieving environmental, energy and development objectives, as has been shown in many countries. Therefore, they should also constitute a fundamental pillar for a future climate regime. This does not mean, however, that all countries should be forced into them, since there are very different conditions even within developed countries. Therefore, they should remain a voluntary option, and what should be ensured is the appropriate transfer of information and experience from those countries who have applied them to those willing to consider them.

Carbon Markets

Carbon markets have shown to be a very important driver for carbon mitigation. They are very flexible, and set a target per firm without the bureaucratic fuss. In addition, they produce a change in culture regarding carbon emissions that is very welcome.

The European Emissions Trading Scheme (ETS), in spite of some shortcomings, has provided a valuable experience for other carbon markets to be developed in the future, and has set a quiet example for the U.S. and others.

However, not all countries should be expected to consider carbon markets. Therefore, it is difficult to envisage a global carbon market, but rather it is expected that markets will develop bottom up, depending on the needs and circumstances of the different countries and regions. Later on, these markets might be linked through prices, as some authors have suggested.

Clean Development Mechanism

The second market mechanism discussed at the Forum was the Clean Development Mechanism (CDM). First, it was generally agreed that the CDM has helped build institutional capacity and technology knowledge. And this institutional aspect of the CDM is much more important for developing countries than the economic aspect.

However, it was also widely understood that the CDM should be thoroughly reconsidered, streamlined and scaled up. Indeed, the CDM was designed within a low-ambition Kyoto agreement. If a new, more ambitious agreement is expected beyond 2012, a new CDM is also warranted. In addition, it has to address sustainable development, which has not been the actual objective in many of the existing CDM projects.

Taxes

Many economists have proposed taxes as the best instrument for mitigating carbon emissions, but the fact is that they face great difficulties in practice, since they easily find political opposition. This is clearly the case in the European Union and the U.S.

Less direct forms of energy or carbon taxation, such as tolls in highways or stronger taxes for less efficient vehicles, may be a good option for mitigating emissions. However, the acquiescence of both the transport, finance and environment ministerial departments is typically difficult to achieve.

Technology Policies

In spite of all the attractiveness of market mechanisms for mitigating GHG emissions, the Forum acknowledged that they are not universally applicable. In addition, it was also recognized that carbon markets will not be able to achieve the required mitigation on their own. The price signal will not be enough, so we will need additional policies, mostly focused on technology development.

These policies will be different for different countries, and again will have to be integrated with national energy policies. More efforts should be devoted, of course, to R&D and innovation, but there was a consensus that the emphasis should be placed on technology deployment, in bringing existing clean technologies to the market in order to make a real contribution.

An important remark was that technology policies should be devised carefully so as not to pick winners in advance, but rather let the different technologies compete and show their advantages. However, it also was generally agreed that a certain focus should be placed on energy efficiency (including transport and energy demand management), renewable energies, and carbon sequestration and storage.

Actions to Reduce Deforestation

Avoiding deforestation is a very relevant issue for developing countries, and a real contributor for mitigating carbon emissions. Therefore, it should be placed higher in the carbon regime agenda.

However, what we find is that there are not enough incentives for avoiding deforestation, especially in developing countries, as shown by the high deforestation rate. In fact, some of the current energy policies conceived by developed countries for mitigating emissions (such as biofuels) are causing more deforestation, as forests are being cleared for new energy crops.

Clear incentives and targets should, therefore, be established, and deforestation should be incorporated on a relevant basis to a future climate regime. In fact, as some attendants pointed out, it may be the oil that lubricates the next agreement.

The Role of Private Entities and NGOs

Private entities and NGOs have a large role to play in future climate regime negotiations and implementation. It is increasingly recognized that companies must be the drivers of change (and of markets), and not governments. Many reasons were identified during the Forum:

- The private sector is essential to provide the large volume of investment in clean technologies and adaptation that will be needed in the short, medium and long term, with the financial entities making available the required funds as well as the instruments for risk hedging.
- Companies can use their know-how and innovation skills to design, structure and promote financial and technological ways to fight climate change.

Therefore, the future climate regime has to provide clear incentives for companies to participate. Strong signals (such as political commitments or targets) are needed to drive investment and technology in the desired directions.

Industry does not need certainty of carbon price (industry is used to managing risks), nor intergovernmental bodies trying to manage most technology transfers, climate policy divorced from energy and transport policy, nor money for potentially profitable activities (there is a lot of low-cost capital available, what is needed is to direct it correctly). What industry needs from governments is to set boundaries and guide markets and to establish a secure framework that allows profitable investments to occur, on a global scale. This requires from governments clarity of purpose and objectives. And it also requires credible governance for the implementation of goals and detachment from short-term policy which can be reversed with a change of government.

(continued on page 26)

Energy and Climate – No Need for Conflict

*By Carole Nakhle**

Is it inevitable that two of the world's major wants – cheap and plentiful energy and a low carbon future, should be in head-on conflict?

Recent experience certainly suggests that the two ambitions can clash awkwardly unless very carefully handled. For example, the European Union and its member states have become increasingly determined to address climate change issues and to set, and hopefully, reach new and demanding targets for reducing carbon dioxide in the atmosphere. Very strong speeches have been made both by German Chancellor Angela Merkel in Berlin and by the British Prime Minister Tony Blair in favour of new carbon goals, well beyond the Kyoto benchmarks, and for higher percentages of renewable, low-carbon, energy sources as a percentage of total EU energy consumption.

But in formulating these new aims Europe's leaders have also encountered new controversies, both amongst the member states and between richer and poorer societies world-wide.

First, several member states, when faced with sweeping new pan-European proposals for limiting emissions, for raising the penalties for exceeding carbon limits and for sharply reducing fossil-fuel use, have hastened to point out their very different and varied local circumstances and energy needs.

The EU of 25 members today is not the smaller and more uniform EU of yesterday, with 15 members or less. Today, with the accession states of Central and Eastern Europe in the club per capita income disparities are far larger, in a ratio of 24 to 1 between rich Luxembourg and newcomer Bulgaria. What richer countries can absorb and are eager to commit to, in the way of carbon pricing and other moves to internalise previously external costs, will be far from the liking of poorer and less mature economies.

Furthermore, while the stronger and larger economies of Western Europe may be prepared, for the sake of curbing greenhouse gases, to shoulder the burden of more expensive energy from renewable sources, in some case with cost profiles well above current commercial levels, the same extra costs could be far more difficult to bear in the poorer member states.

These divergences of interest have duly been reflected in difficult negotiations in Brussels as officials have struggled to find a formula, which will combine tough sounding targets with enough flexibility to accommodate all 25 member states. The inevitable outcome has been a series of generalised policy aspirations rather than specific and detailed commitments. Outright conflict, of which the member states already have enough in other fields such as defence and foreign policy, have been avoided, but only at a cost.

The same treacherous diplomatic waters have had to be navigated when it comes to industrial and business interests, as well as governments. Leading EU industrialists have been outspoken in warning about the dangers to European competitiveness if extra energy costs are heaped on European home industries, in the name of carbon limitation, while the rest of the world escapes them – and duly undercuts European products.

This has led one French authority to go so far as to propose additional import penalties on goods originating in exporting countries outside the carbon pricing regime – a highly questionable idea which would, of course, hurt the poorest countries, seeking access to European markets, the hardest.

A more idealistic line of argument has been that if the EU sets a strong enough example, other countries round the world will follow and adopt similar carbon rationing and pricing systems, thus restoring a level playing field.

Needless to say, these are arguments which sound impressive in learned tracts but which carry little weight with businesses competing day to day in world markets. Here again, the 'solution' in Brussels has been to fall back on generalised statements and aims, combined with reassurances that nothing will be done to place hard-pressed European manufacturers, already struggling in face of ferocious Chinese and other Asian competition, at a further disadvantage.

But these debates within Europe are a microcosm of divisive issues being played out on the much larger world stage. The awkward difficulty has to be faced that the developing world inevitably sees the trade-off between energy needs now and climate threats in the future in quite different terms from the already industrialised community.

Climate change may pose a threat to poorer countries, especially to coastal communities, as much as to richer ones. But the immediate and overriding need is for cheap and plentiful energy to fuel economic growth. Until environmental and climate concerns can be decoupled from the demands of

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economic growth it is clear where the priority is going to lie – with the shorter term demands of survival and lifting living standards from pitiful levels rather than with much longer term, and still in some quarters disputed, climate effects.

If allowed to fester, these controversies and doubts could seriously impede constructive measures to secure a decarbonised future while at the same time increasing divisions and antagonisms within the EU.

Yet handled correctly, these potential conflicts could undoubtedly be avoided. Massive common ground awaits to be opened up between those who want, and desperately need secure energy sources for their development, and those who want a greener, cleaner and more efficient environment.

New energy technologies, new products and techniques for using energy far more efficiently and rapid innovation in cutting the cost of new energy sources such as plant-based oil, solar energy and much safer and cheaper nuclear power are all within reach and all take the world along the same road – to a future of cheaper and more secure energy and to a cleaner, lower-carbon environment. Far from being in conflict, the search for more, and more secure, energy and the search for climate security could be in alliance, forging a new and more compelling unity than either cause standing alone.

Meanwhile, and regrettably, the debate continues to be polarised – between those who want an absolute priority for carbon reduction and those who want energy security now, and between those countries which are higher up or lower down the development scale. It continues, too, between the different energy interests and lobbies, from conventional oil and gas supplies, through to biofuels, to wind and solar power and to nuclear power.

