IAEE International Association for Energy Economics
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# Newsletter

Published by the Energy Economics Education Foundation, Inc.

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Third Quarter 2006

## President's Message

At the end of my previous message I invited you all to join us in Potsdam for the Association's 29th International Conference. For those of you who managed to make it there, and there were many of you, it was, I am sure you will agree, the opportunity to take part in a truly exceptional conference due to the quality of the speakers, the rich program of presentations and the numerous opportunities for networking that were offered. During the conference the energy scene was aptly compared to an energy labyrinth by one of our guest speakers, Lord Howell of Guildford, whose complete presentation can be found in this issue.

I feel that the discussions that took place at the conference went a long way to guiding us all through that maze. Indeed, the main pending questions in the energy sector were addressed openly in the plenary and dual-plenary sessions, speakers sometimes expressing quite strong views. The debate following the speeches or the informal exchanges during the breaks gave rise to further fruitful discussions. Moreover, the diversity of the subjects presented in the concurrent sessions meant that all participants were able to find topics corresponding to their centers of interest and some of the presentations, I was told, were real little gems.

Alongside the very full scientific program, participants were able to enjoy the charm of the historic town of Potsdam, especially the San Souci Palace, residence of Frederick the Great, King of Prussia. The river boat cruise was a great idea and a great success and I personally appreciated this opportunity to speak with many people, while enjoying the beautiful landscape. If this conference went off so well it was due to the perfect planning and effective management of Georg Erdmannn, Ulf Hansen and Steffen Saccharowitz who orchestrated the whole affair perfectly from beginning to end. How better to describe their efforts than by quoting Frederick the Great's friend and intellectual guide, Voltaire: "All was for the best in the best of all possible ways"? I thank them once again, personally and on behalf of the Association, for the tremendous effort they put into organizing such a successful event.

The IAEE conferences are also the opportunity to acknowledge contributions that have been made to energy economics through awards, given generally to members of the Association. This year the IAEE Awards Committee, presided over by Arnie Baker, has decided to award the "Outstanding Contribution to the Profession" to Bill Hogan of the Kennedy School of Government, Harvard University and the "IAEE Journalism Award" to Vijay Vaitheeswaran, of *The Economist* magazine. These awards will be presented in Ann Arbor in September 2006, at the next USAEE conference. This will be the opportunity to remind everyone of the extent of their respective merits. At the Potsdam conference, two awards were given. The IAEE wished to thank Edgardo Curcio for his commitment and dedication to the IAEE over the years by presenting him with the well deserved "Outstanding Contribution to the IAEE" award. Edgardo was at the origin

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## Editor's Notes

This issue of the IAEE Newsletter includes several keynote speeches from the Potsdam Conference as well as a summary of the meeting by Georg Erdmann.

Lord David Howell, former UK Secretary of State for Energy posits that there is no such thing as full energy security and that the best kind of security, as far as it can be obtained, comes from diversity and the ability to switch be-

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INTERNATIONAL ASSOCIATION for ENERGY ECONOMICS

# 30th IAEE INTERNATIONAL CONFERENCE

*Hosted by:*
Oceania Affiliate of the IAEE and the School of Economics and Finance, Victoria University of Wellington, New Zealand

## From Restructuring to Sustainability: Energy Policies for the 21st Century

**18-21 February 2007**
at Pipitea Campus, Victoria University, Wellington, New Zealand

### Conference Themes and Topics

**Taking Stock:**
**Two Decades of Deregulation and Restructuring in Energy Markets**
- Country case studies on restructuring experience
- New market experiments in Africa and Latin America
- Comparative studies of reform outcomes
- Is a systemic approach to institutional design feasible?
- Obstacles to uptake of demand-side and decentralised-energy opportunities in restructured markets
- Investment coordination and infrastructure adequacy
- Electricity and gas market design issues

**Looking Forward: Energy, Poverty, and Sustainable Development**
- Energy poverty: evidence and policy issues
- Economics of decentralised and renewable energy technologies
- Electricity access for the poor in Africa, Asia, Latin America
- Making the power sector sustainable in developing economies
- Cross-border energy trade and the poor
- Consequences of rapid growth in China and India
- Energy and development in small islands in the Pacific and elsewhere

**New Market Drivers:**
**Emerging Global Markets for Carbon and LNG**
- Cross-border energy trade and arbitrage in LNG and carbon
- Growth and structure of the global LNG market
- New transportation technologies for LNG and bulk CNG
- Price relativities between oil and LNG
- New market instruments for trading GHG abatement opportunities
- Recent developments in the global institutional backdrop for GHG abatement efforts
- Climate-change policy responses in New Zealand, Australia, and elsewhere

**Old Habits Die Hard: The Future of Oil and Coal**
- Geopolitics, oil prices, and energy security
- Is a nuclear comeback likely?
- The economics of emerging technologies for carbon capture and storage
- Alternative liquid fuels to replace oil
- New transport fuels and technologies

### Keynote Plenary Session Themes

- **The World Energy and Environmental Outlook at the Commencement of Kyoto I**
- **Energy Market Design: Lessons and Issues from Around the World**
- **Network Expansion, Infrastructure Adequacy and Crisis Management in Decentralised Electricity and Gas Markets**
- **Energy, Poverty and Sustainable Development**
- **The Global Market for LNG: Technologies, Arbitrage Opportunities, and Consequences for National and Regional Energy Markets**
- **The Future of Decentralised Energy Systems**
- **European, New Zealand and Australian Energy and Environmental Perspectives**

### CALL FOR PAPERS

**Abstract Submission Deadline: 23 October 2006 (Include a short CV when submitting your abstract)**

We are pleased to announce the Call for Papers for the 30th IAEE Annual International Conference entitled 'From Restructuring to Sustainability: Energy Policies for the 21st Century', scheduled for 18-21 February 2007 at Victoria University of Wellington, New Zealand. Please mark your calendar for this important conference. There will be at least six major plenary sessions, and at least 24 concurrent sessions.

Papers, and proposals to organise concurrent sessions comprising 4-5 papers each, are invited under the topic headings listed above (NB all invited concurrent session speakers are required to pay speaker registration fees). In addition, abstract submissions on any other topics of likely interest to IAEE members are welcome, and additional sessions may be organised.

### General Organising Committee

**Geoff Bertram:** General Conference Chairman, School of Economics and Finance, Victoria University of Wellington; **John Small:** Deputy Conference Chair, Covec, Auckland, NZ; **David Smol:** Deputy Secretary, Ministry for Economic Development, Wellington NZ; **Ian Dempster:** Gas Industry Company, Wellington, NZ; **Sue Freear:** School of Economics and Finance, Victoria University of Wellington; **Stephen Gale:** Castalia, Wellington, NZ; **Bill Heaps:** Stratagen, Wellington, NZ; **Pattrick Smellie:** Contact Energy, NZ; **Frank Scrimgeour:** University of Waikato, NZ; **Jonathan Lermit**; **Dan Twaddle**.

IAEE BEST STUDENT PAPER AWARD: US $1,000 cash prize plus waiver of conference registration fees. If interested, please contact IAEE headquarters for detailed applications/guidelines.

STUDENT PARTICIPANTS: Please inquire about scholarships for conference attendance to **iaee@iaee.org**

All abstracts are to be submitted online on the conference website **www.vuw.ac.nz/iaee07**

At least one author from an accepted paper must pay the registration fee 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 November 10, 2006, of their paper status. Authors whose abstracts are accepted will have until 29 January 2007, to return their papers for publication in the conference proceedings. While multiple submissions by individuals or groups of authors are welcome, the abstract selection process will seek to ensure as broad participation as possible. 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.

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

of the creation of the Italian Affiliate, and has been regularly reelected President. He has been responsible for two IAEE conferences in Rome (the 2nd European Conference in 1994 and the 22nd IAEE Conference in 1999) and he is at present the Organization Committee Chairman for the 9th European IAEE Conference to be held in Florence in June 2007. For the second award, I had the honor to deliver the "IAEE Past-President's" award to Arnie Baker for his involvement in the IAEE for so many years and his remarkable work as IAEE president. It was a real pleasure for me as I have had the chance to work closely with him for a long time which was a particularly enriching experience for me as he is so knowledgeable.

On the publications scene, the IAEE gives two awards each year: the "Campbell Watkins *The Energy Journal* Best Paper" and the IAEE "Student Best Paper". The first award was presented to Christian von Hirschhausen, Berit Meinhart and Ferdinand Pavel for their paper on "Transporting Russian Gas to Western Europe: a simulation analysis". I was told that this paper, for various reasons, took rather a long time to write but that it has finally turned out to be ready for publication at a particularly relevant time, as Russian gas is now in the forefront of the European energy scene. The second award was given to Ms Fan Zhang, a PhD student at the Kennedy School of Government, Harvard University for her article "Does Electricity Restructuring Work? Evidence from the U.S. Nuclear Energy Industry".

Concerning other news of the Association, I am happy to announce the very rapid birth of a new affiliate. At the beginning of 2006, Victor Ng informed the IAEE of his intention to create an affiliate in Singapore. In record time, the by-laws were drawn up, the positions of the officers (President, Vice President, Treasurer, Secretary) filled and an application to the IAEE for Affiliate status recognition submitted. The IAEE Council, then approved, in a virtual vote, in May 2006 the establishment of the Singapore Association for Energy Economics. As President of the IAEE and in the name of the Council, I wish this new affiliate a long and active life helping its members to better understand and analyze energy issues. I hope that others will follow in their footsteps with the creation of other affiliates in Asia, the Middle-East and in any other parts of the world where the need is felt.

As a conclusion, I would like to refer to a well-worn expression used on several occasions during the Potsdam conference: the "3 Es", the magic triangle that symbolizes the challenges to be met in the energy world, - Energy security, energy and the Economy, energy and the Environment. IAEE is really fulfilling its role in addressing all aspects of energy economics, since greater emphasis was given to Energy security at Potsdam and the other two "Es" will be widely covered, among other topics, at the forthcoming IAEE conferences, as shown by their titles: "Energy in a World of Changing Costs and Technology" will be the subject of the USAEE conference in Ann Arbor this September (24-27th) and "From Restructuring to Sustainability: Energy Policies for the 21st Century" will be the theme of the 30th IAEE International Conference in Wellington (18-21 February 2007). So there is lots in the air with plenty of things to look forward to and I hope to see as many of you as possible at these two milestone events of our association.

In the meantime, I wish you all a happy holiday season.

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

tween a variety of energy sources. He further notes that the information revolution has brought a vastly greater degree of interconnectedness to the energy field. This intensifies the volatility of energy systems. He foresees difficult times ahead, an energy labyrinth, though sketches an exit from it eventually.

Matthias Platzeck, in the opening address at the Potsdam Conference, discusses the energy situation in the State of Brandenburg, noting the importance of the brown coal industry to the State and to Germany. He also notes the importance of renewable energies.

Vijay Vaitheeswaran argues that there are three powerful trends going on that promise to rewrite the rules of the energy game: the global move toward the liberalization of energy markets, the growing popular appeal of environmentalism and the recent surge of technological innovation in areas such as hydrogen fuel cells. Together they could lead to an energy system that meets the needs and desires of future generations while also tackling serious problems like global warming and air pollution.

Mamdouh Salameh comments that with the continued weakening of the U.S. dollar since 2001 and with OPEC's eleven members heavily reliant on oil revenues, OPEC members should seriously consider restructuring their oil-pricing policy by switching from the U.S. dollar to a basket of currencies made up of three equally-weighted currencies, namely the dollar, yen and euro. This will safeguard their oil revenues, stabilize the oil prices and also provide a better risk spread.

Guy Maisonnier notes that on the European continent, the price of natural gas is still directly linked to the oil market. However, under deregulation, as the importance of hubs where prices are quoted increases, there is good reason to think that a gas price will emerge and become the reference price for long-term contracts.

Phillia Restiani, one of IAEE's current student advisors, discusses the synergies between climate change adaptation and mitigation measures, noting that both are responses to climate change policies.

*DLW*

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# Energy in a World of Changing Costs and Technologies

September 24-27, 2006 Ypsilanti Marriott at Eagle Crest Ann Arbor, Michigan – USA

26th USAEE/IAEE North American Conference

United States Association for Energy Economics International Association for Energy Economics

USAEE President: Shirley Neff
Vice President for Conferences: Gürcan Gülen
General Conference Chair: David Nissen Program Co-Chairs: Lynne Kiesling & Tom O'Donnell
Concurrent Session Chair: Wumi Iledare

## Conference Structure

This year we have chosen plenary session themes that we believe reflect the key policy challenges and uncertainties for North America in the global energy economy. These sessions include:

| Transportation & Fuels | Electricity & Fuels |
|---|---|
| **Transportation - Vehicle technologies**<br>• Evolution of technology<br>• Hybrids, diesel, fuel cells<br>• Company strategies and outlook<br>• Fuel economy – market or regulation driven | **Electricity investment, reliability, and environmental effects**<br>• Market design policy evolution in the USA<br>• Capacity markets? – reliability, financing<br>• Europe -- what do "national champions" mean for efficient competition?<br>• Developing markets? -- lessons of liberalization and privatization |
| **Future Trends in Transportation**<br>• Urban transportation policies<br>• Developing and emerging market strategies<br>• Unconventional supplies and advanced fuels | **Regulatory vs. market economics: which really maximizes electric utility consumer benefits?**<br>• Market pricing allocates food, clothing & shelter – why not electricity?<br>• Do technical factors in energy utility services defy competitive market economics?<br>• Is unbundling "wires" from "energy" necessary? Is it sufficient? Is there a "natural monopoly" on the "wires?"<br>• Two fundamentally different ways of setting prices, supply & demand – how do they compare from the electric ratepayer's perspective? |
| **Oil market - security and reliability**<br>• OPEC capacity and price targeting<br>• Strategic and commercial policy for reliability<br>• Emerging roles of China and India<br>• National Oil Company strategies<br>• Impact of EITI and Local Content policies | **Crunch time for North American natural gas: 2007 - 2012**<br>• North American markets<br>• Arctic natural gas<br>• LNG infrastructure<br>• Evolution of global gas markets |
| **Energy, Economic Development & Energy Poverty**<br>• Transition from traditional biomass to modern energy services: policies, technologies<br>• Urban versus rural energy poverty alleviation<br>• Centralized, large-scale projects versus decentralized, micro-scale, locally-owned projects<br>• Investment needs: development aid, project financing, micro financing, cooperatives<br>• Energy sector governance and building local capacity: transparency, institutions, public education and participation | |
| **Science and Technology Policy**<br>• Basic research and commercialization strategies for vehicle technologies, electricity generation, and carbon sequestration<br>• S&T policy to realize "learning by doing" and diffusion externalities | |

Register for this informative conference by visiting our website at: http://www.usaee.org/usaee2006/

For questions please contact:
David Williams, Executive Director, USAEE/IAEE, 28790 Chagrin Blvd., Suite 350, Cleveland, OH 44122 USA
Phone: 216-464-2785 / Fax: 216-464-2768 / E-mail: usaee@usaee.org

**Students:** Students please inquire about our scholarship program for conference attendance. Visit http://www.usaee.org/USAEE2006/students.html for full details.