But it is nonetheless a largely unnecessary debate between false alternatives and false choices. There is no need at all for Europe's internal quarrels to be repeated on a wider global scale. On the contrary calm and careful understanding of the issues show that the transition to a more balanced energy mix and advance towards a decarbonised world lies along exactly the same route. In short, there is a way out of the labyrinth of contradictions and conflicting arguments. It should now be followed.

THE MAJOR ELEMENTS FOR A GLOBAL CLIMATE STRATEGY BEYOND 2012

(continued from page 24)

Guidelines for Future Negotiations

Although sometimes it may seem that there is a lack of action from both developed and developing countries, the fact is that both are already implementing policies which help mitigate climate change and adapt to its consequences. What is needed now is to better communicate to those in developed countries, who think nothing is being done, the evidence that developing countries are doing many things, and vice versa. We need to show and tell.

And we also need to acknowledge the fact that energy security and dependence issues are conditioning the evolution of the climate agreements. Therefore, as already mentioned, both aspects have to be integrated in the future climate regime.

Basically, what is required is a more pragmatic approach for the post-Kyoto negotiation. How to bring the positive tone into the negotiations? The first idea is that we have to understand other parties' interests properly, in order to find an agreement. We must be sure that the elements of the agreement represent the interests of all parties. Another idea is that negotiations might have to move away from binding targets and look at efforts done. Also they may have to talk more specifically about solutions, and how all elements fit together.

And then we shall have to proceed with the delicate task of weaving together all these elements into a common agreement. Although this represents a change from previous experiences, the Forum agreed that this is an achievable task, and, therefore, its final message should be one of optimism.

Chronicle of a Crisis Foretold: Energy Sources in Chile

*By Ricardo Raineri**

In 2006, Chilean per capita GDP reached almost $ 9K ($ 13K in PPP), and since 1980, GDP almost tripled with energy consumption following a similar trend (Figure 1). This tight relation between energy consumption and economic growth contrasts with the relation between GDP and energy consumption growth in more developed countries, where the increase in energy consumption lags behind the increase in GDP.[1]

Chilean energy needs are satisfied from diverse primary sources like oil, natural gas, coal, hydroelectricity, wood and others (Figure 2). In the 1990s, and to satisfy the growing energy needs and because of the depletion of national fossil fuel resources, Chile increased its imports of oil, natural gas and coal (Figures 3 to 5). Today, Chile imports 68% of the energy consumed, with imports of 98% in oil, 73% in natural gas, and 88% in coal. A large share of these imports comes from Argentina, 73% of crude oil imports in 2002 and 37% in 2005 (Figures 6 and 7), and 100% of natural gas imports. Only hydroelectricity and wood are locally supplied.

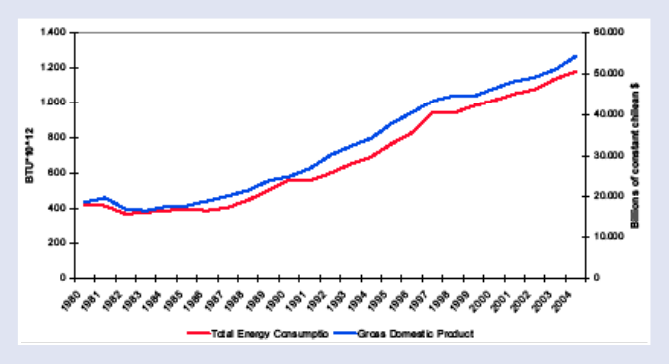

Figure 1: Chile Energy Consumption and Gross Domestic Product

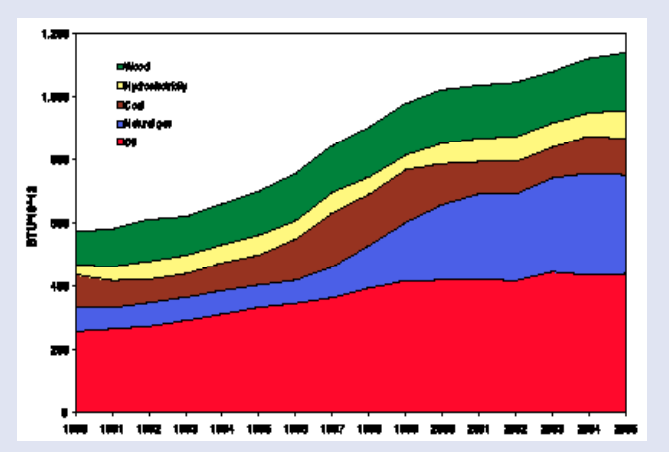

Figure 2: Primary Energy Consumption by Source

In the early 1990s, 70% of the electric system installed capacity was hydraulic and highly exposed to adverse dry weather conditions, and it was only after an episode in the late 1980s when electricity supply was at risk that policy makers, investors and industry analysts convinced themselves on the need to diversify the energy mix to assure the supply of electricity independent from the prevailing weather conditions. At the time, the country also faced a growing demand for a clean and inexpensive source of energy which could provide a deep breath to the highly polluted capital. Both objectives seemed to have found an answer when the chance to import natural gas from Argentina became a reality. For that purpose, in 1995 Chile and Argentina signed a protocol that served as the institutional framework to backup the companies' private contracts between natural gas producers in Argentina and consumers in Chile. Under this scenario, private investors connected Chile and Argentina with large gas pipelines, from north to south.[2] In Chile the transportation infrastructure was complemented with large investments in natural gas power plants and natural gas distribution facilities, as well as infrastructure to substitute more expensive and less clean fuels in industrial processes and household consumption. In 2004, as a result of these large investments, Chile imported about 18.5 million m^3 of natural gas per day from Argentina, representing almost 15% of Argentina's natural gas production. Roughly, one third of natural gas imports were used for electricity generation in the two largest electrical systems, one third was for the Methanol plant installed in the extreme south part of Chile (XII Region), and the remaining one third was for industrial, retail and household consumption, and the State-owned Oil Company refineries. The reliance of Chile on Argentinean natural gas evidenced its weakness in 2004, at a time when Chile imported 22% of its energy needs as natural gas from Argentina. At that moment, the severe price distortions and macroeconomic imbalances that affected the Argentinean economy caused its government to set stringent export constraints on natural gas, with disruptive results on natural gas exports to Chile. Thus, since 2004 Chile has faced an increasingly reduced supply of natural gas from Argentina, with the deficit of the restricted supply reaching peaks above 80% of the contracted supply with Argentinean producers (Figure 8).

The starting point of the energy shortage that affects the Chilean economy lays in the macroeconomic imbalances that affected the Argentinean economy that blew up in 2002 with the end of the

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See footnotes at end of text.

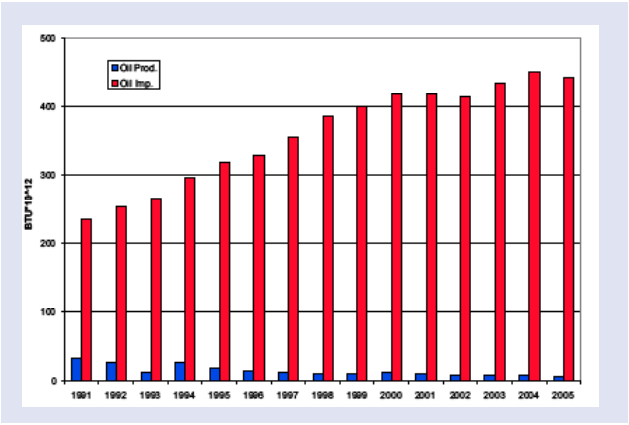

Figure 3: Crude Oil Production and Imports 1991-2005

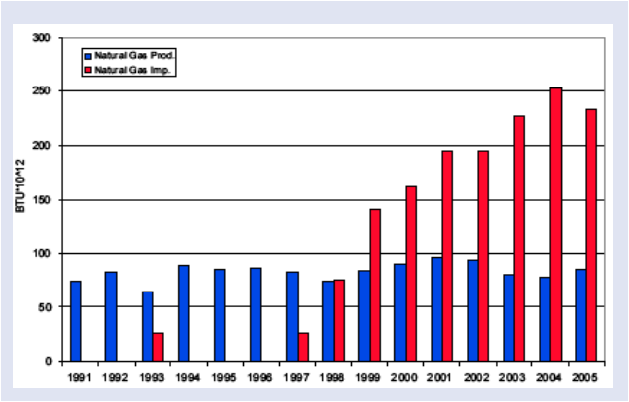

Figure 4: Natural Gas Production and Imports 1991-2005

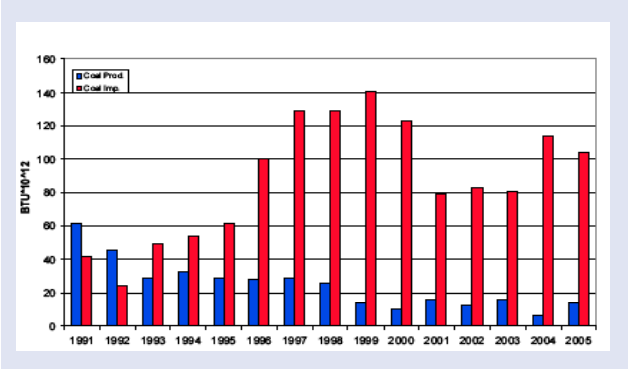

Figure 5: Coal Production and Imports 1991-2005

fixed exchange rate regime (regime established in 1991 to deal with hyperinflation; the exchange rate was set at one Argentinean peso for one American dollar).[3] This triggered one of the deepest governance, political and social crisis in a Latin American country during the last decades. After the devaluation and in a short period of time, the Argentinean peso dropped to a rate of three pesos per American dollar.[4] Misery is what best describes the immediate effects of devaluation. Devaluation resulted in huge changes in relative prices with dramatic effects on incomes and employment. According to World Bank studies, between October 2000 and October 2002, the percentage of the Argentinean population under the poverty line increased from 33% to 58%.[5] After the devaluation, and as an attempt to control its adverse effects on the population and inflationary pressures, the Argentinean Government set price controls to contain inflationary pressures and pacify the increasing social distress. In particular, the natural gas price was set artificially low compared to other fuel prices and world market fossil fuel prices. After the worst part of the 2002 crisis begin to yield and complemented by the artificially low domestic price for natural gas, the domestic demand of natural gas in Argentina increased, sharply decreasing the surplus available for exports. On the supply side, and resulting from the low prices received by Argentinean natural gas producers, the incentives to invest in exploration and development of new gas fields and facilities were eroded and the Argentinean natural gas industry started living based on past investments. As price distortions continued, spare capacity and reserves dried out, and in an effort to assure the domestic provision of natural gas in 2004, Néstor Kirchner's administration imposed constraints on natural gas exports, requiring national gas producers to fulfil domestic consumption contracts, at the artificial low domestic prices, before satisfying their export contracts.[6]