**Accommodations:** The Ypsilanti Marriott at Eagle Crest is our conference venue. The setting is resort-like overlooking Ford Lake. This resort offers an 18-hole championship golf course. Rates are $139 for a Single/Double Room. Details about accommodations and transportation can be found on the conference website at www.usaee.org/USAEE2006/accommodations.html

**Travel Documents:** All international delegates to the 26th USAEE/IAEE North American Conference are urged to contact their consulate, embassy or travel agent regarding the necessity of obtaining a visa for entry into the U.S. If you need a letter of invitation to attend the conference, contact USAEE with an email request to usaee@usaee.org The Conference strongly suggests that you allow plenty of time for processing these documents.

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

## The Global Energy Scene

***By Rt. Hon. Lord David Howell of Guildford****

In surveying the global energy security scene I want to begin with two key concerns – the imperative need for variety and flexibility in energy sources and the huge dangers of over-dependence on single energy sources.

Indeed one could say that they are two sides of the same coin. Let me start with two examples from the 20th Century and three from this new century which are now confronting us in a highly demanding way.

In 1913 Winston Churchill ordered the then gigantic British fleet to switch from coal to oil. Commenting on sources for the new fuel he said 'safety and certainty in oil lie in variety and variety alone'.

Over sixty years later, in 1974, the entire British economy was brought almost to its knees by over-dependence on domestic coal for its electricity supply.

Apparent self-sufficiency in domestic resources turned into disastrous energy insecurity as the miners withdrew their labour and the power stations came to a halt. For a time electricity to both industry and home consumers had to be rationed on a three day a week basis. Only the almost uncanny ability of British officialdom to cope with such a situation, drawing on distant memories of managing wartime shortages, saved Britain from total catastrophe.

The only immediate way forward which offered itself was to seek more diversity and more flexibility in energy supplies, and very much more innovation and efficiency in energy use, and this we set about doing as rapidly as we could, although it was not nearly fast enough and many of the vital incentives for innovation were lacking.

**Are We Repeating Past Mistakes?**

Switch to 2006. Where are the obvious global points of over-dependency? Take three: the dangerous over-dependence of the European Union on piped gas from the Russian Federation; the heavy dependence of France on nuclear electricity from its enormous system of Pressurised Water Reactors; the dependence of the entire world on oil, especially the USA, with oil imports higher than ever, (now around 70 percent), and also the ever-rising dependence of the rising Asian powers.

All three "dependencies", whether of fuel type or source, spell extreme danger and less energy security, not more. This helps explain why even before the 1980s Japan, for example, had begun to move with the utmost expedition away from dependence on oil, dependence on Middle Eastern oil and dependence on one source for the alternative of liquid natural gas or frozen gas. When the 1980s oil price explosion occurred it was Japan that had the greater flexibility and was able to handle the crisis with the greatest dexterity, despite being a country without any natural sources of its own at all (except a small amount of coal). It is also important to note that Japan persisted with vigorous energy savings and efficiency innovations even when the great oil price collapse of 1986 occurred, when many other societies and industries simply gave up on energy saving and went thankfully back to cheap oil.

Now, as we tumble into the next energy crisis, the European Union is plainly committing a very similar 'over-dependency' error. Collectively the EU states have allowed themselves to drift into extremely precarious over-dependence on supplies of gas from the Russian pipeline empire. I recall Helmut Scmidt long ago re-assuring Margaret Thatcher on this point. 'My dear Margaret' he said, slightly patronisingly and taking his pipe out of his mouth, 'the supplier needs the customer as much as the customer needs the supplier. The Russians have always been reliable suppliers of gas. They will never let us down'.

Events have proved otherwise. It is not just a question of unsettled politics in the Russian Federation. I think that aspect could be overrated. But it is inevitable that the huge Russian monopoly, Gazprom, behaves as monopolies do, not necessarily as states and government do – but simply looking for the best customers and seeing little virtue or profit in maintaining customer loyalty in any particular market. Hence the repeated observations of Gazprom officials that if they cannot get their way in supply patterns for Western Europe they have other customers they can supply in China and elsewhere in Asia. In the blunt but not unrealistic words of Viktor Kristenko, the Russian Energy Minister the other day 'If dependency is not good, then one needs to move out of this dependency'. Exactly, but is it too late?

Two propositions sum up the situation: The first is that there is no such thing as full energy security. The vision of totally established long-term regular energy supplies, guaranteeing steady, non-fluctuating and utterly reliable supplies of electricity in the electric societies of the future, is a mirage. No such pattern can last. If the attempt is made to establish it, it fails to endure. Events and transformations will always intervene and always undermine any such reassuring systems.

The second proposition is the one already made above. The best kind of security, in as far as it can ever be attained, comes from diversity and the ability to switch between a very wide variety of sources of primary energy and of secondary energy. This proposition applies at the national level, at the industrial level, the business level, at the public facilities level and at the home and domestic level. In every case there has to be variety and there have to be numerous fall-backs. The glory of the electronic age is that it makes the complex management of these patterns of variety infinitely more obtainable and more profitable.

**Japanese Lessons; European Follies**

The Japanese example is interesting. At the macro level Japan's energy planners, having learnt the lessons of the oil shocks of the 1970s and l980s about the essential need for

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* Lord Howell has been President of the BIEE since 2003. He was a member of Parliament, 1966 to 1997, Secretary of State for Energy, 1979-1981 and for Transport in 1981-1983. He has been the House of Lords Opposition spokesman on foreign affairs since 2000. He was one of the Keynote speakers at the opening of the 29th IAEE International Conference, 7-10 June in Potsdam, Ger-

diversity, are applying the same techniques to the LNG market. Long-term contracts interest them less and less, the more that LNG can be traded like oil in the spot market. What is required is supreme agility at the customer or consumer end to ensure that the full range of resources and possible origins is being constantly reviewed and played upon almost like a musical instrument to ensure overall reliability. Here is a good example of diversity providing security in contrast to over-dependence on single sources providing grotesque insecurity and danger.

Turn back now to the European Union today. The European Commission in Brussels is responding to a classical dangerous position of over-dependence on a single energy source – namely the Russian Federation and more specifically the gas monopoly, Gazprom. The Brussels' instinct is predictable. It is to try and meet the Russian monopoly with a European monopsony or single buyer, and to develop what it calls a common energy policy as far as that is possible – which is in practice not very far at all. The theory is that the single buyer would be able to carry more clout in dealing with the Russian monopoly supplier and somehow enforce Russian liberalisation and opening of Gazprom pipelines to others.

But the practice falls flat on its face. Not only do the different Member States of the European Union, regard secure energy supplies for their citizens as a priority national matter. It turns out that the Russian monopoly has other buyers to turn to, as Gazprom officials have made brutally clear. If the Europeans are not going to behave as good customers and pay the prices asked under the conditions required, then other customers in Asia and other markets in Asia can be supplied instead. In short, the search for energy security in Western Europe has led to frightening insecurity and the prospect the entire Continental system may have reduced pressure or interruption.

Incidentally, this ought not to be too much of a problem for the UK, in contrast to the rest of Europe. The UK now has full market liberalization, it has 7 percent of the world's coal reserves, it has access to almost unlimited gas from Norway and never forget that the UKCS still has plentiful gas and oil resources.

**Dangers of Too Much Integration**

Even so, like every other oil and gas consuming country the UK cannot be immune from the shocks to a highly integrated world system and it still, lacks adequate gas storage.

This brings us to a further key issue. Across the imperative need for diversity of energy sources at all levels in the energy chain there cuts a new and even more complex trend which works the opposite way and makes the need to plan for fuel diversity ever greater. This is the fact that the informational revolution, just as it has brought the dispersal of power, control and opportunity has also brought a vastly greater degree of interconnectedness – and this applies overwhelmingly in the energy field.

Our markets are now so obviously interconnected that one disaster, sabotage event, revolution or accident in any one corner of the oil supply network has an immediate effect – in the case of oil usually through a sharp price spike. In gas the same applies, and in frozen gas as well. It needs one accident or terrorist raid in one part of the pipeline network to send prices soaring. Diversity protects the flow but it does not protect the price.

The sheer rapidity of information has transformed everything. First the speed of information vastly increases market information and market response which in turn intensifies volatility in reaction to every occurrence. Second because markets are infinitely more open and informed the entire planetary system is run on tighter margins and this applies particularly in the energy field. Thus the supply and demand balance is permanently tighter than in the pre-information age and the vulnerability to upsets anywhere in the network vastly greater, despite increased strategic stocks. In these circumstances a considerably greater diversity and variety of supply sources would anyway be required to escape the amplified vulnerabilities of such a highly networked system. This would be so even without the terrorist threat which makes all integrated systems vulnerable at their key points.

**Searching for Security in Vain**

The same thinking is clearly now driving the Chinese as they search for more and more oil imports to feed their super-growth economy. At the outset, as oil import needs rose, Beijing thought mainly in terms of very long contracts and securing access to oil through heavy and detailed agreements with foreign governments, often with the additional motive of irritating the United States of America. In this they had some success "tying up" Sudanese oil supplies, expanding links with Iran, entering into contracts with Venezuela and courting state oil companies in Nigeria, Angola and many other countries.

But it is dawning on the Chinese that this pattern of contracts is not the guarantee of security of supply they might have hoped for. Even China cannot be immune from the laws of diversity and the dangers of over-dependence. In a sellers' market, when oil producers need customers, it all works very well. But in times of crisis and shortage, and in times of political upheaval, even contracts and commercial law go to the wall. Despite all their contracts and long-term arrangements and agreements to take oil at certain prices, the Chinese will find the moment comes that they are as vulnerable as everybody else to the vagaries of world oil markets and the disruptions that can be imposed anywhere in the oil network by upheaval and revolution, whether in the Middle East or elsewhere.

Like Japan, China's best hope for energy security in the future lies in diversity – diversity between suppliers of fossil fuels, including their own internal coal suppliers, diversity of types of primary energy sources, diversity within their own industrial structures within their cities, towns and homes, and above all, highly profitable new technologies for reduced conventional oil dependence. This is where real security, in as far as it can be obtained, really lies. Chinese leaders, led by President Hu Jintao, may zig-zag across the Middle East

and Africa, as well as, of course, Latin America, trying to tie up access to oil, but in the end they will face the same reality. The only security is diversity, combined with market-driven efficiency.

Just now, today, the outlook is not at all good. The Chinese and the Indians have arrived. Gas guzzlers prowl Chelsea. American energy policy is frankly chaotic. If we look to President Bush we get such gems as the statement that 'If we do not succeed we run the risk of failure!' – not a very inspiring lead!

Meanwhile, the Middle East is in worse turmoil than ever. Iraq output has collapsed. Iran is highly unstable – again. Terrorism has threatened an increasingly vulnerable and integrated world energy supply system, for example at Ab Qaiq and a dozen other key places. The Saudis may have overstated their cheapest remaining recoverable reserves. Oil refineries are mis-matched, out of date and need replacing. The North Sea province is running down and at the same time we are pumping more carbon into the atmosphere than ever before.

**No Simplicities in a New Situation**

In short, we are confronted with a deeply serious situation requiring new policies and a new approach. These policies must be rooted in realism not swayed by current fads or theories. The energy conditions have undoubtedly changed fundamentally and the old market approach which was appropriate and right at the time, will no longer do on its own, as we will explain. But nor will the green simplicities. Certainly fossil-based oil can be downgraded in the energy hierarchy and removed from its strategic throne, but there is no way in which it will cease to be an important component of the energy supply balance, as will other fossil fuels in the future, including slightly cleaner gas, very much cleaner frozen gas and a coal treated for clean burning.

The cost ruler must also be put once again across nuclear power generation – to see whether it is really, truly, worth it – and whether anyone other than a government flush with funds (of which there are very few) can ever dare to invest in nuclear power when the pay-back time is so long, the planning and other costs so uncertain, the likelihood of profit so remote. Above all, innovative technologies and new electronic control systems can be combined with plain commonsense about energy use to get far more out of a unit of energy purchased, and to do so far more cheaply, thanks to business innovation and restless, profit-seeking enterprise, than governments and central planners and politicians seem able to grasp.

The transition can and must be driven by economics, and by ever better business models. We can make higher mileage hybrid cars the norm (and the Japanese car makers and their Chinese subsidiaries are already tooling up for a massive expansion of this product). And the huge remaining reserves of coal, both in Northern Europe, in America, in Australasia and in China can be gasified, liquefied and otherwise treated to achieve a cleaner and cleaner carbon-free burn, although costs have yet to be brought down to competitive levels. Plant-derived carbohydrates also have their place, although real costs (and I do not mean costs softened with huge farming subsidies) have yet to be brought down to competitive levels.

But the new emerging pathway for energy is going to be much more complicated than any of this. None of these policy ambitions is going to deliver energy security at the level people have hitherto expected and governments have promised.

Giant integrated energy systems, which is what the closing decades of the 20th century have bequeathed to us, are never going to be fully secure again. Small, micro-generation methods are going to help at the margins but the impact of these will unfold slowly.

So ahead there are going to be accidents, revolutions and piratical acts of government, all of which spell power cuts, blackouts, supply interruptions, disturbing price spikes and increasing climatic extremes, which may or may not be related to the man-made carbon gas emissions of the last century – and which anyway we are told on the highest authority (Sir David King, the UK Government's chief scientific adviser) it is too late to do anything about in this century, and that the benefits will be in time for our great grandchildren.

This is the energy labyrinth. Can we escape it? The answer is certainly, "yes". As succeeding chapters will show many of the fears about the energy future are misplaced notably, for instance, that the world is running out of oil and gas.

**Escape from the Labyrinth**

So where do we start? The idealists of today see a fossil-free, green energy future emerging somehow out of the mists and confusion of the short-term and medium-term landscape. But the realist has to start from certain and basic awkward realities. Viz:

1. We know that, like it or not, and whatever savings are achieved through increased efficiency, energy consumption will increase hugely over the next twenty years. The most conservative estimates confirm a rocketing demand across the planet for more electricity in the ever more electrified societies of the advanced world, plus huge energy demand increases in the awakening giants, China and India, and the rest of the developing world. So regardless of anybody's policy and regardless of government taxes much more energy will be needed and much more energy will be consumed.
2. We know that, like it or not, oil and gas and coal, the old fossil fuel trio, will still continue to play a big role in the energy supply mix.
3. We know that a new set of policy objectives are needed but that these will have to be supported and enabled by radical changes of attitude inside the minds of every home owner and every manager responsible for energy consuming operations. The energy savings are there but there are no government measures or top down policies that can achieve them.
4. We know that the huge potential growth of the BRIC economies (Brazil, Russia, India, China) simply cannot be based on the same sort of per capita consumption of energy which the citizens of the United States or Europe consider normal and their rightful expectation. So the

really big changes of policy direction will have to take place for the most part in the poorer societies which are struggling to develop. So even in the richer societies politicians will not dare to alienate voters by making some of the changes necessary until events are staring them in the face and shocks are compelling them to act.