The current shortage of natural gas that the Chilean economy is facing has adverse effects on the electric industry as well as residential customers and industrial processes. About 35% of the installed capacity corresponds to power plants intended to be fuelled with natural gas.[7] Also in Chile, since the year 2000, due to the world markets' fossil fuel price increases and the restricted supply of Argentinean natural gas, electricity prices more than doubled, with additional increases expected because of the critical conditions for the electric system foreseen for 2008 and 2009. Currently, to deal with the high dependency that Chile faces on Argentinean natural gas imports, the State-owned Oil company (Enap), the largest power electric generator (Endesa Chile), the main natural gas distribution company (Metrogas) and a foreign LNG supplier (BG) have decided to build an LNG importing plant. Unfortunately, it seems that this plant would not be in operation before 2010.

Following the trend of Chilean economic reforms since the 1970s, in the 1990s the political unrest, which used to characterize the Latin America region, gave way to more orthodox economic policies supplemented with large privatization programs of previous state monopolies. At the time, the renewed political orientation that followed free-market economic principles and a strict respect for property rights was the groundwork where Chile and Argentina agreed for a broader economic integration and an open trade of energy within both countries. However, this brief window of orthodox economic policies came to an abrupt end in the late 1990s, and today many Latin American governments have turned left.

President Hugo Chavez leads the more extreme positions, which tries to implement populist formulas that have failed in the past. President Chavez is heading radical reforms with provocative speeches, remembering that Latin America is a place where the old ideals of radical socialism, the Cuban formula,

and the concept of the Welfare State are still attractive for a large share of the population who feels that in the 1990s the liberal economic policies were unable to provide an answer to their social demands in a timely manner. Ludwig von Mises (The Freeman, May 4 1953) indicated that the core idea of the Welfare State was originally established by Ferdinand Lassalle (1825-1864), positing that the State has practically unlimited resources to make all the citizens happy and prosperous, that it should nationalize large companies, develop those projects for which there is no capital, redistribute national income, and provide all the citizens with health, social security, education and housing, from the cradle to the grave. Today this concept of Welfare State is a bright idea in Latin American countries.

South America has large oil and natural gas reserves (mostly Venezuela and Bolivia), as well as renewable energy sources, and there are large returns to complement their electricity, gas, oil and other fuels markets. However, under current geopolitical conditions, the integration should be analyzed carefully considering the political imbalances that may arise within exporting and importing countries. In the case of Chile, further integration of regional energy markets is not the way to solve its fossil fuels problem.[8] Chile has a vivid experience of increasing its energy dependency on neighbouring countries, on oil and natural gas, where, after turning the corner, it was locked in a critical condition and in the short term is lacking inexpensive alternatives to solve the restricted natural gas supply problem without a major adjustment in domestic energy prices and the impoverishment of its population. Particularly, and at odds with what happened with oil imports from Argentina, where the country has more flexibility to substitute crude oil imports (see Figures 6 and 7), in the case of natural gas in which Chile was locked in, it had almost no alternatives to fuel the new natural gas power plants that represented most of the electrical system expansion since the late 1990s.

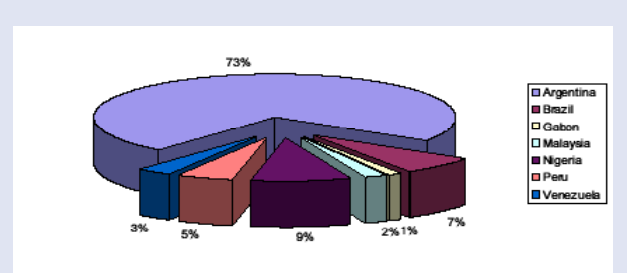

Figure 6: Crude Oil Imports by Country of Origin, 2002

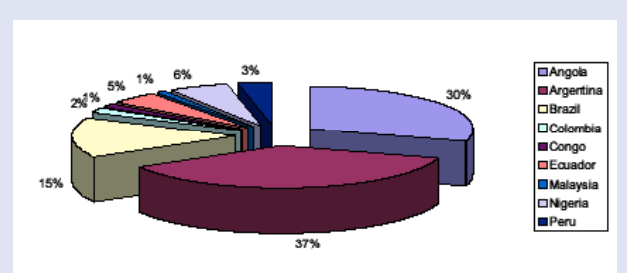

Figure 7: Crude Oil Imports by Country of Origin, 2005

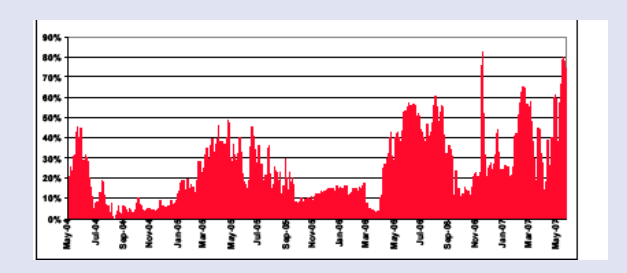

Figure 8: Constraints on Chilean Imports of Argentinean Natural Gas (% respect to normal requirements)

Chile has a history of conflicts with neighbour countries; therefore, there it would not find reliable energy sources to solve its long-term energy supply problems. Even though Chile has strongly supported the promotion of friendly relations with neighbouring countries, Chile must look for a solution to its energy supply problems within its internal boundaries and beyond neighbouring countries, within other American countries or world economies, who share the principles of free a market and a strict respect for property rights. To achieve the objectives of secure, clean, and affordable energy supply, Chile must progress further to:

- Increase market liberalization, particularly in exploration and exploitation of oil and natural gas;
- Promote reliable international alliances;
- Promote market mechanism for the efficient use of energy;[9]
- Remove market and bureaucratic barriers that slow down the introduction of new technologies and the development of large projects, like large hydroelectric power plants and transmission lines;
- Improve the procedures to speed up the environmental analysis of energy investment projects, without sacrificing environmental requirements;
- Develop the capabilities, legislation and regulation required to safely allow the development of all competitive sources of energy;
- Recognition for its high standards of legal certainty; and
- Work a flexible pricing mechanism to reflect the real energy costs such as real time pricing

Recently, the Chilean government announced a bill to promote renewable energies. This responds to President Michelle Bachelet's statement, where she stated that by 2010, 15% of the new generation capacity must be produced through renewable energy sources, including small hydroelectric power plants. For this objective, this bill requires from the generators that 5% of the energy sold[10] must come from renewable energy sources for a period of 20 years starting in 2010. The companies that do not satisfy that re-

quirement must pay a fine for any MWh not certified within the 5% requirement. This penalty in principle makes renewable energies competitive with the conventional sources of energy. Today, renewable energies do not solve all the energy needs. They may be part of the solution for a diversified energy mix, but they will impose an additional charge on the already high energy prices that affect the Chilean population. This point is something that the Authority must carefully watch in the final design of its energy policy.

Footnotes

[1] See International Energy Outlook 2006, Energy Information Administration, DOE.

[2] Also, in the north of Chile a transmission line was installed to import electricity from natural gas power plants installed in the north of Argentina.

[3] Bill on Public Emergency and Reform to the Exchange Regime 25,561, February 2002.

[4] By mid 2002, there was an exchange rate that almost reached four Argentinean pesos per American dollar.

[5] Argentina Crisis and Poverty 2003, World Bank Report N° 26127-AR, July 24, 2003.

[6] Provision 27/2004, Fuels Undersecretary, NATURAL GAS. Approves the rationalization Program for natural gas Exports and Use of Transport Capacity.

[7] 25% of the installed capacity in the SIC and 60% in the SING are fuelled by natural gas, even though today most of the natural gas power plants have been adapted to also run with oil. However, currently there are critical logistic and storage constraints to supply all the natural gas power plants with oil. The SIC electric system has 70% of the country installed capacity and serves 93% of the population, while the SING electric system has 29% of the country's installed capacity and serves the northern region of the country, where 90% of its electricity production goes to the large mining industry. Further, natural gas distribution utilities for household consumption lack enough backup capacity to substitute for the natural gas required. Thus, currently natural gas for household consumption, for heating and cooking, is under increasing risk because of the increasing restraint on Argentinean natural gas exports.