When there are increasingly frequent power cuts, when petrol queues form, when gas supplies are interrupted to homes as well as to industry, when all kinds of shortages develop through interruptions to the transport system, then we can expect to see the necessary ripples of hysteria through the media which will enable politicians to move.

When these things happen, when the newspaper headlines shriek, the slow-witted commentators begin to catch up, the ponderous government policy-making machines also catch up and the politicians rush about like headless chickens making hopelessly short-term suggestions and calling for remedies which should have been applied long ago and for which it is now far too late – when this becomes the chaotic landscape, that will be the time to get a hearing for a way forward, out of the labyrinth, which will be attainable, practical, cheap, politically possible, intelligible, appealing and obvious to most people.

The labyrinth is dark. Arguments go round and round and keep coming up against dead ends. But there is an exit route to be found turning round unlikely corners, and a sunnier landscape ahead then to be traversed. A greater degree of energy reliability and security, although never complete, is an attainable goal in the great global electric society of the future – a world populated by 2030 by eight or nine billion people. No slick policy "answer" can deliver this. Crises will always occur in face of which extreme flexibility and constant attention to diversity of sources, methods and technologies are the only workable response.

A reasonable pattern of arrangements against severe disruption and energy breakdown can be manoeuvred and crafted into shape. Energy in the form of light and warmth and industrial and agricultural power can be delivered at reasonable cost to the cold, the starving, the hungry and those locked in the cycle of poverty and deprivation. It will not all be perfect and smooth. The idealist is not our guide and must not be allowed to lead us down false paths. But nor should the sceptic be our guide either. The social perfectionism of the left cannot be attained, but nor can the scepticism of the right be allowed to prevail, nor yet the 'oilman's answer', which is simply to produce more oil. The best qualities from either side must be drawn to the centre and leavened by moderation and realism. Thus armed we can feel our way through the dark labyrinth and reach out to the sunnier land that lies beyond the exit.

## Robert N. McRae (1948-2006)

Bob McCrae was a native of Vancouver, British Columbia, where he attended UBC, obtaining a B.Sc. in honours mathematics in 1970, an M.Sc. in computer science in 1972, and a Ph.D in economics in 1977. His dissertation, completed under the supervision of John Helliwell, was entitled "A Quantitative Analysis of Policies Affecting Canadian Trade in Crude Oil and Natural Gas."

Bob joined the Economics Department of the University of Calgary in 1977 as an assistant professor but quickly rose to associate and then full professor. His area of specialization was energy economics, with a focus on estimating systems of fuel consumption equations and analyzing the implications of energy policy initiatives. In his early career, he concentrated on Canadian energy policy; but, later, he became known internationally for his work on Asia and Latin America - thus combining his love of travel with his work. Also, he was co-author of one of the first and most respected statistical packages for personal computers, SHAZAM.

His many contributions to Canadian energy analysis are best reflected in his 1989 Canadian Tax Foundation book (with John Helliwell, Mary MacGregor, and Andre Plourde) entitled "Oil and Gas in Canada: The Effects of Domestic Policies and World Events."

Through his work on energy economics, Bob was actively involved in the Canadian Energy Research Institute, the International Association for Energy Economics, the Canadian Economics Association (where he was a member of the Executive Council from 1994 to 1997), and OLADE (the Latin American Energy Organization — Organización Latinoamericana de Energía).

Despite his ongoing involvement in research, Bob never forgot the other two roles of the well-rounded academic: administration and teaching. As an administrator, he was best known for taking on the position of Head of the Economics Department from 1991-1996, during a period that was particularly crucial for the development of the department as it exists today. But he was also highly respected throughout the university for his participation in many other high-level university bodies – most importantly General Faculties Council.

He will also be remembered with the greatest respect by his students. He was an enthusiastic, knowledgeable, and sympathetic instructor, both at the graduate and undergraduate levels, and was one of the department's busiest supervisors of graduate theses.

Bob is survived by his wife, Ann, and his children, Scott and Kate. He will be sadly missed by all who knew him.

*Christopher J. Bruce and John Helliwell*

BIEE
British Institute of
Energy Economics

UKERC

**BIEE Academic Conference in Association with UK Energy Research Centre**

**20-21 September 2006, St John's College Oxford**

## 6th BIEE Academic Conference

in association with

## UK Energy Research Centre

# Energy Policies in a Global Context

St John's College Oxford, England
20-21 September 2006

On behalf of the British Institute of Energy Economics and UK Energy Research Centre, it is our pleasure to announce the 2006 Academic Conference ***Energy Policies in a Global Context***, which will be held at St. John's College in Oxford on the 20-21 September 2006.

The UK is in a time of flux while the Energy Review, the Climate Change Review and the Review of the Economics of Climate Change all take place. Rather than second guess the outcomes of these reviews, the BIEE 6th annual conference intends to concentrate on global issues which impact upon domestic and international energy policies.

This event brings participants together with senior level speakers from energy industries, academia and policy makers from the UK, Europe and the US, including **Alistair Darling, Secretary of State, Department of Trade & Industry, Jonathon Porritt, Dr Herman Franssen, Prof Chris Allsopp, Dr Beatriz Yordi, Prof Tim Jackson, Dr Stephen Berry and Prof Lester Hunt –** with an opening speech by **Lord David Howell, BIEE President.**

Student participation is sought in the main conference and via the "market place"; a highly interactive event in which students can set up a stall around a poster and present the key results of their recent academic work in a short session, including instant questions and feedback from the conference audience.

Oxford does not really need any introduction in the academic world, but more information on the city and how to get there can be found on www.citysightseeingoxford.com. Accommodation for 1 night is reserved at St. John's College, St Giles, Oxford, OX1 3JP, www.multimap.com/map/browse.cgi?pc=ox13jp.

If you have any questions regarding abstract submission or the conference, our Conference Secretariat admin@biee.org will be happy to respond to your enquiries.

We look forward to seeing you at the 2006 BIEE/UKERC Oxford Academic Conference.

Matthew Leach
Chairman BIEE

## Energy in the State of Brandenburg: Opening Speech at the Potsdam Conference

***By Matthias Platzeck****

Welcome to Potsdam! I am happy that you have chosen the capital city of Brandenburg as location for your conference. Firstly it underlines the role of the region as an outstanding energy location and secondly you will hopefully have the time, next to your strenuous conference, to discover the one or the other sight of this city.

The Energy question is a matter of our contemporary civilization. It is linked to social, economic, and ecological challenges. The conditions of political independence and individual freedom are at stake. Securing energy means protection against disastrous wars, the stability of states and governments, and the chance for fair development opportunities on all continents.

Therefore, we have to ask: what will be the energy base of our future way of living? Which energy sources will allow wealth, quality of life and peace in the globalized world of the 21st Century? We have to formulate appropriate answers. The challenges are enormous and they are not for tomorrow but they beset us here and today. The extensive programme of your annual conference is an impressing proof. A broad and forward looking policy approach is required. Someone who pursues egoistic interests at the expenses of others, due to lack of understanding or lack of determination, will sooner or later have losses themselves. Energy insecurity cannot be limited any more. Energy supply and climate change risks cross the border between poor and rich, and between nations and continents.

Our present energy decisions have a large political range. The Federal Republic of Germany has taken the right course. Our policy will escape the constraints of the nuclear and oil economy.

The energy chapter of the coalition treaty states:

- that our agreement on the nuclear phase out will not be modified,
- that renewable energy use will be extended,
- that the Renewable Energy Law will be continued,
- that ecological tax reform will not be revised,
- that the share of biofuels will be increased,
- that energy efficiency will be increased in an extensive manner,
- that our innovative efforts will be focused on renewable energy and energy efficient technologies.

The reasons for phasing out nuclear power should not be repeated here. The risks as well as the costs of nuclear power have again and again been discussed. Some weeks ago we had the 20th anniversary of the Chernobyl disaster. The question of radioactive nuclear garbage is unsolved. We have also to recall the billions of Euro tax subsidies for nuclear energy.

It remains without question that the phase out of nuclear power has averted society from a crucial test. The statement remains valid: the withdrawal from nuclear power is the entrance to energy security.

Let us come to the energy policy of Brandenburg. It is part of an economic policy that is oriented towards growth and employment. The most important energy policy instrument that is binding for the state government is the "energy strategy 2010" that was agreed on in 2002.

We know: energy policy decisions are always long-term strategy decisions that depend on high investments. For this reason continuity and security must apply. For this reason the energy strategy is evaluated now and carried on in the long term. Brandenburg is the most important energy state in eastern Germany. More Energy is produced than is used. 50 percent of the produced energy is exported.

In the past 16 years the entire energy infrastructure of the state was completely renewed with billion Euro costs.

The stable, inexpensive and environmentally sound energy supply has contributed significantly to the development of the state.

The energy and brown coal economy is the most important industry branch in the state with approximately 15000 employees. Approximately 350 small scale businesses are active in the energy sector in Brandenburg.

Also for this reason do the energy economy and technology belong to the growing sectors in the state, which are in the focus of the economic policy. Vattenfall Europe Mining & Generation, energy business with its headquarters in Cottbus is one of the biggest businesses in Eastern Germany both for number of employees and business volume.

The extraction and electricity production from brown coal in the Lausitz, a region in the south of the state, is now as in the past economically important. All the region of the Lausitz and in particular the areas around the industry area of Schwarze Pumpe are traditional energy areas. People here have always lived from and with coal.

Pit brown coal is extracted in three surface mining pits (Cottbus-Nord, Jänschwalde, and Welzow-Süd): in 2005 40.4 million tons altogether. Brandenburg is the second most important extraction state after North Rhine- Westphalia. Brown coal mining does not only ensure employment. Brown coal is and will remain for a long time to come the only competitive inland energy carrier.

And: inland brown coal doesn't need incentives and is mined without subsidies. The coal is available on the market without security risks, without disposal and shortage risks. And on the background of scarcity of oil reserves in the USA, the "oil hunger" of China and the geopolitical developments, these are factors that should not be underestimated.

The power plant in Schwarze Pumpe, which started operations in 1998, is one of the most modern and most efficient brown coal plants in the world.

With 2.3 billion Euro it is till today the biggest private investment in Brandenburg and at the same time the biggest investment in the building of a powerful and environmentally

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* Matthias Platzeck is Prime minister of the State Brandenburg. He delivered this opening speech on the occasion of the 29th international meeting of the International Association for Energy Economics (IAEE) 7th – 10th June 2006 in Potsdam, Germany.

sound energy supply in the newly formed German states.

About 80 percent of electricity production in Brandenburg comes from brown coal power plants in the Lausitz. Around half of the clients outside the state are supplied with this electricity.

The week before last Federal Chancellor Merkel and I put the foundation stone for a $CO_2$ free pilot power plant in Schwarze Pumpe. We are very proud to be able to present such a project here in Brandenburg. It is the first plant of this type. The state Brandenburg documents that even in the future brown coal will remain an important economic factor. Especially, when it is possible to include the tradition and prepare the way for highly modern technologies of the future. The $CO_2$ free pilot power plant is an example for this.

Vattenfall is the first business to experiment this technology outside laboratories. About 50 milion Euro will be invested in this pilot plant. It should start operating in 2008.

The decision for the location at Schwarze Pumpe was taken because of the good general framework, e.g., the process steam can be used in the surrounding industries. In addition the synergies both for the supply and disposal and for the technical staff will be optimally used.

Another advantage is the cooperation with the closeby Technical University in Cottbus. There are many research projects to increase the efficiency of the Oxyfuel technology (CO2 capturing in the exhaust), which is used by Vattenfall.

We are convinced that only the use of the most modern technology will achieve the long-term acceptance of inland brown.

To maintain and expand the headstart in the field of brown coal power plant technology is a big challenge. It is a big benefit for the state that the Vattenfall company together with the Technical University of Cottbus and other research establishments have accepted this challenge.

Not only the deposits of brown coal, but also the strong position of Brandenburg in the production and utilisation of renewable energies allow us to speak of the energy state Brandenburg. The use of these resources was promoted with the becoming effective of the law on renewable energies on 1st August 2004.

Brandenburg is one of the leading states in the production of energy from wind. At the end of 2005 there were 2,033 wind power plants with an installed capacity of 2,62 Megawatt connected to the grid. The utilisation of solid fuel biomass in the production of electricity has noticeably increased. Many job opportunities were created due to the positive development of renewable energies in particular in the economically underdeveloped regions.

Examples are the production of rotor blades in Lauchhammer or the production of solar modules in Prenzlau. The investments that were undertaken deserve appropriate conditions. Brandenburg offers them. Brandenburg's aim with its energy policy is to increase the utilisation of renewable energies. Till the year 2010 the primary energy consumption should be boosted from 3 percent to 5 percent. The share of electricity from renewable energies has increased to around 10 percent.

After the quick development of wind energy utilisation in the past few years, in the future, the focus will lie on the utilisation of inland biomass to produce electricity, heat and transport fuels. Biomass contributes the most among renewable energies to the added value in the state and secures new jobs and revenues in particular in rural areas.

The promotion of renewable energies should, according to our belief, be applied so that integration is further developed on various levels: we need not only a lot of energy from renewable sources, but also energy with high availability and tradability to achieve a stable energy supply.

In 2005 a new record of production was achieved at the PCK Refinery GmbH in Schwedt, in the North East of the state on the Oder River, where 11.5 tons of crude oil are processed. About one tenth of each ton of crude oil used in Germany is processed in Schwedt: PCK is one of the most efficient and profitable refineries in all Europe. The refinery was one of the first to produce fuel without sulphur and was the first to produce fuels with biogenous components in Germany. Brandenburg is, in Europe, one of the most important regions in the production of fuels from renewable primary products.

Biodiesel is produced in seven plants with a capacity of approx. 380,000 tons. In Brandenburg it is possible to refuel biodiesel at over 50 fuelling stations.

In Brandenburg, in Schwedt, a bio-ethanol plant with a capacity of 180,000 tons per year operates. There are plants for other bio-ethanol production in Brandenburg. Two plants are going to be constructed in Wittenberge and in Premnitz, with capacities of 150,000 and 100,000 tons per year respectively.

The development of processes and plants to produce synthetical fuels from biomass is being greatly considered. On the one hand new possibilities are being given to agriculture and forestry business to produce biomass. On the other hand there are many middle sized businesses in the state that could contribute to the development of processes and plant components with their know how.

Recapitulating it is possible to take note of the following main focuses of the state's energy economic policy in the next years: securing electricity production from brown coal, the further development of renewable energies (in particular biomass), incentives for energy research, securing of energy infrastructure, development and utilisation of new energy technologies.

From the program of your conference I saw that it embraces many of the addressed topics. Your debates are, of course, very interesting for the further development of our energy strategy.

I would like to ask you, Prof. Dr. Erdmann, to make the results of your conference available to the Brandenburg State Government.

I wish all participants a stirring experience exchange and enough time to deepen already existing and to initiate new contacts.

I wish the yearly conference good progress and all of you a good stay in the capital city of Brandenburg. Come back!

## In Review - 29th IAEE International Conference, Potsdam, Germany

"I thought the Potsdam Conference was a huge success from a professional point of view." "Congratulations for the great success of the Conference. Contents, management and venue were all excellent." "One of the highspots was the number of young people attending. It is good to see the IAEE renewing itself."

These are some of the comments from the delegates attending the 29th IAEE International Conference on "Securing Energy in Insecure Times" this June 2006 in Potsdam, Germany. The conference theme addresses some of the big issues in contemporary energy economics. The conference organizers should have proposed *Vladimir Putin* as the conference patron because his interruption of natural gas flows from Russia via the Ukraine to Western Europe this January put a particular spotlight to the energy security issue, especially in Europe. This move from Russia waked up energy economists to look at security and accordingly it was not surprising that as many as 270 papers had been presented around the manifold facets of the conference theme.

It is difficult to present a comprehensive overview about the conference. But some highlights should be mentioned here.

Each day stood under a particular headline that guided the discussion in the plenary sessions and some concurrent sessions. The key message of the **Day on Global Issues** was that, according to the instrumental role of markets towards efficiency gains, markets should lead energy policy. *Lord David Howell*, former UK energy minister, stated that there is no such thing as full energy security. Energy supply may always be disrupted by events. The best degree of security is achieved through diversity and the ability to switch between sources of primary and secondary energy. On the other hand, *Klaus, Töpfer*, Germany's first federal minister for the environment and until recently the UNEP executive director, pointed to the role of efficiency gains on the energy demand side. This is by far the best strategy towards energy security. However, progress is always slow and lazy. Therefore a long term strategy is required. Actions must be taken today even if their beneficial role becomes obvious only in some distant future. As example, urban settlement structures are determined by the relative price of gasoline. In order to achieve more efficient vehicle energy demand, the appropriate method is to remove all energy subsidies. If subsidies persist, then there are no appropriate economic signals towards an efficient settlement structure.

Currently fossil fuels are subsidized because the costs of climate change are not included. The knowledge on carbon dioxide is still incomplete but this cannot be an excuse for postponing actions because all types of economic decisions are taken with incomplete knowledge.

In the mean time the world is becoming increasingly dependent on oil and other fossil fuels. According to *Majid Al-Moneef*, Saudi Arabian Governor to OPEC, further demand growth, combined with increasing concentration of world oil reserves in areas such as the Middle East, Russia and Africa, meant that fossil fuel markets would become increasingly interdependent and that energy security was linked to recognizing this interdependence. Producers could contribute to increasing energy security by expanding their crude production capacity and investing in the downstream in order to ensure supply continuity.

Another view of producing companies was presented by *Ruslan Nickolov*, Director of TNK-BP. He argued in favour of reciprocity as a critical element of energy security. Reciprocal transparency enables to plan demand, supply, investments and deliveries. Reciprocal market access and openness to investment foster greater energy security. Most important are cross-border capital flows, openness to investments and absence of protectionism.

According to *Olivier Appert*, President of the Institut Français du Pétrole, present oil prices exercise a strong incentive on oil producers to increase production, but they do not want to invest for nothing. US President George Bush's recent statement on reducing US dependence on Middle East oil was naturally a cause for concern and is not helpful for energy investments. On the other hand, producers that originally were opposed to climate change mitigation have realized that the introduction of greenhouse gas measures had no impact on price.

The second day of the conference dealt with **Securing Energy under Competition and Regulation**. The key message was that securing energy requires energy markets to be open to newcomers and new investments. There are obvious deficits in this concern. In recent months and years there had been a tremendous activity of incumbents and national governments to avoid and restrict market access to newcomers. Key words are re-nationalization of fossil energy resources and the growing attention of governments in consuming countries to establish so called national champions. Both contribute to the recent increase in energy prices.

*Ulf Boege*, president of Germany's Federal Cartel Office, argued in his key note speech that the protection of companies by politicians has been seen to fail time and time again. If competition is to work, it is necessary to have free movement of capital, but, referring to E.ON's attempted takeover of Spain's Endesa, there remains far too much political resistance.

As a result, energy prices and the margins of incumbents are extremely high in these days. *Boege* proposed to remove the automatic link between oil and gas prices in continental Europe. Under the present price link, gas prices rise in response to events in Iraq, oil market speculation, etc. This sends the wrong signals to the consumers. Without the price link, rising oil prices would make gas more competitive and stimulate appropriate consumer reaction. If gas and oil prices move together, then the oil price can raise more than it would otherwise do.

*David Nissen* from the Columbia University put up the question to what degree energy policy should determine the market design. While regulators in the US are aggressive towards market design, European regulators respond until

recently to "anti-trust" practice. Retail competition is supposed to control wholesale market power. Unfortunately, the European regulators' recent change to a more active market design did not result in a more competitive market structure which is, according to *David Nissen*, a result of the bargaining power of energy companies.

The last day of the conference was on **Long-term Technology and Policy Choices**. The plenary speakers didn't promote a single technology that energy market should rely on in order to increase supply security. The discussion rather recognized that a diverse range of energy sources including enhanced energy efficiency is needed to meet the challenges presented by climate change, security of supply concerns and energy poverty.

In spite of their technical advancements, renewable energy technologies are still missing the cost targets necessary for becoming competitive. An example discussed by *Hermann-Josef Wagner*, professor at the University of Bochum, is offshore wind power generation. In addition to the still to high specific investment costs, the investment volume of a typical offshore wind farm represents a handicap as it seems unlikely that project volumes of 100 Mio. EURO or more can be financed prior to the proven maturity and reliability of this technology. According to *Shirley Neff* from the Columbia University the renewable energies in the US are in an early stage because of the insufficient and instable investment environment.

On the other side of the spectrum is nuclear power which had been discussed rather intensively in Potsdam. While *Matthias Platzeck*, Prime Minister of the Federal State of Brandenburg and until recently party president of the German Social Democratic Party, underlined in his opening speech the position that energy supply should not rely on nuclear power due to the many risks associated with this technology and the missing acceptance in the population, other speakers had been more optimistic. There is little doubt that a turning point has been made in the fortunes of the nuclear industry, even though the problem of waste management persists with no better solution than to stick it in the ground. However, the industry's expansion faces other constraints, the most serious of which is its limited capacity of the construction industry. Another concern is the long term uranium resource availability. According to *Hadi Hallouche* from Shell, the combined call on the industry for decommissioning, plant replacement and new-build suggests that capacity restraints will limit the expansion of the nuclear industry to a peak in 2030.

Regarding the important role that coal may have as a feedstock of future energy systems, *Claude Mandil*, Executive Director of the International Energy Agency (IEA), mentioned efforts towards coal capture and storage technologies (CCS). He claimed that CCS is a key for a sustainable energy future and that demonstration projects have to begin now.

My report on the conference should stop here. A good overview about the statements given at the concurrent sessions of the conference offers the "Book of Executive Summaries" containing two page summaries of each paper presented in the concurrent sessions. This publication is particularly designed for all those energy experts and practitioners that would like to follow the present trends in energy economics research without having to read all the technical details of the papers. With the book comes a CD-ROM that contains the extended abstracts and all available full length papers. This package (book of 512 pages plus proceedings CD-ROM; ISSN 1559-792X) can be ordered at the IAEE website https://www.iaee.org/en/publications/proceedings.aspx

The 29th IAEE International Conference offered not only stimulating presentations and discussions but also a well received social program. The highlight was a 4-hour sunset boat trip from the conference hotel along the lakes of Potsdam. As rumours say, IAEE delegates consumed 800 glasses of beer and 200 bottles of wine during the boat ride which is a true sign of the relaxed atmosphere on this pleasant summer evening. It is most astonishing that delegates didn't show any signs of tiredness or exhaustion on the next conference day. Among the findings of the conference is that energy economists are not only rather strong with respect to analyzing energy security issues but also with respect to their physical form. So I have some hope that I will meet all the Potsdam delegates at future IAEE conferences.

*Georg Erdmann*
*Conference Chair*

IAEE INTERNATIONAL ASSOCIATION for ENERGY ECONOMICS
WWW.IAEE.ORG

## Newsletter Disclaimer

# Scenes from the 29th IAEE International Conference

7–10 June, 2006 – Potsdam near Berlin, Germany





DF Lounge
IAEE
International Association for Energy Economics
www.iaee.org
Securing Energy in Insecure Times


Potsdam-
HAVELSTERN

# "Energy Markets and Sustainability in a Larger Europe"

## Florence, June 10-12, 2007

### 9th IAEE European Energy Conference

A.I.E.E - Italian Association of Energy Economists
IAEE - International Association for Energy Economics

The conference will debate a whole range of up-to-date energy issues in one of the most beautiful and artistic cities in the world, offering the participants a unique opportunity to see its cultural heritage and to visit exceptional museums and galleries.

*General Conference Chair:*
Carlo Andrea Bollino, Professor University of Perugia, V. President of AIEE
*Program Committee Chair:*
Ugo Farinelli Professor University of Rome and of Lund, General Secretary of AIEE
*Organization Committee Chair:*
Edgardo Curcio, Professor University of Rome and President of AIEE

| **Conference Structure** | **MONDAY 11 June 2007** | **TUESDAY 12 June 2007** |
|---|---|---|
| **SUNDAY 10 June 2007**<br><br>17.00-18.00 IAEE European Affiliate Leadership Meeting<br>18.00-20.00 Conference registration and cocktail for participants | 08:00-09:00 **Registration**<br>09.30-10:30 **Opening session**<br>10:30-10:45 Coffee break<br>**Plenary session 1**<br>10:45-11.45 ***Sustainability***:<br>Implications of different scenarios for energy supply and demand;<br>Technology outlook response<br>11.45-12:45 ***Security of supply:***<br>Availability of oil; The role of natural gas in Europe<br>12:45-14.00 Lunch<br>14:00-15:45 **Concurrent sessions** 1<br>15:45-16:00 Coffee break<br>16:00-17:45 **Concurrent sessions** 2<br>19:30- **Gala dinner** | **Plenary session 2**<br>08:30-9.30 ***A wider EU energy market***:<br>From Eastern Europe to the Mediterranean;<br>Evolution in market regulation<br>9.30-10:30 ***Implementing renewables.***<br>Drivers and opportunities for EU industries.<br>10:30-10.45 Coffee break<br>10:45-12:30 **Concurrent sessions 3**<br>12:30-14:00 Lunch<br>14:00-15:45 **Concurrent sessions 4**<br>15:45-16:00 Coffee break<br>16:00-17:45 **Concurrent sessions 5** |

**The "call for papers": the topics of the papers to be presented in the concurrent sessions**

Four of the concurrent sessions should be devoted to the four themes covered in the plenary sessions, both to present additional papers on these subjects and to discuss the presentations in the plenaries. The following is an indicative list of other themes that will be accommodated in the concurrent sessions:

1) Transmission and transportation infrastructures in a liberalised environment
2) Experience curves cost development vs. value
3) Policy measures to accelerate development of RES
4) Integration of intermittent RES into energy markets
5) Market instruments to improve energy efficiency
6) Improving social acceptance of energy infrastructures
7) Liberalisation and regulation of the European energy markets
8) Supply and security in oil and gas European market
9) Regulatory regimes in the larger Europe
10) Geopolitics of energy
11) Understanding energy demand
12) Energy, environment and emission tradin

A special website will soon be set up for the Conference that will provide precise information regarding the format and modality for submitting the abstracts. For the moment, the information about the conference venue, organization and social events can be found on the AIEE website **www.aiee.it** that will soon be able to provide also information regarding the conference registration fees and student scholarship funds, as well as the registration and accommodation forms.

**Venue**: The Venue is Grand Hotel Baglioni a symbol of Florentine hospitality, since 1903 preserves the charm and elegance typical of the Florentine tradition and is equipped with all the modern comforts. Located in the very centre of Florence, this venue is 5 minutes walk from the Central Station and just near the other hotels reserved for the conference.

**Accommodations**: Arrangements have been made for special rates with hotels of various categories near the conference venue: The Hotel Machiavelli Palace, The Hotel Corona d'Italia, Atlantic Palace Hotel with rates of € 100/150 for single/double rooms. More details about accommodations, gala dinner and sightseeing tours will be available on the AIEE website.

**Social events:** The gala diner will be organized at the Pitti Palace which origins go back to 1448. It was built for the banker Luca Pitti and it passed to the Medici family in 1549 and over the years became the residence of the grand-dukes of Tuscany and later of the King of Italy. Today it was transformed into a museum with various galleries and is hosting special cultural and social events.
Two guided sightseeing tours will be organised for delegates and accompanying persons: one through the city centre, through the Old Town and second a visit at the Uffizi Gallery.

**For any questions please contact AIEE:**

Conference Secretariat
Phone +39-06-3227367 -Fax 39-06-3234921, e-mail: assaiee@aiee.it; info@aiee.it

## Power to the People

***By Vijay V. Vaitheeswaran****

Editor's note: Vijay Vaitheeswaran has been selected to receive the 2005 IAEE Journalism Award. In 2003 he published the book, *Power to the People: How the coming Energy Revolution Will Transform an Industry, Charge Our Lives and Maybe Even Save the Planet.* We are pleased to excerpt a portion of the book here.

**Introduction: The Coming Energy Revolution**

This book is about the future of our planet. The needlessly filthy and inefficient way we use energy is the single most destructive thing we do to the environment. Whether it is the burning of coal in industrial power plants or the felling of tropical forests, our appetite for energy which is essential to modern life seems insatiable. With enough clean energy, most environmental problems not just air pollution or global warming but also chemical waste and recycling and water scarcity can be tackled, and future economic growth can be made much more sustainable.

The problem is that change comes slowly in the energy realm. Old ways of thinking have encouraged monopolies, shielded polluters, and stifled innovation. That has burdened the rich world with an energy system locked into outmoded technologies such as America's many coal plants that are dirty and inefficient. That's bad enough, but now it seems that giants of the developing world, like China and India, may follow the same path as their economies surge over the next couple of decades. If they do, then many millions of unfortunates will die needlessly from the resultant pollution as will the world's hopes of curbing the carbon emissions that are fueling global warming. That is why this is the key question: Can we move beyond today's dirty energy system to one that is cleaner, smarter, and altogether more sustainable?