[8] This, despite Hugo Chavez is promotion of a greater integration of the energy markets in Latin America. In fact that was clearly reflected in the First South America Energy Summit hosted by President Hugo Chavez in Venezuela's Margarita Island. One of the issues discussed is the ambitious project to build a 5,000-mile (8,000-kilometre) pipeline to deliver natural gas from Venezuela to Argentina, Brazil, Bolivia, Paraguay and Uruguay. Also, in the summit Brazilian President Luis Inacio Lula da Silva ratified his commitment to the expansion of ethanol, which he highlighted in previous talks with President George W. Bush. Other Latin America integration efforts have been supported within:

- Siepac in Central America, system that connects a total of six countries, Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica and Panama with a 1,790 km transmission line with a capacity of 300 MW at 230 kV.
- Andean Community of Nations (CAN) (Bolivia, Colombia, Ecuador, Peru and Venezuela), which looks for electricity and natural gas integration. Current network interconnections exist within Venezuela-Colombia, Colombia-Ecuador and Ecuador Peru, where the largest interconnection reaches 260 MW of transmission capacity.
- Mercosur (Argentina, Brazil, Paraguay, Uruguay and recently Venezuela). Currently there are electricity and gas interconnections between some of these countries as well as between Argentina and Chile.

[9] The Authority already has an Energy Efficiency Program to develop the policies which should contribute to a more efficient use of energy, and it is working on the development of a labelling program for household appliances. This program has financial support from the The Global Environment Facility (GEF), and participants in the program are Chile, Argentina, Paraguay and Uruguay. http://www.gefweb.org/

[10] This applies for energy supply contracts for 2010 on until 2029, for contracts signed since 2007 if the bill is approved.

Welcome To Our Newest Affiliate: The Emirates Association for Energy Economics (EAEE)

Our newest affiliate, the Emirates Association for Energy Economics (EAEE), is the first IAEE affiliate in the GCC and is open to all energy professionals. Their focus will be on building a national network of energy professionals. The Dubai Multi Commodities Center (DMCC) has helped to set up the UAE affiliate and attract members. The group's activities will focus on a series of prestigious lectures by global energy experts each year, as well as important networking opportunities. The Honorary President of the affiliate is His Excellency Mohamed bin Dhaen Al Hamli, (UAE Minister of Energy & President of the OPEC Conference). Officers of the affiliate include: President, Ali Obaid Al Yabhouni (UAE OPEC Governor and Manager, Planning & Co-ordination, Refining & Marketing Directorate, ADNOC); Vice President, Martin Trachsel (Vice President, Middle East-Gulf, Shell Gas & Power); Secretary, Tilak Doshi (Executive Director for Energy, DMCC); and Treasurer, Paul Wood (Business Development Manager, DMCC).

Bulgaria's Energy Policy after Accession to the EU

*By Atanas Georgiev and Nataliya Aleksandrova**

Overview of the Bulgarian Energy Sector

Bulgaria has a strategic location on the crossroads between the East and the West. In the period between 1945 and 1989 Bulgaria had a centrally-planned economy. After that it witnessed a transition period to market-based economy. In March 2004 the country joined the North Atlantic Treaty Organization (NATO) and since January 1st, 2007 it is a full member of the European Union. All these issues in Bulgaria's economic and political development influenced its energy policy.

Energy Strategy

In 2002 Bulgaria established its Energy Strategy that sets the basis for energy reform and reflects the country's path to the EU. The leading priority of the Strategy is to develop a competitive energy market and all priorities are related to this aim. There are several long-term goals of this strategy: to secure energy supplies, to create competition in the energy sector, to protect environment, and to position Bulgaria as a regional hub for the transit of oil, natural gas and electricity.

The current Energy Act was last revised in 2006. The main purposes of the law are: to create a legal framework for energy activities related to the change in the market model for electricity and natural gas, to encourage combined heat and power generation (co-generation) and to ensure more conditions for energy production from renewable energy sources (RES).

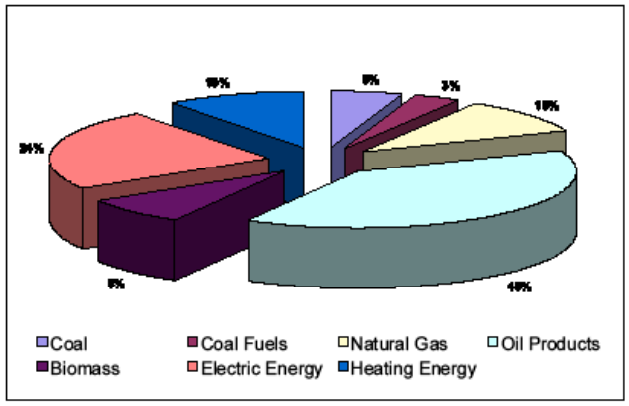

Figure 1: End Energy Consumption (2005)
Source: Bulgarian National Statistical Institute (www.nsi.bg)

Coal

More than 60% of Bulgaria's energy consumption is satisfied with imported resources, especially oil and natural gas that come mainly from Russia. About 65% of the power generated by the Bulgarian coal-fired plants is produced by the Maritza Iztok basin complex. It consists of four coal-fired plants (total capacity of 2,950 MW) which are specifically designed to use low-caloricity and high-dust content local lignite coal. The fuel used in the plants comes from the adjacent Maritsa Iztok Mines, which account for 80% of the coal produced in Bulgaria. The U.S.-based AES Corppration announced in 2006 that it will begin construction of a 670-MW coal-fired plant that will replace the existing Maritsa Istok 1 plant. This project is the largest green-field investment in Bulgaria and has a total cost of USD 1.4 billion. The plant is scheduled to be completed in 2009 and will replace the lost generating capacity from the closure of units III and IV in the Kozloduy NPP. AES has signed a 15-year power-purchase agreement with the National Electricity Company (NEK) for selling the electricity at a fixed price.

Oil and Natural Gas Supply Future

Bulgaria has a strategic location in Europe. This is the reason why there are many multinational energy projects that include the participation of Bulgaria. The construction of the NABUCCO gas pipeline is an important project not only for Europe to reduce its dependence on Russian natural gas but also for Bulgaria. The European Union and the energy ministers of Austria, Bulgaria, Hungary, Romania, and Turkey agreed to build the 3300 km NABUCCO pipeline that will guarantee the supply of about 30 billion cubic metres of gas a year from Iran to Central Europe by 2015.

Early this year (2007) Russia, Greece and Bulgaria agreed to build the Bourgas-Alexandroupolis pipeline with a capacity of 35 – 50 mln tonnes of oil annually. Its construction will start in 2008. Russia has a 51% majority stake and the rest is split between Greece and Bulgaria. In 2006 Albania, Bulgaria, and Macedonia signed a treaty concerning the AMBO (Albania, Macedonia, Bulgaria Oil) pipeline. It will carry oil from the Caspian region to the Black Sea port of Bourgas in Bulgaria and then through Macedonia to the Mediterranean port of Vlore in Albania. After years of little work, optimistic scenarios suggest the 850 kilometre-long pipeline, with a capacity of 35 million metric tonnes per year and costing USD 1.3 billion to construct, may be ready by the end of 2010.

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Electricity Market

Generally the distribution sector in Bulgaria has been in a decline for the past 15 years. The government has already privatized seven power distribution companies, selling them to the Czech Republic's CEZ, Germany's E.ON, and Austria's EVN in 2005 for a total of EUR 693 million. In 2006, Bulgaria's Privatization Agency (PA) signed a draft contract to sell the 1,260 MW Varna TPP to the Czech energy corporation CEZ for $250 million. CEZ has also agreed to invest an additional $140 million in the power plant. The new owners will make additional investments in the energy sector of the country. The privatization of power plants is one of the priorities in the Energy Strategy, but the current government has decided to change its policy toward a CEZ-like model. The rest of the state property in the country's energy sector will be gathered in a holding corporation, which will be listed on the Sofia Stock Exchange and possibly some of the leading international stock exchanges. Thus the state will keep control over the sector, but will be able to bring fresh funds and more transparency as well.

Bulgaria expects to fully liberalize its electricity market by July 1st, 2007, adhering to EU standards. It is expected that after contracting large and smaller industrial electricity consumers, electricity traders will offer tempting prices for households as well – initially in the large cities, where consumers use more electricity and are able to use advanced services as electronic payment and bill presentment. However, a large part of household consumers will most likely stay with their current providers (the EDCs), as they will not have the information and courage to undertake such a change.

Currently a debate for opening a Bulgarian electricity exchange is going on among national experts. Most of them agree that the current model with bilateral contracts should be upgraded to an exchange-based model, which will bring more transparency on energy prices (which are currently secret) and will support price-setting of balancing energy and sunk costs. Opponents of the idea consider the exchanges in the neighbouring Romania and Slovenia to be sufficient for the future regional electricity market and think that Bulgaria has lost its chance to become the Southeast European energy exchange.

Nuclear Energy in Bulgaria and EU Perspectives

Overview of the NPP Electricity Production in Bulgaria

Bulgaria has developed its nuclear energy sector since 1966, when a contract was signed between the country and the USSR for cooperation in constructing a nuclear power plant (NPP). A site near the Danube River town of Kozloduy was selected and the construction started on April 6, 1970. The first two units of the plant were commissioned in 1974 and 1975 and before they were finished, the construction of units III and IV was started in 1973. They were finished in 1980 and 1982 respectively. All four reactors are of the type VVER-440 (440 MW each). In 1988 and in 1993 the two newest units of the plant were finished. These are of the type VVER-1000/B-230 and are have a capacity of 1000 MW each. Currently the first four units are idle (I & II – since 2002 and III & IV since the end of 2006) in accordance with the EU acquisition obligations of Bulgaria. The 6 units are operated by the state-owned company Kozloduy NPP plc.

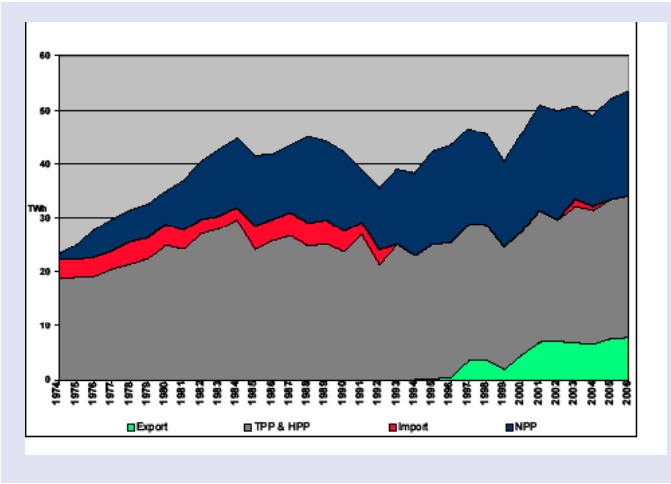

Figure 2: Kozloduy NPP's Stake in Bulgaria's Energy Generation

Source: NPP Kozloduy (www.kznpp.org)

In 2006 Kozloduy NPP produced 42.66% of Bulgaria's total electric energy generation (net energy amounting 18,130,174 MWh). Most of the energy is sold to the state-owned transmission operator NEK at regulated prices but part of the production is sold via bilateral contracts to eligible customers and electricity traders in the liberalized segment of the market. The generation capacity of Bulgaria in 2006 allowed NEK to export a record volume of electric energy (about 7.8 billion KWh) and thus to satisfy the electricity deficit in the region of Southeast Europe, which amounts to about 10 billion KWh. With the closure of units I-IV not only Bulgaria, but the whole region loses one of its cheapest, cleanest and safest sources of energy.

The NPP Belene Project

In order to balance the Bulgarian energy system, in 2002 the Bulgarian government decided to restart the halted project for a second nuclear power plant in Bulgaria, at another town down the Danube River – Belene. The Belene NPP will have two 1000-MW units of a modernized type VVER-1000. Currently a strategic investor is to be selected to provide financing for 49% of the project, the remaining 51% being property of the state-owned NEK. It has not been announced whether the new plant will be financed with power-purchase agreements and for what amounts as well as who will be the 49% strategic investor in this project. The total amount of the two new units may reach about 4 billion EUR.

EU's Nuclear Energy Policy and its Implications for the Bulgarian Nuclear Sector

In January 2007 the European Commission announced its Strategic Energy Review. In the nuclear part of the review, the EC encouraged EU members to decide for themselves whether or not to use nuclear energy, but mentioned as well the benefits of nuclear plants:

- saving CO_2, SO_2, NO_X, and other harmful emissions;
- higher relative security of supply (in comparison to natural gas and oil);
- price of nuclear generation is lower than that of coal and natural gas generation.

The new turn in Europe and in the world as a whole in respect of nuclear energy follows a 20-year "ice-age" with almost no development and almost no new nuclear projects after the Chernobyl incident. Now safety is priority number one all over the world and nuclear energy has proven to be one of the most promising solutions for the future. Bulgaria and neighbouring Romania, as the two newest members of the European Union, are among the first ones on the "Nuclear Renaissance" track. With two new units planned in Bulgaria and two more in Romania, Europe's energy balance will be supported with an additional 4000 MW of clean, emissions-free, cheap and secure generation.

Renewables in Bulgaria and Related Opportunities

Current Usage of Renewable Energy in Bulgaria

Renewable energy generation is very popular in Bulgaria with the country's accession to the EU and the adopted measures for supporting green energy. The Bulgarian government has decided to target an 11% share of RES in total electricity generation of the country by 2010, but some administrative obstacles are slowing down investments. Currently there are projects for more than 600 MW of wind generation capacity, but only two major projects have started – one for 100 MW on the Balkans Mountain and one for 60 MW on the Black Sea coast. The State Energy and Water Regulatory Commission (SERWC) expects RES capacities to reach about 1500 MW in 2010. Another booming sub-sector is small hydro power plants (with capacity under 10 MW). Currently there are 28 such plants and more are planned. The potential for biomass applications is also considerable, both for electricity/heating and biofuels production. Solar and geothermal sources in Bulgaria are not strong enough to be used for electricity generation, but the heating potential is very good. Regretfully, it is still undeveloped. Heat pumps will also become popular as they can be used for almost every home or commercial building.

The Price of Renewable Energy

Because of Bulgaria's obligations to the EU to support renewable energy, preferential minimum prices are set for electricity from RES. For wind generators under 10 MW the price is 120 BGN (61.36 EUR) per MWh. If the generators are using new equipment (produced after 01.01.2006), the price is higher: 175 BGN (89.48 EUR) per MWh for plants generating in less than 2250 hours per year and 156 BGN (79.76 EUR) per MWh for plants working more than 2250 hours per year. The small hydro power plants (with capacity under 10 MW) have a price of 85.19 BGN (43.56 EUR) per MWh. All the prices mentioned are defined by the SEWRC and are without VAT (20%). For comparison, the prices of the large generation plants in Bulgaria are without VAT. See Table 1.

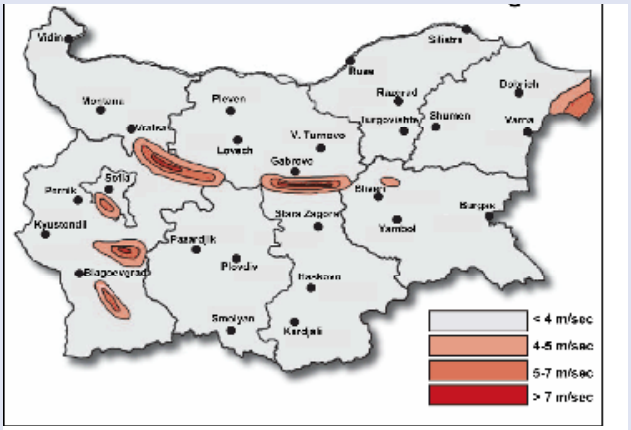

Figure 3: Suitable Zones for Wind Generation in Bulgaria

Source: Bulgarian Energy Efficiency Agency (www.seea.government.bg)

Negative Externalities of Conventional and Renewable Generation

Conventional generation is from 2 to 10 times cheaper than renewable generation, but often the conventional energy prices do not include negative externalities such as pollution (CO_2, SO_2, NO_X, Mercury, dust, etc.), they use imported primary energy sources, which affects the trade balance, and their prices are volatile as they depend on the fuel used.

There is a negative externality of renewable energy as well – especially from volatile sources as wind and solar energy. Wind and solar power can not be predicted, which means that the electric energy system becomes more unstable. Another aspect, which will affect electricity prices in general, is the needed upgrade of the electric grids (both distribution and transmission) in order to provide capacity for the new generators. The investments will have to be transferred to end consumers, which means prices will go higher in general.

The Bulgarian and the EU's RES policy

Carbon emissions, pollution and security of energy supply push the RES sector forward. This is why

Price Power Plant	Price for in BGN/EUR per MWh	Availability in BGN/EUR per MWh
Kozloduy NPP	14.27 / 7.30	22.03 / 11.26
Bobov Dol TPP	55.26 / 28.25	10.68 / 5.46
Maritza 3 TPP	57.28 / 29.29	13.01 / 6.65
District Heating Russe TPP	55.39 / 14.97	7.79 / 3.98
Varna TPP	45.82 / 23.43	7.94 / 4.06
Maritza East 2 TPP	33.24 / 17.00	By contract

Table 1: Regulated Prices for Conventional Energy Generation
Source: State Energy and Water Regulatory Commission (www.dker.bg)

the Bulgarian government has promised to update the Energy Strategy of the country in order to reflect the latest policy changes of the European Union. It has also prepared a law for Encouraging the Use of Renewable and Alternative Energy Sources, which will define the form and purpose of the state support for this sector. Supportive measures are provided in the Energy Act and the Energy Efficiency Act as well.

Energy Efficiency Policy in Bulgaria

Current Situation with the Energy Consumption in the Country

As stated earlier, Bulgaria is highly energy dependent. An important role in Bulgaria's competitiveness on the EU market is its energy intensity and energy-efficient production. Although the consumption of final energy by industry has been reduced by 60% since 1990, industry is still the most energy-consuming sector. Industry's share of energy consumption is significantly higher than the EU-27 average of 28%. Transport accounts for a 26% of final energy consumption. Final consumption in 2004 was 44% lower than in 1990. Oil and electricity have the highest shares of final energy consumed.

The average growth of consumption annually is 1-2%. The pessimistic prognosis is that the GDP growth per year will be 4-5% and energy consumption growth 1.7% – with absolute growth of more than 30% by 2020. Energy growth is most significant in the household and services sector. Industry has stabilized its energy consumption growth recently due to many investments made in new environment-friendly technologies, but there is still a high potential for energy efficiency projects.

Indicator	Bulgaria	EU-27
Energy per capita (kgoe/cap)	2,425	3,689
Energy intensity (toe/MEUR '00)	1,142	185
Energy import dependency %	48.0	50.1
CO_2 Emissions (Mt)	44	4,004
CO_2 intensity (tCO2/toe)	2.3	2.2
CO_2 per capita (kg/cap)	5,671	8,180

Table 2: Key Energy Indicators (2004)
Source: The European Commission

Energy Efficiency Policy

One of the main activities in the Bulgarian energy strategy is the rational use of energy resources. The projects for natural gas transit through Bulgaria are part of the energy policy to diversify the energy mix and supply. New generation capacities are planned but first of all energy efficiency measures are needed because one saved MW of energy is cheaper than building a new one in generation. Energy efficiency policy in Bulgaria is focused on two areas – lowering energy intensity and using RES. The Energy Efficiency Act from 2004 is based on the energy strategy of Bulgaria, the EU legal framework, the Kyoto Protocol, etc. Some of the main measures in Bulgaria are: introduction of the obligation for energy management; regulation of the possibility for the introduction of energy efficient services; requirements on labeling and stamping; tax reliefs, etc.