Absolutely. Though cries of shortage and crisis are often heard these days in the energy world, there is actually more reason for hope than there has been in decades. This book argues that there are three powerful trends going on below the radar that promise to rewrite the rules of the energy game: the global move toward the liberalization of energy markets, the growing popular appeal of environmentalism, and the recent surge of technological innovation in areas such as hydrogen fuel cells. Taken together, they could lead to an energy system that meets the needs and desires of future generations while still tackling serious problems like global warming and local air pollution. If this clean energy revolution is really going to take off, though, we must first be ready to think the unthinkable: we must end our addiction to oil. Ironically, it may happen for reasons entirely unrelated to concerns about the environment and human health.

The problem is economic and political as much as ecological. Consider a simple question: How much is a barrel of oil worth? You might think that the price would be whatever the market will bear. Yet the price of oil is influenced less by the free interplay of supply and demand than by the whims of the Organization of Petroleum Exporting Countries (OPEC)—the ill-disciplined cartel led by Saudi Arabia. Small wonder, then, that the oil price has yo-yoed, from around $20 a barrel for much of the 1990s down to $10 in 1998 to more than $30 a barrel in early 2003.

If you could ask Osama bin Laden that same question, though, you would get a very precise figure: $144. Several years ago, before the al Qaeda terrorist group carried out its attacks on America, bin Laden made some curious comments on energy economics. In that little-noticed diatribe, he accused the United States of the biggest theft in history for using its military presence in Saudi Arabia to keep oil prices down. He calculated that this hostile takeover of his country's patrimony added up to some $36 trillion in lost revenues and, he insisted, America now owes each and every Muslim in the world around $30,000. And counting.

That chilling calculation points to the nightmare scenario that keeps energy security experts up at night: a hostile regime seizes the oil fields of the Middle East and either raises prices sky-high or cuts off oil supplies altogether. Before September 11, scenario planners reassured themselves that if this ever happened, America would just send in its troops to quash the troublemakers and ensure safe passage for the oil supplies. After all, that was the main outcome of the Gulf War, when the coalition led by the elder George Bush booted Saddam Hussein out of the oil fields of Kuwait. And when George W. Bush began to prepare for an invasion of Iraq a decade later, even those who agreed that Saddam Hussein should be ousted took note of the fact that Iraq happens to have a bit of oil: the largest reserves in the world, in fact, after Saudi Arabia.

America's military supremacy is now unchallenged. Even so, the attacks of September 11 revealed the limits of American power in at least one realm: they have exposed the vulnerability of the global energy system to a postmodern oil shock. Today we have to consider the possibility that revolutionaries or terrorists could possess nuclear weapons and might use them on American troops or the oil wells. Such an outcome could precipitate a global economic and political crisis of the sort never seen before. The good news is that such a scenario is extremely unlikely, even in light of recent events. The bad news is that it might still happen, and not even America's mighty military can prevent it. Even short of such an extreme outcome, though, the monopoly grip that petroleum has on the world's transport infrastructure might result in an energy crisis sometime over the next few decades.

Surprising as it may seem, the reason is not scarcity. Back in the 1970s, in the aftermath of the oil shocks of that decade, many people fretted that the energy was running out. With the arrival of the younger Bush in the White House, Americans once again heard talk of an energy crisis. Yet it's abundantly clear that there is enough oil to keep the world's motors humming for decades to come.

The real problem is not scarcity but *concentration*. The lion's share of that remaining oil -- and most of the oil that is

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cheap to extract lies under the desert sands of a small handful of countries in the Persian Gulf. Today, Saudi Arabia and its immediate neighbors sit atop nearly two-thirds of the world's proven oil reserves -- that's right, two-thirds. However, those countries are not producing oil nearly as fast as they can. As the world continues to deplete expensive, non-OPEC oil in places like the deep waters of the Gulf of Mexico and the frigid reaches of Siberia in coming years, OPEC's market share is set to increase dramatically -- and with it, the power of those Middle Eastern regimes. The potential for supply disruption by anti-Western terrorist bands like al Qaeda can therefore only grow. This threat is particularly acute for the United States, which is both the biggest oil guzzler and the de facto guarantor of oil supplies for its allies.

Unfortunately, there is no immediate solution, because there is no practical alternative to oil-fired transport. In the short term, all governments can do is buy some insurance against politically inspired supply disruptions and the panics that tend to accompany them. The way to do that is to expand dramatically their buffer stocks of petroleum, such as those stored in salt domes in Louisiana. To his credit, George Bush started to do this in 2001. Structural changes in the oil industry resulting from mega-mergers, cost-cutting, and a move to just-in-time inventories make the matter particularly urgent, because the private sector has greatly reduced its levels of stocks from the 1970s. Add to this the official neglect of government stockpiles, which are inadequate in the rich world and practically nonexistent in the developing world, and you get a world needlessly vulnerable to the next oil shock.

As for longer-term policy responses, three views typically dominate the energy debate raging around the world post September 11: *Relax*; *Keep pumping*; and *Ride your bicycle*. The first camp insists that the very premise of the argument is false and that "energy security" is a bogus notion not worth worrying about. The second camp sees the threat as real, but argues that it can be countered effectively through supply-side measures that boost non-OPEC sources of oil. The final camp argues that conservation is the only way forward. They tend to perpetuate a number of popular myths about energy:

- The oil's about to run out
- Without fossil fuels, we'd return to the Stone Age
- Windmills and warm sweaters will save the planet
- Rampant economic growth is the root cause of our environmental problems
- Clean technologies will emerge spontaneously, without the need for government action or difficult policy measures like energy taxes
- Sport-utility vehicles (SUVs) are the work of the devil

This book will explode these and other nonsensical notions, and explain why none of these three camps gets it quite right.

**What, Me Worry?**

Perhaps unsurprisingly, Saudi Arabia is at the forefront of the Panglossian camp. In 1999, Ali Naimi, its oil minister, gave a speech in which he vigorously challenged the notion that his country's growing market power will be a problem: "Oil is a global market . . . those who propagate the issue of supply insecurity, dangers of import dependence and perceived instability of the Arabian Gulf are ignoring realities."

He pointed out that his country intentionally maintains a cushion of excess capacity to counter any supply disruption. It was his country's buffer, not any non-OPEC production, he noted, that came to the rescue when previous disruptions resulted from the Iranian revolution, the Iran-Iraq War, and the Gulf War. True, but this hardly answers the question as to what will happen if his regime is toppled by a rabidly anti-Western cabal.

Lord Browne, the boss of BP, countered such fears, observing that "however fundamentalist, a regime still needs money to look after its people." Many economists agree, insisting that oil is a "fungible" commodity that is worthless unless it gets to market. In the long term, that is doubtless true. But even short-term disruptions can wreak havoc on the world economy. For example, when the Iranian revolution booted out the shah, Iran's oil exports did in fact collapse for some time, and even years later reached only two-thirds their previous level. Just imagine the chaos if willfully irrational zealots toppled the Saudi regime -- and then decided to deny themselves oil revenues in order to punish the Great Satan.

Another part of the *Relax* camp of energy policy relies on free-market arguments to make its case. Libertarians argue, quite rightly, that the pain associated with previous oil shocks had more to do with foolish policy responses by Western governments meddling in the market (by imposing oil price controls, for example) than with any actual lack of supply. On one estimate, America spent some $60 billion a year during the 1990s to guard oil from the Persian Gulf, when the actual cash value of those oil imports totaled only around $10 billion a year -- a mind-boggling subsidy for fossil-fuel energy. Such folk contrast this overcautious approach with America's relaxed attitude to semiconductors: these silicon sandwiches are, after all, the backbone of the digital economy and also come chiefly from just one place (in this case, Taiwan), but America's military clearly does not guard chip plants.

All that sounds quite plausible until one considers the differences between semiconductors and petroleum: the American economy can manage fine without new semiconductors for some time, but the country would grind to a halt the minute that oil dried up. Also, semiconductor plants can be built anywhere but oil wells can go only where there is oil. The gasoline riots that brought Britain and parts of continental Europe to a standstill in late 2000 showed how quickly a modern industrial economy (even one that produces a lot of its own oil and gas, like Britain) can be crippled when its flow of oil is interrupted. That vulnerability is as good a reason as any to start weaning the world economy off petroleum.

**Supply-Side Chimera**

If the first camp wants you to relax, the second camp wants to get you all riled up to *Keep pumping*. To do so, these folk have tried to hijack the concerns about energy security to

support domestic energy firms. Explicitly citing the need to enhance America's "energy independence," George W. Bush tried in his early days in office to push a bill through Congress that would throw open part of the Arctic National Wildlife Refuge (ANWR) to oil drilling. Environmentalists were outraged by Bush's plan because they believed that it would inevitably spoil a pristine wilderness. Yet he redoubled his efforts after September 11, arguing that the case for Alaskan oil was only strengthened. He did not even blush when critics pointed out that the pipeline through which that oil must flow is itself more insecure than oil purchased on the global market: the pipeline has been shot at, bombed, and otherwise attacked a number of times already by drunks and delusional locals. A determined band of terrorists would probably find this vital conduit, which transports over a million barrels of oil a day to the lower forty-eight states, a nearly indefensible target.

An even bigger flaw in the Alaskan proposal was that it was based on the false premise that America could ever get close to energy independence. All the oil trapped in Alaska -- for that matter, in all protected lands in the country -- would not provide energy independence. America consumes a quarter of the world's oil but sits atop merely 3 percent of its proven reserves.

Even assuming that oil majors invest enough money to develop new fields in non-OPEC areas like the Gulf of Mexico and Russia, the "call on OPEC" will still double over the next twenty years. In order to meet the world's unchecked thirst for oil, leading energy forecasters are hoping that Saudi Arabia and its neighbors will invest the vast sums necessary to expand output dramatically. If they do not, their output will stagnate or decline, and the consumers of the world will pay the price. But if OPEC does crank out all that extra oil, as economic self-interest would seem to dictate, consumers will still suffer. That is because the cartel's grip on the world's oil market -- and therefore its ability to dictate prices -- will then grow much stronger. And Russia, which has received a lot of attention of late as a potential "anti-OPEC," simply does not have enough reserves to challenge Saudi Arabia over the long haul. Alaskan oil or not, the future of the world economy will increasingly become a gamble on Middle Eastern oil. That's surely reason enough to begin the transition away from petroleum now.

**CAFE Culture**

"Conservation may be a sign of personal virtue, but it is not a sufficient basis, all by itself, for a sound, comprehensive energy policy." So proclaimed Vice President Dick Cheney in April 2001. The political backlash against that speech was so great that conservation is now firmly on the American political agenda. Cheney, the most forceful of those who argued that we should keep pumping, even became the poster boy for the third camp of energy thinkers: the *Ride your bicycle* gang.

At first blush, a focus on energy conservation seems an entirely good thing for America. The United States, unlike Europe, has done little to discourage the inefficient use of fossil fuels in recent years. The country imports over 11 million barrels of oil per day. America could have reduced that greatly if it had made a serious, sustained effort at curbing oil use during the last two decades.

Still, many people will always wonder how important reducing oil demand is when compared with adding supply. That is because some people's gut instinct about the nature of depletion of natural resources may be misleading. Evar Nering, a mathematician at Arizona State University, explained to readers of *The New York Times* in 2001 that the nature of exponential growth means that curbing demand is more important than adding supply: "If consumption of an energy resource is allowed to grow at a steady 5% annual rate, a full doubling of the available supply will not be as effective as reducing that growth rate by half to 2.5%. Doubling the size of the oil reserve will add at most fourteen years to the life expectancy of the resource if we continue to use it at the currently increasing rate, no matter how large it is currently. On the other hand, halving the growth of consumption will almost double the life expectancy of the supply, no matter what it is."

Using less oil is critical, but how exactly to do that? There is actually reason to think Cheney's skepticism about conservation is justified after all (though perhaps not for the reasons he had in mind): conservation may be morally appealing to the *Ride your bicycle* camp, but it could end up being a bad thing if it merely resulted in far less mobility, trade, and other things made possible by energy that enhance human welfare. In contrast, increasing energy efficiency is a very good thing -- and policies that end subsidies or other sorts of support for inefficient or dirty technologies are even better. This is particularly true given how inefficient, in energy terms, the American economy is: Europe and Japan squeeze considerably more economic output out of the energy that they use than does the United States.

One efficiency measure that is always controversial in America is the strengthening of the Corporate Average Fuel Economy (CAFE) law: raising it for cars, and closing the loophole that allows light trucks and sport-utility vehicles (SUVs) to use more gas. The automotive industry has long fought such a move, arguing that it would impose an unacceptably high cost. Yet a look at the history of CAFE suggests otherwise. The years after Jimmy Carter's presidency saw the average fuel-efficiency of America's new car fleet rise by seven miles per gallon. From 1977 to 1985, America's GDP rose by more than a quarter even as total American imports of oil fell by two-fifths; over that period, America's productivity in oil use soared. In other words, fuel-efficiency measures need not equal disaster. Even so, a far better way to encourage efficiency would be a price signal—for example, the imposition of a higher gasoline tax designed to reflect the environmental harm and energy security risks involved in using petroleum.

The car industry put on a full-court press in Washington to kill the effort to strengthen CAFE, insinuating that it would be the death of the American car industry. However, its bluff was called by a nonpartisan study done by America's

National Academy of Sciences (NAS) in 2001. That analysis debunked the industry's arguments by identifying readily available technologies that could "significantly reduce fuel consumption of new cars over the next fifteen years." The experts were certain that reductions in fuel use up to 20 percent could be achieved easily.

What's more, the NAS group left the door open for even bigger reductions if radical new technologies that are now getting close to commercialization penetrate the market. Their optimism was based on the exciting new combination of hydrogen energy and fuel-cell cars, which makes it possible for the first time to contemplate a system of personal mobility that is completely free of harmful emissions and does not rely on the iron nexus of gasoline and the internal combustion engine. If that magical technology really takes off, and it will probably take a decade or more before it hits the big time, it could signal the end of the Age of Oil -- and bring with it the death of OPEC, the collapse of Middle Eastern dictatorships, and a radical realignment of geopolitics. Because the hydrogen energy required to feed those fuel cells can be produced in all sorts of ways all over the world, and not just in the Middle East, this brave new energy world would not see any wars waged over energy resources and could never be held hostage by a future Osama bin Laden.

Impossible, you say? Not at all. In fact, this energy revolution is already well under way, as a trek to the mountaintop home of Amory Lovins reveals.

**The Sage of Snowmass Speaks**

If you want to catch a glimpse of our planet's future, visit the Rocky Mountain Institute (RMI). Nestled away in Old Snowmass, a quaint hamlet high in Colorado's snowcapped peaks, this curious think tank and "do tank" attracts visitors from all over the world who are interested in new ideas about energy and the environment. Upon arrival, visitors often find themselves on a tour whose highlights include a superefficient toilet and an indoor banana farm, "perhaps the world's highest," as one staffer boasted without hint of irony. Despite the elevation, the people who run this place do not really have their heads stuck in the clouds.

Amory Lovins is the intellectual force behind RMI. Like all visionaries, he gets things wrong, but he has also gotten some big things spectacularly right. In an article published in *Foreign Affairs* in the gloom after the first oil shock in the 1970s, he famously predicted that improvements in energy efficiency would lead to the decoupling of economic growth and energy use. At the time, most were convinced that America would continue to suck up more energy in lockstep with economic growth, and Lovins was widely ridiculed. Even America's Department of Energy had predicted that by the year 2000, oil prices would have skyrocketed to more than $150 a barrel in today's money. Though Americans will always complain about gasoline prices above a buck a gallon at the retail pump, the DOE's predictions were clearly wrong. America has learned to use energy more efficiently than it did in the 1970s -- though, it must be noted, still not as efficiently as Japan or Europe -- and history has vindicated Lovins.

For some years now, the Sage of Snowmass has been making another sweeping forecast for the future of energy, and again he is sounding fanciful: "This breakthrough will be like the leap from the steam engine to the diesel locomotive, from the typewriter to the laptop computer . . . it's a really disruptive technology." He gestures toward a covered object in the center of a spacious high-tech workshop where his team of engineers has been beavering away for years. With a flourish befitting a mad scientist, he unveils his creation: the Hypercar.

After nearly a decade of work, and with the support of big industrial firms from Europe, Japan, and the United States, his outfit has developed a concept car that it believes will be the clean power plant of the future: it features electric propulsion, a 100 percent composite-plastics body, highly sophisticated electronics and software, and a radically simplified and integrated design. Most important, his roomy and stylish SUV will be powered by a stack of fuel cells.

What exactly are fuel cells? According to Lovins and others, these nifty inventions are the Next Big Thing. They are essentially big batteries that produce electricity by combining hydrogen fuel and available oxygen. They do this much more efficiently than a conventional car engine that uses gasoline. They run nearly silently. Best of all, their only by-product is harmless water vapor. They are already beginning to appear in stationary applications, such as generating power for clusters of homes and factories, and are likely to appear within a few years in portable applications: laptop computers, cellular phones, even climate-controlled bodysuits for tomorrow's soldiers.

Greens, consumers, and industrialists alike should rethink their prejudices. With fuel-cell technology, even a gargantuan Ford Expedition could sip hydrogen and emit absolutely none of the usual tailpipe gases that contribute to smog and global warming or that damage human health. There's a dream that avid consumers and righteous environmentalists might share.

But Lovins has his eye on bigger game. He is convinced that consumers will be able to use the fuel cell under the hood as a "micropower" plant that can power their homes or offices. Such cars might also be used as backup generators, or while traveling in remote areas. He sees nothing preventing consumers from plugging these electric cars into a wall socket during peak hours, when the power grid is overloaded, and selling the electricity they generate back to the utilities for a profit.

In a nutshell, Lovins thinks that some version of the Hypercar will turn the modern world upside down. It is tempting to dismiss his latest forecast as hopelessly utopian. Oddly enough, though, just days before Lovins unveiled his Hypercar on the other side of the world, another wild-haired visionary, Ferdinand Panik, had introduced a similar hyper-green power plant on wheels. At that unveiling, in Berlin, there had also been talk of revolution, and even the promise of an Energy Internet: "We can use the energy unit in this car for homes or stationary power. When linked together by smart electronics, our customers can buy and trade energy freely." Panik's boss, Jürgen Schrempp, was even more effusive: "The problem of how to ensure sufficient supply of energy

that is environmentally friendly is the key challenge of the future, and we see fuel cells as the solution."

Schrempp and Panik were not pundits or pie-in-the-sky dreamers: they were, respectively, the chairman and the chief fuel-cell expert at DaimlerChrysler, one of the biggest carmakers in the world. The company has already spent $1 billion to develop its "new electric car" (NECAR), and Panik expects the company to shell out another billion or so over the next decade to ensure its success. Daimler now expects to have its first commercial fuel-cell cars on the road by 2005, and mass-market volumes in about a decade.

Daimler is far from alone. Honda, Toyota, and GM also say their fuel-cell cars will be ready by then, and others claim they will follow. A number of car firms and oil companies have jointly opened up a hydrogen refueling station for their demonstration cars near California's capital of Sacramento. There is also a similar hydrogen station near Munich's airport. Daimler's top managers claim that in twenty years time, fuel cells will power perhaps 20 percent of all new passenger vehicles, and possibly all urban buses.

What do the stodgy old utilities think of all this airy talk? Ask Kurt Yeager, the head of the Electric Power Research Institute, which is the research body of the utility business. You might expect him to be dismissive of all this talk of micropower and Energy Internets. On the contrary, he can hardly contain his excitement: "Today's technological revolution in power is the most dramatic we have seen since Edison's day, given the spread of distributed generation, transportation using electric drives, and the convergence of electricity with gas and even telecommunications. Ultimately, this coming century will be truly the century of electricity, with the microchip as the ultimate customer."

If the lines between the auto industry and the power industry really do begin to blur, the impact on the economy, on industry, and on all our lives could be dramatic indeed. Consider just one killer statistic: the power generation capacity found under the hoods of cars in Germany or America is ten times that of all of the nuclear, coal, and gas power plants combined in those countries. In other words, Ford Motor Company alone could add more juice to America's power grid than all of America's conventional power utilities put together. That is what makes this recent pronouncement from Bill Ford -- Ford's chairman and the great-grandson of the company's famous founder such a bombshell: "I believe fuel cells will finally end the 100-year reign of the internal combustion engine."

That is nothing short of an endorsement of Lovins's vision, and the epitaph for today's motorcar—the filthy but durable workhorse of the twentieth century.

**The Quiet Revolution**

This book is a survey of something really big going on in the energy world. The first section looks at one of the three powerful forces behind that change: the rise of market forces. From California to Cologne to Calcutta, governments are liberalizing their cosseted energy markets and throwing open their borders to trade in gas and electricity. For example, about half of America's states, led by California, have forged ahead with some form of electricity deregulation. Europe and Japan are also liberalizing their gas and power markets in fits and starts. Though there will be some bumps along the way, the resultant outpouring of entrepreneurship, financial capital, and innovation promises to transform today's energy world beyond recognition.

The second section of the book examines how the recent surge of environmentalism is now reshaping energy. Outrage over local air pollution, from California to China, is putting pressure on governments to explore clean power and transport. Equally important has been the concern over climate change, which will require mankind to make a slow but sure shift to a low-carbon energy system over the course of this century. Many countries now look unfavorably on fossil fuels, and encourage renewable energy. However, the recent move by George Bush to kill the UN's Kyoto treaty on climate change has led many environmentalists to despair that America will never do its fair share to combat global warming. Look beyond Bush's desire to please the energy business, however, and you find that his skepticism about Kyoto is shared by many others, who also worry how much fighting global warming will cost - and wonder if it is really worth doing whatever the price.

So is there no hope for meaningful action on global warming? Have Big Oil and the Bush Administration made a mockery of the efforts to green the energy industry? On the contrary. Today's debates over climate change are but a small taste of the broader environmental challenges to be faced by the world as it tries to meet its soaring energy needs, and a sign that Big Oil must change -- or find itself relegated to the rubbish heap of history. The most promising development on this front is the growing popularity of market-based environmentalism, which applies commonsense tools of economics like cost-benefit analysis, emissions trading, and pollution taxes to problems like climate change. By leveling the energy playing field and using carrots as well as sticks to motivate companies, governments are much likelier to nudge the market in a greener direction.

The third section of the book describes the unprecedented wave of technological innovation now upending the energy business. The deregulation of markets, when combined with rising environmental demands, is spurring the development of such promising technologies as fuel cells and microturbines. Thanks to the rise of the Internet and sophisticated command, control, and communications software, the creaky old power grid is about to leapfrog into an intelligent network worthy of being the true backbone of the digital economy.

Just a few years ago, talk of the energy sector as exciting or innovative would have inspired loud guffaws from Wall Street: after all, utilities have long been considered so safe and stable (read: boring) that they used to be called widows' and orphans' stocks. Thanks to deregulation, the rules of the game are now changing at a dizzying pace. The stock market interest in "energy technology" stocks, which even produced an Internet-style bubble in the late 1990s, is a clear sign that the broader public is waking up to the potential of fuel cells.

The happy collision of markets, environmentalism, and innovation explains the most powerful trend of all in energy today: micropower, which puts small, clean power plants close to homes and factories. That may sound unremarkable, or even like common sense, to the reader -- but in the energy business it is near heresy. It is in fact a dramatic reversal of the age-old utility practice of building giant power plants far from the end user. The most surprising aspect of the micropower revolution is that tomorrow's energy world will be based as much on silicon chips, software, and superconductors as on soot and sulfur. Dramatic advances in software and electronics offer new and more flexible ways to link parts of electricity systems together. Today's antiquated power grid, designed when power flowed from big plants to distant consumers, is being upgraded to handle tomorrow's complex, multidirectional flows (the result of micropower plants selling power into the grid as well as buying from it). It is this breakthrough that will finally make possible the intelligent homes and the Energy Internet of the squeaky-clean, not-too-distant future.

**Bigger than the Internet**

What is about to happen in the energy realm is every bit as dramatic as the telecommunications revolution of the past two decades, which, despite the recent rocky ride of telecom stocks, has brought the world such astonishing developments as cheap long-distance calls, cellular telephony, and the Internet. In fact, the coming energy revolution is quite possibly more important, for two reasons. One is that energy is the world's biggest industry, by far -- America's electricity industry alone is bigger, in terms of revenues, than the country's long-distance telephony and cellular telephony businesses combined (that calculation does not even include Big Oil, Big Coal, or Big Anything Else). All told, the global energy game is nearly a $2 trillion-a-year business.

The second reason the energy revolution is so important is, of course, the impact our energy use has on the environment. The planet's health was the theme of the famous Earth Summit organized by the United Nations in Rio de Janeiro in 1992. The world's heads of state, along with thousands of activists, lobbyists, officials, scientists, and journalists, were there to push for their pet green causes -- especially fighting global warming. After a decade of sketchy progress, the world's leaders gathered for a follow-up Earth Summit in Johannesburg, South Africa, in August 2002. Once again they sought to reconcile the demands of economic development with concerns about the environment -- and once again energy-related problems such as global warming and local air pollution were at the top of their list of concerns.

This time, though, something interesting happened. After the usual squabbles -- over whether to put the earth first or people first -- subsided, the gathered heads of state hit upon a strategy that would do both: they agreed to help the world's poorest people gain access to modern energy in ways that are environmentally sustainable. In the next couple of decades, China and India will add thousands of new power plants and many millions of new vehicles as their economies grow. The rich world should help them do so using clean technologies like renewables and micropower. If not, a window of opportunity to set the world on a clean energy footing may be lost forever. It would kill many Indians and Chinese prematurely and needlessly, and would undermine efforts to combat global warming. It may even radically alter geopolitics if the relationship between an energy-starved China and an oil-rich Saudi Arabia begins to threaten America's web of alliances in the Middle East.

The world is at a crossroads. Decisions taken in the next few years about energy in big countries like the United States will shape the investments made in energy infrastructure around the world for a generation or more. After all, coal plants and oil refineries last for decades -- and that sunk investment displaces or discourages nimbler, cleaner, and more distributed options like micropower. If we want to shift to a clean, secure, low-carbon energy system during this century, the time to start is now.

If the three camps in the energy debate remain so intransigent and shortsighted, the road ahead might prove a tortuous one. Happily, there are already signs that the dizzying pace of innovation out in the real world is bringing with it entirely new and better ways of thinking about energy that may yet render their arcane policy debates irrelevant. If micropower really takes off, then there is every reason for optimism about our planet's future. Let the revolution roll!

## Announcement

### 9th Annual USAEE/IAEE/ASSA Meeting

Chicago, Illinois., USA January 5- 7, 2007

**Session Title: Current Issues in Energy Economics and Energy Modeling**

**Presiding**: Carol Dahl, Colorado School of Mines

**Speakers:** Alireza Tehrani Nejad M. and Valérie Saint-Antonin, Institut Francais du Pétrole – *Allocation of $CO_2$ Emissions in Petroleum Refineries to Petroleum Joint Products: A Case Study*

Lester C. Hunt, University of Surrey, and Frederick L. Joutz, George Washington University – *Modeling Underlying Trends in OECD Energy Demand: Deterministic Vs. Stochastic?*

Benjamin F. Blair and Jon P. Rezek, Mississippi State University – *The Effects of Hurricane Katrina on Price Pass – Through in Gulf Coast Gasoline Markets*

Youngho Chang and Qiyan Ong, National University of Singapore – *Consumption Efficiency and Deregulated Electricity Market*

**Discussants**:

Donald A. Hanson – Argonne National Laboratory

Clifton T. Jones – Stephen F. Austin State University

Young Yoo – Federal Energy Regulatory Commission

Lynne Kiesling – Northwestern University

Abstracts are posted at http://www.iaee.org/en/conferences/assa2007.aspx

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

For program information and pre-registration forms on the larger meeting (usually available in September) go to http://www.vanderbilt.edu/AEA/anmt.htm. Also watch for the USAEE/IAEE Cocktail Party.

# Should OPEC Price Its Oil in a Basket of Currencies Rather Than in U.S. Dollar?

*By Mamdouh G. Salameh**

**Introduction**

With the continued weakening of the U.S. dollar since 2001 and with OPEC's eleven members heavily reliant on oil revenue as their main source of income, many members have been considering a switch in their oil-pricing policy from the U.S. dollar to a basket of currencies as a way for safeguarding their oil revenues against a declining U.S. currency and also stabilizing the oil prices.

Iraq already prices its oil in euros, having made the switch in 2000. Iran has also been considering such a switch for several years and the subject has been discussed in Saudi Arabia. Venezuela currently sells part of its oil output under a barter system to avoid using any currency at all. Last year, a senior OPEC official suggested that such a move might one day make economic sense for the Organization. Nobody thinks any such switch is imminent.

Russia sells most of its oil to Europe and gets most of its exports from the eurozone. So pricing oil in euros would enable both sides to save on the costs of currency conversion. But this would only represent a very small saving, so in a sense, the move would be economically insignificant. The real importance of such a move would be political. It would be hugely symbolic in the context of the European Union's (EU) ambitions to establish the euro as an alternative reserve currency to the dollar. The risk is that it would also do damage to the dollar and to the global economy.