Financing Energy Efficiency

There are several opportunities for financing energy efficiency measures in Bulgaria: third-party financing; concession-type financing by a third party; using risk capital funds as alternatives of bank loans; selling reduced number of greenhouse gases using the flexible mechanisms of the Kyoto Protocol, etc. Some of the schemes are:

The Kozloduy International Decommissioning Support Fund: a joint initiative between the Bulgarian Energy Efficiency Agency, the EBRD, and the European Commission. It finances and co-finances selected projects for two main purposes: decommissioning of units 1-4 of the Kozloduy nuclear power plant and addresseing issues in the energy sector related to the closure of units 1-4 by demonstrating ways to reform and modernize both the supply and the demand side of energy use in Bulgaria.

The Energy Efficiency Fund (EEF): the equity capital of the EEF amounting USD 10 million has been allocated by the UN Global Environmental Facility with support from the World Bank. The Bulgarian government participates with funds from the state budget in the amount of EUR 1.5 million, and the Austrian Government made a donation in the amount of EUR 1.5 million. The EEF grants credits and credit guarantees for energy efficiency investment projects.

The Municipal Energy Efficiency Program (MEEP): funded by the Sofia Mission of USAID. The program aims to establish sustainable mechanisms for long-term commercial financing of energy efficiency projects in Bulgaria. The main financial tool for program implementation is the Development Credit Authority (DCA) Guarantee Mechanism.

Efficiency measures, stimulating RES, and nuclear energy are at the base of the common energy policy today. The success of this policy depends on the success of all EU member states. Bulgaria is already a part of the EU and is on the right track to uphold its significant place on the European energy market.

Alfa Fellowship Program

Alfa-Bank and CDS International are pleased to announce a call for applications for the Alfa Fellowship Program's 2008-09 Fellows. Now entering its sixth round, the Alfa Fellowship Program is a professional-level exchange designed to foster a new generation of American leaders and decision-makers with meaningful professional experience in Russia.

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Promoting Understanding of Russia

Applications must be received by CDS International no later than December 15, 2007.

Program information and application forms can be downloaded from the CDS website at: www.cdsintl.org/fromusa/alfa.htm

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Announcement

1st Joint IAEE/MEEA Session at ASSA Meeting

New Orleans, Louisiana, USA - January 4, 2008

Hilton Riverside Hotel, Meeting Room TBA – 2:30pm

Oil and Energy Issues

Presider: Serdar Sayan, TOBB University of Economics and Technology

Mohamed Abdelaziz, Georgios Chortareas and Andrea Cipollini, University of Essex - *Stock Prices, Exchange Rates, and Oil: Evidence from Oil Exporting Countries in the Middle East*

Shawkat Hammoudeh, Drexel University - *Do Oil-Rich GCC Countries Finance US Current Account Deficit?*

Joyce M. Dargay, University of Leeds, Dermot Gately, New York University, and Hillard G. Huntington, Stanford University - *Determinants of World Oil Demand, 1971-2006*

Peter Hartley and Ken Medlock, Department of Economics and James A. Baker III Institute for Public Policy, Rice University - *Empirical Evidence on the Operational Efficiency of National Oil Companies*

Nathan Balke, Southern Methodist University, Stephen Brown, Federal Reserve Bank of Dallas and Mine K. Yücel, Federal Reserve Bank of Dallas - *Globalization and Oil Prices: Demand versus Supply Shocks*

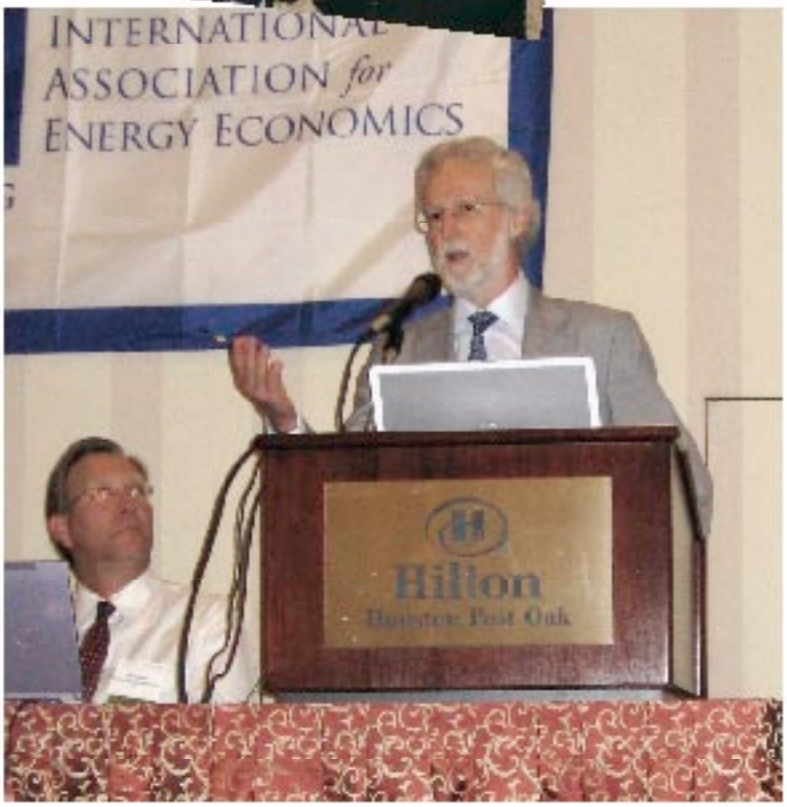
Discussants: **Riza Demirer**, Southern Illinois University-Edwardsville
Hadi Salehi Esfahani, University of Illinois at Urbana-Champaign
Gokhan Ozertan, Bogazici University
Ahmet Faruk Aysan, Bogazici University
Mehmet Serkan Tosun, University of Nevada, Reno

The meeting is part of the Allied Social Science Association meetings (ASSA).

For complete program information please visit http://www.vanderbilt.edu/AEA/Annual_Meeting/index.htm Also watch for the USAEE/IAEE Cocktail Party.

Scenes from the 27th USAEE/IAEE North American Conference

16–19 SEPTEMBER 2007 – Houston, Texas, USA



UNVEILING THE FUTURE OF ENERGY FRONTIERS

**** CALL FOR PAPERS ****

December 3-5, 2008 Sheraton Hotel, New Orleans, Louisiana, USA
28th USAEE/IAEE North American Conference

United States Association for Energy Economics International Association for Energy Economics
Louisiana Chapter, USAEE

Submission Deadline for Abstracts (with a short CV): July 11, 2008.

NORTH AMERICA has new **energy frontiers:** Ultra-deepwater and unconventional production of oil and gas, evolving global markets for LNG, and a "smarter" continental delivery system for electricity from clean coal, renewable, and nuclear generating systems, with efficiency ever a goal. Plenaries will address progress and challenge; concurrent sessions can amplify economics in implementation. **We particularly invite papers on the bullet points below.** Other topic ideas will also be considered; those interested in organizing sessions should propose topic and possible speakers to: Mina Dioun, Concurrent Session Chair (p) 512-473-3200, ext. 2549, (e) mina.dioun@lcra.org There will be workshops, public outreach and student recruitment. We'll ask:

What fresh opportunities exist in the offshore – production, LNG, wind, waves?
What's happening offshore in the Western Hemisphere – in the Arctic, Cuba, Mexico?
How will continental infrastructure have to be reconfigured to meet future needs?
What's beyond the hype? (Technical and cost perspectives on emerging technologies)
What are the technical, cost, and political challenges for Low Carbon Power – nuclear, coal, wind, and solar?
Will higher prices drive efficiency improvements, or are explicit policies needed?
How might geopolitics affect all of this?

Offshore Oil and Gas Issues
- Access and supply
- Unconventional resources
- Incentive taxation issues
- Royalty regimes
- Estimating and forecasting project costs

Infrastructure Development
- Conventional & unconventional resources of oil & gas; geopolitics; vulnerabilities
- Refining – capacity, technology
- LNG development: what's driving the train?
- Pipelines and high deliverability gas storage

Natural Gas Demand and Delivery
- Is industrial demand destruction inevitable?
- Is declining use-per-customer a problem?
- LDC infrastructure challenges of the next decade
- Effects of conservation & carbon reg on demand

Deepwater Exploration and Production
- Technological trends and costs
- Challenges in infrastructure development
- Environmental performance
- Comparisons of royalty regimes and incentives
- The role of national oil companies.

Electricity Infrastructure
- Is there a looming crisis in baseload generation?
- Nuclear power: Regulatory and incentive issues
- Risk sharing in new generation and transmission
- Smart grids and other IT applications
- Electricity market planning

Climate Change and Environmental Issues
- Measuring the challenge; developing world issues
- Costs of mitigation technologies and investments
- Cap-and-trade and carbon taxes: winners and losers

Energy Efficiency
- Supply side; demand side

Alternative Energy
- Regulatory, ratemaking & incentive issues
- Ratemaking issues in risk sharing
- Costs trends and forecasts in alternative energy
- RPS development: status, success and challenges
- Coal gasification
- Biofuels – amount, timing, delivery infrastructure
- Agricultural economics: tariffs and biofuels

Arctic & Canadian Energy Development
- Technical and economic potentials
- Who owns the rights to Arctic development?
- Infrastructure to link remote supply with demand
- Oil sands development: challenges and opportunities

Labor Requirements for Energy Industries
- The implications of an aging workforce
- Impacts: economics, demographics, societal trends
- Role of educational institutions
- Wages, benefits, compensation: just a pay issue?