And now Norway is also considering pricing its oil in euros and also establishing its own commodities and energy bourse. Norwegian Bourse Director Mr Sven Arild Andersen is of the opinion that Norwegian oil should be traded in euros, which can be advantageous for international customers. He said that Norway has the prerequisites for building a Norwegian or Scandinavian energy bourse. He added that his Bourse has performed market studies which showed that both Russia, which is a large oil exporter, as well as the countries of the Middle East have large parts of their economies in euros. They would be able to view such a bourse as a contribution to balancing their economies in a better manner than at present, where their products are traded solely in dollars.[1]

There is, however, a political dimension for switching from U.S. dollar to a basket of currencies. The question is do the Arab Gulf members of OPEC have the political will to make such a switch. Any such switch will be interpreted by the United States as an anti-American political act. The U.S. could understand it if Iran and Venezuela were to adopt such a pricing policy given their anti-U.S. attitude but not the Arab Gulf producers whose security is defended by the U.S.

This paper will endeavour to analyse the economic and political impact of such a switch on the economies of the OPEC countries and the stability of the oil price. It will assess the impact of such a switch on the U.S. economy and the value of the U.S. dollar. The paper will argue that it is highly essential for oil producers worldwide, particularly the OPEC countries, to restructure their oil-pricing policy in order to achieve higher oil revenues and obtain more stable oil pricing in the global oil market.

**OPEC Oil-Pricing Background, 1970-2000**

OPEC members currently supply 41% of global oil production and possess 74% of the world's proven crude oil reserves.[2] They also export some 25 million barrels of oil a day (mbd).

However, in recent years the economies of OPEC countries and, therefore, their oil revenues, have been adversely affected by the weakening U.S. dollar. For instance, UAE's oil revenues declined from $19.4 bn in 1980 to $6.9 bn in 1985 and then rose to $26 bn in 2000. Without any doubt, these figures impacted heavily on the gross domestic product (GDP) of the country. GDP declined from $30 bn in 1980 to $21.5 bn in 1985 then increased to $35.5 bn in 2000.[3]

The current economic situation in the United States since September 11th 2001 and the accounting mismanagement of many American corporate firms such as Enron and WORLCOM have shaken the U.S. economy and the U.S. dollar.[4] Furthermore, the introduction of the euro has provided an alternative petro- and reserve-currency. The euro is expected to play a key role in the global economy and to be a strong contender to the unstable U.S. dollar. However, I very much doubt that the euro could, on its own, replace the U.S. dollar as the global petro-currency.

An early assessment of the impact of OPEC's pricing policy on its oil revenues between 1970 and 2000 compared two baskets of currencies with the U.S. dollar. The first basket consisted of five equally-weighted currencies consisting of the U.S. dollar, Japanese yen, British pound, French franc and the German deutschemark. The second basket was made up of seven equally-weighted currencies, namely, the U.S. dollar, Japanese yen, British pound, French franc, Canadian dollar, German deutschemark and Swiss franc.

The assessment showed that total savings of $170 bn to $178 bn could have been achieved had OPEC tied its oil pricing to either of the two baskets of five and seven currencies respectively in the 30-year period. These extra savings are approximately equivalent to the revenues generated in one year of an average OPEC oil production and export.[5]

Although the OPEC members produced and exported oil at a steady and consistent rate throughout the 30-year period, the price of oil showed a great instability throughout the same period. These price fluctuations and instabilities had a significant impact on the economic growth of the OPEC countries and their oil revenues especially in the mid-1980's (see Table 1).

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**Table 1**
**OPEC Countries's Oil Revenues, 1970-2000**
**($ bn)**

| | 1970 | 1975 | 1980 | 1985 | 1990 | 1995 | 2000 |
|---|---|---|---|---|---|---|---|
| Oil exports (mbd) | 22.09 | 26.63 | 20.51 | 14.55 | 20.58 | 22.30 | 25.90 |
| Oil price (U.S.$/b | 1.80 | 11.09 | 38.00 | 27.81 | 23.17 | 17.24 | 28.50 |
| Oil revenue ($ bn | 14.51 | 107.78 | 284.50 | 127.18 | 174.05 | 140.32 | 269.42 |

Sources: OPEC Annual Statistical Bulletins, 1988-2003 / BP Statistical Review of World Energy,1989-2005 / Author's calculations.

Therefore, it is highly essential for the OPEC countries to consider restructuring their current oil-pricing policy in order to achieve higher returns and obtain more stable oil pricing in the world's oil market. The question is what basket of currencies should OPEC adopt now.

**A Restructuring of the OPEC's Current Pricing Policy**

The U.S. Energy Information Administration (EIA) estimated OPEC's oil revenue in 2004 at $338.4 bn based on exports of 25 mbd and an average price of $37/barrel. However, OPEC's oil revenues in 2005 were estimated at $501 bn based on exports of 25 mbd and an average price of $55/barrel. They are projected to reach $548 bn in 2006 based on a price of $60/barrel (see Table 2). The Arab Gulf producers accounted for an estimated $271 bn of OPEC's projected revenues in 2005.

**Table 2**
**Estimated OPEC's Oil Revenues, 2004-2006**
**($ bn)**

| Country | 2004 | 2005 | 2006 |
|---|---|---|---|
| Algeria | 22.6 | 32.1 | 36.6 |
| Iran | 32.5 | 48.2 | 52.6 |
| Iraq | 20.0 | 29.7 | 32.4 |
| Kuwait | 27.4 | 40.6 | 44.2 |
| Libya | 18.1 | 26.9 | 29.3 |
| Nigeria | 29.8 | 44.2 | 48.2 |
| Qatar | 13.5 | 20.1 | 21.9 |
| Saudi Arabia | 115.1 | 171.0 | 186.6 |
| UAE | 30.3 | 45.0 | 49.1 |
| Venezuela | 29.1 | 43.2 | 47.1 |
| **Total** | **338.4** | **501.0** | **548.0** |

Source: U.S. Energy Information Administration (EIA) / Author's calculations.

Despite this projected rise in OPEC's oil revenues, economists are concerned about the health of the economies of the Arab Gulf producers for two reasons: first, the continued weakening of the U.S. dollar against the yen and the euro, the two currencies used the most to pay for these countries's imports; second, the gradual rise in the interest rates of the U.S. dollar to which the Arab Gulf currencies are pegged. This could slow down economic growth in this region.

As a matter of fact, net per capita income in the Arab Gulf is three times lower in real terms than it was thirty years ago.

In a new assessment I compared OPEC's dollar-based oil revenues in 2005 with yen-based and euro-based revenues and also with a basket of currencies made up of three equally-weighted yen, euro and dollar (see Table 3).

The assessment showed that if OPEC priced its oil in either the yen or the euro, they would have earned an extra $75 bn and $80 bn respectively. If, however, OPEC priced its oil in a basket of currencies made up of the yen, euro and dollar, they would have earned an extra $52 bn in revenue. Though OPEC's revenue resulting from the adoption of a basket of the three currencies is $23 bn and $28 bn short of adopting either the yen or the euro, respectively, the risk spread is better. Moreover, neither the euro nor the yen can individually act as a global petro-currency while a basket made up of these two currencies and the U.S. dollar can.

**Table 3**
**OPEC Oil Revenues in 2005**

| | U.S. Dollar | Yen | Euro | Basket of Currencies |
|---|---|---|---|---|
| At 2005 U.S.$ exchange rates | 501 bn | 576 bn | 581 bn | 553 bn |

Sources: EIA / Handbook of Energy & Economic Statistics in Japan / Author's calculations.

**How Does Reserve Currency Status Benefit the U.S.?**

The U.S. derives a small benefit from 'seigniorage' – the profit the U.S. makes from the circulation of nearly $3 trillions worth of U.S. banknotes outside the U.S., which cost little to print but are backed by interest-bearing Treasury bills. This is worth $10 bn a year. But the real benefit of reserve currency status is that it ensures a virtually insatiable demand for dollars from the world's Central banks, who need the U.S. currency to boost their own reserves and thereby support their own currencies.[6] China alone, for instance, holds an estimated $800 bn in U.S. Treasury bills while Japan holds more than $1 trillion and South Korea $500 bn. This has given the United States carte blanche to borrow unprecedented amounts of money to fund its tax cuts and consumer spending at very low interest rates.

There are far more serious implications for the U.S. economy were OPEC to adopt this shift in their oil-pricing policy and were other oil producers to follow suit. The value of the crude oil traded in the global market exceeds $1.5 trillion per annum. This is equivalent to 15% of the United States GDP. A shift to a basket of currencies made up of the yen, euro and dollar, would have added $36 bn to the estimated U.S. oil bill of $285 bn in 2005. It will also expand the U.S. budget deficit significantly, lead to a lesser demand for the U.S. currency in the global markets and would result in a further steep fall in the value of the U.S. dollar.

It would be devastating for the dollar if the crude oil transactions were to be priced in a basket of currencies rather than in the dollar alone and the world's Central banks were to start switching part of their reserves into euros and yens, or even simply stop buying dollar assets. Because oil importers would need to buy euros and yen to pay for oil, demand for these two currencies would surge. This would also increase the use of the euro and the yen as reserve currencies. The value of the dollar would collapse, since demand for dollars would fall. Worse still, the U.S. would find it very hard to finance its giant twin deficits – its trade and budget deficits. The dollar's reserve currency status has allowed it to run up debts no other country in history could have got away with. America's trade deficit now stands at $600 bn, equivalent to

6% of GDP while its external debts are many times bigger.

This would have been unthinkable under the gold standard, when those debts would have been redeemable in gold. It was because Britain ran up similar debts in the 1930's and 1940's that sterling had to be devalued and thus ceased to be the main global reserve currency.[7]

**Impact on the U.S. Economy**

Over the last year, portfolio (private) investment in the U.S. has dried up amid fears that the trade deficit is unsustainable and that a fall in the value of the dollar is inevitable.

America shows no signs of being prepared to live within its means: the response to every tax and interest rate cut of the last few years has been a burst of consumer borrowing and spending. But Asian Central banks have spent billions propping up the dollar – and thus funding this debt binge – because they fear a collapse in the dollar would choke off their own economic growth. But despite this intervention, the dollar is still weakening.

The euro and the yen are the main beneficiary of the weaker dollar and their strength has added to their appeal as potential reserve currencies. But a collapse in the dollar could be as much as a disaster for both Europe and Japan and the world at large as for the U.S. The U.S. could be faced with higher inflation, higher interest rates and a stock market and property market crash, while the eurozone and Japan could find their goods priced out of world markets. Unable to rely on exports to the U.S., the nascent eurozone and Japanese recovery would collapse. The eurozone and Japan may hope this scenario can be avoided by collective government action, as it was in 1986 with the Louvre Accord, following a 44% collapse in the dollar's value. The answer then was interest-rate cuts, which led to a boom followed by a stock market crash in 1987. This time, a solution would most likely involve big sacrifices by the U.S. – sacrifices that in the current political climate it may not be able to make.

**Conclusions**

OPEC members should seriously consider restructuring their oil-pricing policy by switching from the U.S. dollar to a basket of currencies made up of three equally- weighted dollar, yen and euro. This will safeguard their oil revenues and stabilize the oil prices and also provide a better risk spread.

However, it is inadvisable for them to price their oil in either the euro or the yen separately as neither of these two currencies can act individually as a global petro-currency or a global reserve currency. A basket of the three biggest currencies would provide stability to the oil market and assured revenues to OPEC oil producers. This will also open the door for other non-OPEC producers like Russia and Mexico to follow suit.

The added revenues amounting to at least $52 bn per annum could be used to expand their oil production and refining capacities and exploration and also to improve their health and educational services and renovating their infrastructure.

**Footnotes**

[1] Energy Bulletin published on 27 December 2005 by NRK.

[2] BP Statistical Review of World Energy, June 2005, p.4 & p.6.

[3] OPEC Annual Statistical Bulletin, 1988-2004.

[4] S. Pearlstein, *Corporate Scandals Taking Toll on Markets*, Washington Post, June 26, 2002, p. A01.

[5] Data secured via Prof. MU.S.a Essayyad, King Fahd University of Petroleum &Minerals, Dhahran, Saudi Arabia.

[6] Money Week, 9 July, 2005,p.2.

[7] Ibid., p.2.

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| | |
|---|---|
| **President-Elect** | Andre Plourde |
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| **Vice President & Treasurer** | Jan Myslivec |

## The Ties Betwen Natural Gas and Oil Prices

***By Guy Maisonnier****

On the European continent, the price of natural gas is still tied directly to the price of competing energies, especially heavy fuel oil and home heating oil. In other words, the gas market is linked to the oil market. Under the effect of deregulation, this model is likely to change, making a shift like that which took place on the American market.

In the natural gas sector, one question keeps cropping up: Will there continue to be a link between the gas and oil prices? First of all, let us note that this question mainly concerns the continental European and Asian markets. Since deregulation of gas markets in the United States and the United Kingdom, the reference price for natural gas has been based on short-term prices (spot prices at the Henry Hub or the NBP) and on standardized quotes at marketplaces like the Nymex (United States) or the IPE (United Kingdom): these prices reflect the supply/demand equilibrium on the market.

However, even on these deregulated markets, there is a connection with the price of crude. The price of gas is influenced directly by using formulas based on the price of petroleum products, or indirectly, like in the United States. Two questions arise: Will direct price indexation formulas eventually be dropped? What kind of link persists in a deregulated market?

### Formulas Used to Compute the Gas Price in Europe and Asia

The mid-'50s marked the beginning of long-distance gas exchange transactions, especially in the United States and Europe. The development of a grid enabled Europe to import natural gas from Russia, Algeria, Norway and the Netherlands. At the same time, liquid natural gas (LNG) exchanges were implemented in Asia to supply power plants in Japan that had previously burned oil. As for North America today, Canada will soon be supplying the United States.

To ensure the longevity of these exchanges, which require very heavy capital expenditure worth billions of dollars, it was of paramount importance to find an instrument that would reassure both buyer and seller, and the long-term contract did just that. Its key characteristics are: a term of 20 to 25 years, a buyer obligation to physically take and pay for a minimum quantity ("take or pay" clause), and a seller obligation to supply the gas and a price indexed on competing energies.

The purpose of having a price indexed on heavy fuel or home heating oil or directly on crude oil (Algeria or Asian LNG contracts) is to protect market share. In the absence of a separate market for natural gas, which must compete across the board with petroleum products, this type of procurement formula yields a price that is in line with competing energies; this price practically guarantees that natural gas will find sales outlets. Transport investment can be amortized without any serious risk of a decline in deliveries. Such formulas and contracts are still used on European and Asian markets.

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The price is computed on a net-back basis: the transport and distribution costs are subtracted from the average price of competing energies on the final market. The result corresponds to the maximum purchase price that the gas distributor is prepared to pay the producer. Through conventional indexation, natural gas is tied to competing energies over time.