Legal and Regulatory Considerations
- Siting energy facilities
- Increasing regulatory efficiency
- Managing legal uncertainties

See Call for Papers>

**** CALL FOR PAPERS ****

Abstract Submission Deadline: July 11, 2008

28th USAEE/IAEE North American Conference

December 3-5, 2008 Sheraton Hotel, New Orleans, Louisiana, USA

Abstracts for papers should be no longer than one to two pages, giving a concise overview of the topic to be covered. Abstracts should comprise of a brief (1) overview, (2) methods, (3) results, (4) conclusions, and (5) references. Please visit http://www.usaee.org/usaee2008/ to download a sample abstract template. NOTE: All abstracts must conform to the format structure outlined in sample abstract template. At least one author from an accepted paper must pay the registration fees and attend the conference to present the paper. The lead author submitting the abstract must provide complete contact details - mailing address, phone, fax, e-mail, etc. Authors will be notified by August 15 of their paper status. Authors whose abstracts are accepted will have until October 10, 2008, to submit their full papers for publication in the conference proceedings. While multiple submissions by individuals or groups of authors are welcome, the abstract selection process will seek to ensure as broad participation as possible: each speaker is to present only one paper in the conference. No author should submit more than one abstract as its single author. If multiple submissions are accepted, then a different co-author will be required to pay the reduced registration fee and present each paper. Otherwise, authors will be contacted and asked to drop one or more paper(s) for presentation.

Abstracts **must be submitted online** to http://usaee.org/USAEE2008/submissions.aspx Abstracts submitted by email will not be processed. Please use the online abstract submission form.

Students: Submit your paper for consideration of the USAEE Student Paper Awards (cash prizes plus waiver of conference registration fees). Students may also inquire about our scholarships for conference attendance. Visit http://www.usaee.org/USAEE2008/paperawards.html for full details.

Travel Documents: All international delegates to the 28th USAEE/IAEE North American Conference are urged to contact their respective consulate, embassy or travel agent regarding the necessity of obtaining a visa for entry into the U.S. If you need a letter of invitation to attend the conference, contact USAEE with an email request to usaee@usaee.org The Conference strongly suggests that you allow plenty of time for processing these documents.

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Abstract Submission Deadline: 6 June 2008

Authors will be notified by 4 July 2008 of their paper status. Authors whose abstracts are accepted will have to register and submit their full-length papers before 1 August 2008. Other related documents are available on **cbs.curtin.edu.au/aaee2008.**

Concurrent sessions will be organised from accepted abstracts. Abstracts should be submitted to the AAEE Conference Chair through email (as an attachment). Please submit abstracts of one to two pages in length, comprising: 1. Overview, 2. Methods, 3. Results, and 4. Conclusions. Papers with focus on Asian energy issues are highly welcome. Please also attach a short CV. Abstracts must be prepared in standard Microsoft Word format or Adobe Acrobat PDF format. The lead author submitting the abstract must provide complete contact details: mailing address, phone, fax, email. At least one author of an accepted paper must pay the registration fee and attend the conference.

While multiple submissions by individuals or groups of authors are welcome, the abstract selection process will seek to ensure as broad participation as possible: each speaker is to deliver only one presentation in the conference. If multiple submissions are accepted, then a different co-author will be required to pay the registration fee and present the paper.

Conference Themes and Topics

- The Changing Nature of LNG Trade
- Energy and Poverty in the Asia/Pacific Region
- Nuclear Power
- Carbon Capture and Sequestration
- Regional Oil Markets and Security of Supply
- Economic Viability of Renewable Energy Technologies
- Experience in Creating Markets for Emissions Trading
- Energy Nationalism

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Publications

Out of the Energy Labyrinth. David Howell and Carole Nakhle (2007). Price: £8.99. Contact: I.B. Tauris Publishers, Macmillan Distribution (MDL), Customer Services, Brunel Road, Houndmills, Basingstoke RG21 6XS, United Kingdom. Phone: 44-1256-302699. Fax: 44-1256-812521. Email: direct@macmillan.co.uk URL: www.ibtauris.com

Oil Sands Industry Update: Production Outlook and Supply Costs 2007-2027. David McColl (2007). Price: C$6500+GST. Contact: Canadian Energy Research Institute, 150, 3512-33 Street NW, Calgary AB, Canada T2L 2A6. Fax: 1-403-289-2344. Email: rrees@ceri.ca

Calendar

7-8 November 2007, Carbon Markets Africa at Cape Town, South Africa**.** Contact: Annie Ellis, Green Power Conferences. Phone: 0044 207 801 6333 Email: Info@greenpowerconferences.com URL: http://www.greenpowerconferences.com/carbonmarkets/index.html

7-10 November 2007, On the Road to Kyoto at Rimini, Italy. Contact: Conference Secretariat, RiminiFiera, Via Emilia 155, Rimini, 47900, Italy. Phone: 39-0541-744111. Fax: 39-0541-744200 Email: riminifiera@riminifiera.it URL: www.riminifiera.it

12-16 November 2007, Negotiating Oil & Gas Contracts **at London, UK**. Contact: Victoria Jolly, CWC School for Energy Limited. Phone: +44 20 7978 0074. Fax: +44 20 7978 0099 Email: vjolly@thecwcgroup.com URL: http://www.thecwcgroup.com/train_home.asp

12-13 November 2007, 2nd Americas SugarTrade & Ethanol at Miami, US. Contact: Ms. Linh Huynh, Event Marketing Executive, Centre for Management Technology (CMT), 80 Marine Parade Road, #13-02, Parkway Parade, Singapore, Singapore, 449269, Singapore. Phone: (65) 6346 9218. Fax: (65) 6345 5928 Email: linh@cmtsp.com.sg URL: www.cmtevents.com/?ev=071158&st=47

12-14 November 2007, 3rd Annual HR Shared Services Summit East at Omni Hotel at CNN Center* Atlanta, GA. Contact: Colin Strang, IQPC. Phone: 1-800-882-8684 Email: info@iqpc.com URL: www.iqpc.com/us/hrsharedservices

12-16 November 2007, Negotiating Oil & Gas Contracts at London, UK. Contact: Victoria Jolly, CWC School for Energy Limited Email: vjolly@thecwcgroup.com URL: http://www.thecwcgroup.com/train_home.asp

18-23 November 2007, Gas Liberalisation & Regulation Course part 2 at Moscow, Russia. Contact: Evanya Breuer, Manager Customer Relations, Drs., Energy Delta Institute, P.O. Box 11073, Laan Corpus den Hoorn 300, Groningen, Groningen, 9700 CB, The Netherlands. Phone: +31 50 524 83 12. Fax: +31 50 524 83 01 Email: breuer@energydelta.nl URL: www.energydelta.org

19-20 November 2007, HPHT Wells 2007 at Ardoe House Hotel, Aberdeen, Scotland. Contact: Swaantje Buss, Marketing Director, IQPC Ltd., 15-19 Britten Street, London, SW3 3QL, United Kingdom. Phone: +44 (0)20 7368 9300. Fax: +44 (0)20 7368 9301 Email: swaantje.buss@iqpc.co.uk URL: www.iqpc.com/uk/hpht

19-23 November 2007, Gas Markets Deregulation - Challenges & Opportunities at London, UK. Contact: Viviane Walker, Miss, CWC School for Energy, Regent Houst, Oyster Wharf, 16 - 18 Lombard Road, London, United Kingdom. Phone: +44 20 7978 0042. Fax: +44 20 7978 0099 Email: vwalker@thecwcgroup.com URL: http://www.thecwcgroup.com/train_detail_home.asp?TID=36

20-23 November 2007, Strategic use of IT in the Gas Industry at Groningen, The Netherlands. Contact: Evanya Breuer, Manager Customer Relations, Drs., Energy Delta Institute, P.O. Box 11073, Laan Corpus den Hoorn 300, Groningen, Groningen, 9700 CB, The Netherlands. Phone: +31 50 524 83 12. Fax: +31 50 524 83 01 Email: breuer@energydelta.nl URL: www.energydelta.org

21-22 November 2007, EMART ENERGY 2007 at Amsterdam, The netherlands. Contact: Sandra Langendijk, Conference manager, Synergy, The Netherlands. Phone: +31 346 590901. Fax: +31 346 590601 Email: sandra@synergy-events.com URL: www.synergy-events.com

21-22 November 2007, 3rd Annual European Energy Policy Conference 2007 - EU Energy Policy and Technology Challenges at Brussels. Contact: James Wilmott, Conference Contact, Epsilon Events Ltd, United Kingdom. Phone: 44-2920-894-757 Email: jwilmott@epsilonevents.com URL: www.euenergypolicy.com

25-29 November 2007, World Fiscal Systems & Contracts for Oil & Gas at Dusit Dubai, UAE. Contact: Viviane Walker, Miss, The CWC School for Energy, Regent Houst, Oyster Wharf, 16 - 18 Lombard Road, London, SW11 3RF, United Kingdom. Phone: +44 20 7978 0042. Fax: +44 20 7978 0099 Email: vwalker@thecwcgroup.com URL: http://www.thecwcgroup.com/train_detail_home.asp?TID=35

26-27 November 2007, Platts Creating Value in European Oil Storage at Budapest, Hungary. Contact: Daniel Lawson, Platts, 20 Canada Square, Canary Wharf, London, E14 5LH, Hungary. Phone: 0044-20-7176-6228 Email: daniel_lawson@platts.com URL: http://www.platts.com/Events/pc779

26-30 November 2007, Global LNG – The Complete Supply Chain at Oxford UK. Contact: Lesley Rigg, Sales Manager, The Oxford Princeton Programme, 1st Floor, 59 St Aldates, Oxford, OX1 1ST, United Kingdom. Phone: +44 (0) 1865 254 524. Fax: +44 (0) 1865 254 599 Email: lrigg@oxfordprinceton.com URL: http://www.oxfordprinceton.com/search/coursedetails.asp?ID=318&PLP=LNG1

26-30 November 2007, World Legal Systems & Contracts for Oil & Gas at The Chesterfield Mayfair, London, UK. Contact: Victoria Jolly, Miss, The CWC School for Energy, Regent Houst, Oyster Wharf, 16 - 18 Lombard Road, London, SW11 3RF, United Kingdom. Phone: +44 20 7978 0074. Fax: +44 20 7978 0099 Email: vjolly@thecwcgroup.com URL: http://www.thecwcgroup.com/train_detail_home.asp?TID=15

27-28 November 2007, 10th Vietnam/Mekong Oil, Gas & Power Summit at Hanoi, Vietnam. Contact: Ms. Linh Huynh, Event Marketing Executive, Centre for Management Technology (CMT), 80 Marine Parade Road, #13-02, Parkway Parade, Singapore, Singapore, 449269, Singapore. Phone: (65) 6346 9218. Fax: (65) 6345 5928 Email: linh@cmtsp.com.sg URL: www.cmtevents.com/?ev=071157&st=47

27-28 November 2007, 3rd Annual Women's Global Leadership Conference in Energy & Technology at Houston, TX. Contact: Conference Secretariat, Center for Energy

Economics, The University of Texas at Austin, 1801 Allen Parkway, Houston, TX, 77019, USA. Phone: 713-654-5400. Fax: 713-654-5405 URL: www.gulfpub.com/wglc

27-28 November 2007, Advanced Contract Risk Management in Upstream Oil & Gas Asia 2007 at Kuala Lumpur. Contact: Ulrike Potratz, Senior Marketing Manager, IQPC Worldwide Pte Ltd, Singapore. Phone: 65 6722 9388 Email: enquiry@iqpc.com.sg URL: www.iqpc.com/sg/CRM2007

27-30 November 2007, 4th European Congress on Economics and Management of Energy in Industry at Porto, Portugal. Contact: Albino Reis, Chairman, ECEMEI, Rua Gago Coutinho, 185-187, Rio Tinto, 4435-034, Portugal. Phone: 351-22-973-4624. Fax: 351-22-973-0746 Email: albino.reis@cenertec.pt URL: www.cenertec.pt/ecemei

27-28 November 2007, Brazil Trade & Export Finance Forum at Rio de Janeiro, Brazil. Contact: Conference Secretariat, Exporta Events, 3c Hillgate Place, London, SW12 9ER, United Kingdom. Phone: 44-0-20-8673-9666. Fax: 44-0-20-8673-8662 Email: sales@exportagroup.com URL: www.gtreview.com

28-29 November 2007, Renewable Energy in America: Phase II Policy Forum at Capitol Hill Club & Cannon Caucus Room, Cannon House Office Building. Contact: Tom Weirich, ACORE, PO Box 33518, Washington, DC, 20033-3518, USA. Phone: 202-393-0001 ext. 7582 Email: weirich@acore.org URL: www.acore.org

3-6 December 2007, Corrosion Management and Fitness for Service for Oil & Gas at Abu Dhabi National Exhibitions Company, Abu Dhabi, United Arab Emirates. Contact: Eileen, Administrator, IQPC - ME, United Arab Emirates. Phone: +971 364 2975. Fax: +971 4 363 1938 Email: enquiry@iqpc.ae URL: www.corrosionmanagementme.com

3-7 December 2007, New Era in Oil, Gas & Power Value Creation: Focus on Commercial Best Practices at The Federal Reserve Bank of Dallas - Houston Branch, Houston, TX. Contact: Conference Coordinator, University of Texas, Center for Energy Economics, Houston, TX, 77019, USA Email: energyecon@beg.utexas.edu URL: www.beg.utexas.edu/energyecon/new-era

4-5 December 2007, Wind & Hydro Summit 2007 at Manila, Philippines. Contact: Li Zhengxi, Mr., IQPC Worldwide, 61 Robinson Rd, Singapore, 068893, Singapore. Phone: 65 6722 9388. Fax: 65 6722 3804 Email: enquiry@iqpc.com.sg URL: www.iqpc.com/ph/windhydro

4-6 December 2007, Sparks & Flames 07 at Amsterdam. Contact: Kathryn Bond, Conference Director, Sparks & Flames 2007, ICBI, 8th Flr 29 Bressenden Place, London, SW1E 5DR, United Kingdom. Phone: 44-20-7017-7200. Fax: 44-20-7017-7807 Email: info@icbi.co.uk URL: www.icbi-sparksandflames.com

7-9 December 2007, Energy Expo 2007 at Ahmedabad, India. Contact: Mr. Abhijit Mukherjee, Deputy Director, Confederation of Indian Industry, 203-204 Sears Tower, Gulbai Tekra Near Panchvati, Ahmedabad, 380 006, India. Phone: 91-79-65215956. Fax: 91-79-26462878 Email: abhijit.mukherjee@ciionline.org URL: www.energyexpo.biz

11-11 December 2007, Reducing the Carbon Footprint in the Built Environment at Savoy Place, London, UK. Contact: Gemma Lyon, Event Executive, The Institution of Engineering and Technology, Michael Faraday House, Six Hills Way, Stevenage, Herts, United Kingdom. Phone: +44 (0) 1438 765647. Fax: +44 (0) 1438 765659 Email: eventsa3@theiet.org URL: http://www.theiet.org/events/2007/14027.cfm

10-11 January 2008, 4th Energy Technologies Forum 2008 at Mumbai, India. Contact: Sushil Jiwarajka, Chairman, FICCI-WRC, Plot No 33-B Krishnamai, Sir Pochkhanwala Rd Worli, Mumbai, 40030, India. Phone: 91-22-2496-8000. Fax: 91-22-2496-6631 URL: http://etf.ficci-wrc.com

16-19 January 2008, Central European Biomass Conference 2008 at Graz, Austria. Contact: Conference Secretariat, Osterreichischer Biomasse Verband, Franz Josefs Kai 13, Wien, A-1010, Austria. Phone: 43-1-533-0797-0. Fax: 43-1-533-0797-90 Email: office@biomasseverband.at URL: www.biomasseverband.at

22-24 January 2008, Distributech 2008 at Tampa, FL. Contact: Conference Secretariat, DistribuTECH Conference and Exhibition 2008, 1421 S Sheridan Rd, Tulsa, OK, 74112, USA URL: www.distributech.com

28-30 January 2008, The 4th Annual Procure to Pay Conference at TBC, USA. Contact: Colin Strang, IQPC. Phone: 1-800-882-8684 Email: info@iqpc.com URL: http://www.iqpc.com//us/procuretopay

28-30 January 2008, Clean Development Mechanism and Carbon Trading 2008 at Gallagher Estate, Johannesburg, South Africa. Contact: Chimwemwe Kainja, IQPC, Private Bag, X174, Bryanston, 2021, Johannesburg, South Africa. Phone: +27116695000. Fax: +27116695069 Email: chimwemwe.kainja@iqpc.co.za URL: http://www.iqpc.com/za/cdm

January 30, 2008 - February 1, 2008, Turning on Distributed Energy Resources Locally, Nationally and Globally at San Diego, CA. Contact: Rekha Gopal, Conference Coordinator, Kappa Creations, PO Box 2585, Fair Oaks, CA, 95628, USA. Phone: 916-863-5643 Email: kappacreations@gmail.com URL: www.cader.org

20-21 February 2008, Mining Forum at Jakarta, Indonesia. Contact: Cindy Cluny, Marketing Assistant, Marcus Evans, Malaysia. Phone: +00 603 2723 6745. Fax: +00 603 2723 6699 Email: CindyC@marcusevanskl.com URL: www.marcusevanskl.com

25-29 February 2008, Training Course: National Oil Companies - Opportunities & Challenges for NOCs, IOCs & Service Companies at London, UK. Contact: Viviane Walker, Miss, CWC School for Energy, Regent Houst, Oyster Wharf, 16 - 18 Lombard Road, London, SW11 3RF, United Kingdom. Phone: +44 20 7978 0042. Fax: +44 20 7978 0099 Email: vwalker@thecwcgroup.com URL: http://www.thecwcgroup.com/train_home.asp

1-8 March 2008, Washington International Renewable Energy Conference (WIREC 2008) at Washington Convention Center, Washington DC. Contact: William Armbruster. Phone: 202 647-1247 URL: www.wirec2008.org

2-7 March 2008, Natural Gas Strategy Course 9 part 1 at Groningen. Contact: Evanya Breuer, Manager Customer Relations, Drs, Energy Delta Institute, P.O. Box 11073, Laan Corpus den Hoorn 300, Groningen, Groningen, 9700 CB, Netherlands. Phone: +31 50 524 83 12. Fax: +31 50 524 83 01 Email: breuer@energydelta.nl URL: www.energydelta.org

4-6 March 2008, WIREC 2008 at Washington, DC. Contact: Conference Coordinator, American Renewables, Washington, DC, USA URL: www.americanrenewables.org

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IAEE NEWSLETTER

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