***Example of a gas pricing formula:***

- Europe: P = Po + A x (G-Go) + B x (F-Fo)
- Asia: P = Po + A x (B-Bo)

Where:

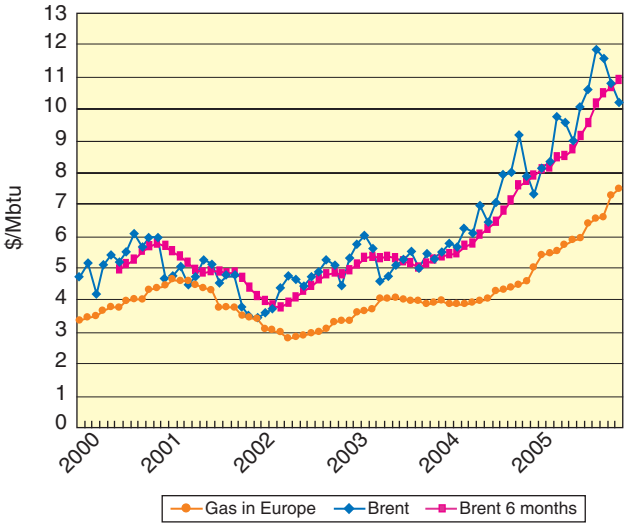
P (Po) = Monthly price at which gas is purchased from the producer (index o: initial date of contract implementation);

G / F / B = Average price over 3, 6 or 9 months for heating fuel G, heavy fuel F, petroleum B. (Using an average limits oil price increases or decreases.)

In Europe, natural gas is usually indexed on fuel oils (heavy oil and home heating oil), because it competes mainly in the industrial and commercial sectors. In Asia, it is indexed on crude oil, which was the energy used at most electric power plants in the 1970s.

To make an initial approximation, one can establish a good correlation between the crude price average over 6 months and the monthly price of long-term gas contracts (see the figure below), which confirms the close tie between the two energies. The following relationships give us an order of magnitude: When the crude price stood at $20/b ($3.7/Mbtu), the gas price in Europe approximated $3/Mbtu (€8.6/MWh, with the dollar at €1.2). When the crude price hit $60/b ($11/Mbtu), gas cost about $7/Mbtu (€20 /MWh). Prices are currently in this range.

**Figure 1**
**Tie Between the Price of Long-term Gas in Europe and the Brent Price**




*Remark: The long-term price of gas is indicative and reflects European averages.*

### Challenges to These Formulas in Deregulated Markets

Long-term contracts are perfect instruments to meet the needs of emerging gas markets, with their "take or pay"

clauses (containing a contractual obligation to physically take and pay for a minimum quantity) and their prices indexed on competing energies. In the absence of a reference gas price, indexing is used to obtain a price in line with the market, thereby ensuring that gas will find sales outlets.

The market risk is low, enabling the purchaser to make a longer-term commitment and accept the "Take or Pay" clause. Actually, the latter has practically never been implemented, either in Europe or in Asia. The system is perfectly geared to limiting risks and financing transport investment. This type of contract will long continue to be used in countries developing a gas industry (e.g., China and India today).

Gas market deregulation, undertaken in the mid-1980s in the United States and the United Kingdom, has challenged the long-term contract. To put it schematically, deregulation has two major objectives:

1. Have one operator manage transport and distribution, since duplicating the network would be an economic absurdity.
2. Open up gas buying and selling to competition.

This change requires the separation of operator activities, by implementing separate accounts or separate legal entities. There would be the network managers supervised by a regulatory authority (in France, the CRE) on the one hand, and production and marketing companies ruled by market laws on the other. The consequences of this new organizational set-up are far-reaching.

First of all, long-term visibility is not as good as when there is one operator per region (Germany) or per country (e.g., France or Italy), as in the past. On a competitive market, it is impossible to accurately determine demand for any given operator in 5 years, much less in 10 years. Entering into long-term contracts over a 20-year period becomes a much riskier proposition. Therefore, the first consequence of deregulation is to reduce the buying contract term to less than 10 years compared to 20 to 25 years previously. That's what happened in the United States and the United Kingdom.

**Key Differences Between Monopolistic and Deregulated Markets**

| | **Monopolistic Market** | **Deregulated Market** |
|---|---|---|
| **Term of contract** | Most long-term contracts: 20 to 25 years | Short-term (1 month) medium-term (18 months) and long-term contracts (less than 10 years) |
| **Buying** | "Take or pay" clause | "Take or release" clause (US) |
| **Price** | Calculated on a net-back basis, indexed on competing energies | Indexed on the spot market price |
| **Transport** | Managed by a gas company with a monopoly | Managed by a dedicated transport company; signature of transport contracts (TPA) |

*TPA: Third-Party Access.*

The second major consequence is the emergence of a spot market for natural gas. Spot trading from day to day enables a large number of market players to balance their supplies by making short-term exchanges on the market. The creation of a market regulated by the Nymex or the IPE and of standardized contracts (such as futures and options) happens naturally to allow operators to cover their price risk, a basic function of such exchanges.

On a deregulated market, standard contract characteristics are different:

- The term of contract is shorter, with an array of contracts ranging from 1 month, 18 months and over 18 months (United States).
- The "take or pay" clause is occasionally replaced by a "take or release" clause (allowing resale of excess gas on the spot market).
- The price is set with reference to the gas market, which depends on the supply/demand equilibrium and not on competing energies.
- Gas transport is handled by a dedicated manager (not responsible for commercial operations); its rates are supervised by a regulator.

Contrary to a widespread misconception, the long-term contract does not totally disappear from a market when the spot price becomes the market reference. Long-term contracts are still in use, although now the term of contract is shorter and the price is indexed on the spot market. Relatively long-term transport contracts make it possible to plan future network investment requirements. To a certain extent, they offer the long-term visibility that existed in markets dominated by a single operator.

At any rate, decreased visibility on deregulated markets can be attributed more to the non-existence of a single operator than to the existence of a spot price. Long-term contracts bearing on large volumes (e.g., in Europe) enable effective supply planning. Planning is much harder for producers dealing with many buyers. In a deregulated market, strong price fluctuations make the necessary market adjustments. Price volatility is inherent to a competitive market.

### The European Market: Current Situation and Outlook

A dual situation now exists on the European gas market: in Great Britain, the spot market price is the reference whereas on the continent the gas price is directly influenced by petroleum product prices. These two markets are not independent, because the Interconnector, the gas pipeline between Belgium and the U.K., creates opportunities for arbitrage.

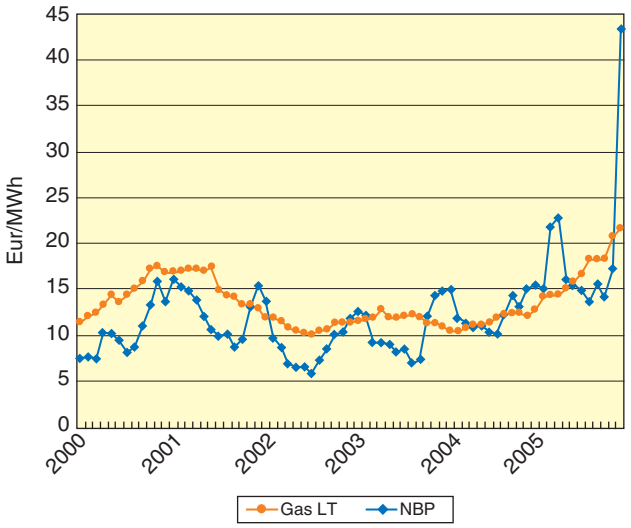
A look at gas price variations since 2000 (see graph below) shows that the main uptrends and downtrends are common to both markets. On the other hand, large price differentials have occurred. Roughly speaking, one can distinguish two periods: before 2003 and after 2003.

Before October 2003, the price on the U.K. market was noticeably lower than the indexed prices of long-term contracts on the continent. The latter served as upper limits to U.K. prices during tight market periods, especially in win-

ter. The winter of 2003 marked a turning point with the U.K. price equivalent to or even higher on average than prices on the continent.

It's as if the long-term price acted to moderate trends (up or down) in the U.K. spot price: it served as a ceiling during periods of slack demand on the U.K. market (before October 2003) and, inversely, as a floor during periods of chronic tension (after 2003). The Interconnector enables two-way gas flows, hence opportunities for arbitrage.

**Figure 2**
**Spot Price (NBP) in the United Kingdom and Long-term Price on the Continent**




*NBP: National Balancing Point*

The National Balancing Point (NBP) in the U.K. is no longer Europe's only marketplace. Zeebrugge in Belgium and, to a lesser extent, the Title Transfer Facility (TTF) in the Netherlands are the two largest marketplaces on the European continent. These two markets are linked by the Interconnector, whose two-way flows between the United Kingdom and Belgium keep the spot prices at the NBP and at Zeebrugge in equilibrium for most of the year.

Given this context, the biggest question that arises today is whether this duality is likely to continue in the future. Long-term "take or pay" contracts currently represent about 90% of the gas supply in continental Europe. Outside the United Kingdom, the spot price only plays a limited role.

The spot price will probably become more influential in the future, judging by what has happened on deregulated markets in the past. Whether this occurs quickly or not will depend on the emergence of more intense competition, which in turn depends on gas availabilities on the market and on spot prices.

This could be accelerated by a situation in which spot prices tended to be lower than long-term contract prices. Such a situation is likely to develop in 2006/2007 with the arrival of new transport infrastructure (pipeline and LNG) on the U.K. market.

So there is a very real short-term possibility that the European continent will adopt a spot price for its reference price. To some degree, this happens naturally on deregulated markets and it is hard to believe that Europe will be any different. In this possible future scenario, prices may not fall: this is borne out by current developments on the deregulated U.S. or U.S markets. A tight supply situation triggers soaring prices… the supply/demand equilibrium determines the price level.

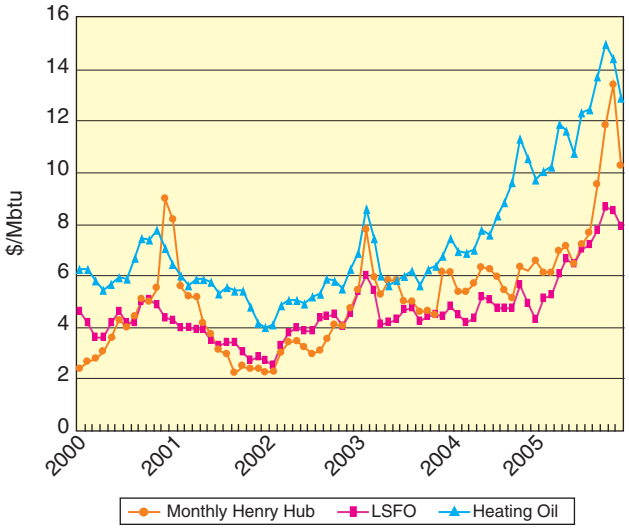
**An Indirect Link with Oil**

As we have already seen for the United States and the United Kingdom, there already exist natural gas markets with their own price barometer. The U.S. market, where there is no longer interference with indexed prices, merits special attention.

On this market, reference spot prices are quoted at hubs where several pipelines converge, the most prominent being the Henry Hub in Texas. Although gas prices are set independently, a correlation does exist with the oil market. The figure below shows that the price trend for natural gas runs parallel to that of petroleum products. However, its monthly prices are more independent and range between an upper limit (the price of home heating oil) and a lower limit (the price of heavy fuel oil).

If the price of gas momentarily deviates from these upper and lower limit values, spring forces (inter-energy replacement) bring it back within the petroleum product price range.

**Figure 3**
**Spot Price (Henry Hub) in the U.S. and Price of Petroleum Products (home heating oil and LS heavy fuel)**




Replacing natural gas with coal (electricity production) or heavy fuel oil (industry) helps avoid excessive price spikes. Inversely, an excessive decrease reaching levels below the heavy fuel oil price will stimulate gas demand and bring the price back into the heating oil/heavy fuel range. In the last few months, there has been price parity between natural gas and WTI crude, due to the shortage of supply caused by Hurricanes Katrina and Rita.

Therefore, even on this deregulated market, there is an indirect relationship with the oil market because of the pos-

sibilities for replacing one energy with another. Roughly speaking, the heavy fuel price serves as the lower price limit, which can rise in a tight market; here, the gas price comes close to the crude price and can even exceed it for short periods.

**By Way of a Conclusion**

The price of natural gas on the European market will continue to be directly tied to the price of crude for some time yet, considering the current importance of traditional long-term contracts indexed on the price of petroleum products.

This being said, the importance of hubs where prices are quoted, such as the NBP in Great Britain or Zeebrugge in Belgium, is increasing. There is good reason to think that a gas price will emerge and become the reference price for long-term contracts. Sophisticated indexation formulas (to average spot prices or futures over several months) could be used in addition to or to replace indexations on oil. Indexations on electricity will also come into more frequent use, given the size of its share in European and world gas demand.

Traditional contracts may be used to a lesser extent, but that does not mean that short-term contracts will reign supreme. Long-term contracts can exist even on deregulated markets, especially for the reservation of transport capacity. Nor will crude prices stop having an influence; the interaction between energies can be used to regulate excessive temporary price differentials.

Perhaps the *real* question is this: For natural gas, when will there be a world price and when will there be a reference price on the energy market? Looking to the future, which will bring developments on the liquefied natural gas (LNG) market and the decline of oil production, perhaps in the ten to thirty years to come, these are legitimate questions.

In the United States, LNG is expected to develop from a relatively marginal source of supply into a major one. Accounting for 2% of U.S. demand in 2003, it will represent over 20% by 2025 (source: DOE). It will have a major impact on the market because the United States will represent 25% of world trade versus 5 to 6% today.

This important change will help fluidize this market, probably creating opportunities for arbitrage with the two other LNG importing regions, i.e., Europe and Asia. If we also consider the arrival of the two Asian giants, India and China, there is every reason to think that an international natural gas market will be set up within the next ten years. Instead of a single world price, there will probably be several strongly correlated regional prices that will interact in the same way that benchmark crudes (Brent in Europe, WTI in the U.S. and Dubai in Asia) do on the oil market.

The second issue, concerning the preeminence of natural gas over oil as the leading energy, is more problematical, given the inertia inherent to historical trends. Nevertheless, it ought to be considered, owing to the changes expected on the energy market.

The production of oil is expected to peak sometime during the next 10 to 30 years. This expectation might lead to an increasing use of oil in the transport sector, its natural outlet. In contrast, the use of natural gas is growing across all sectors – domestic, industrial, electricity production and, albeit to a more moderate extent – transport (NGV, Fischer Tropsch diesel fuel). There is a legitimate argument in favor of making this energy the market reference.

It may be academic, but this question highlights the complexity characterizing the energy market of the future. The answer, still uncertain with respect to the link between energy prices, will probably become clearer in the next ten years.

***Appendix: Long-term Gas Price Trends***

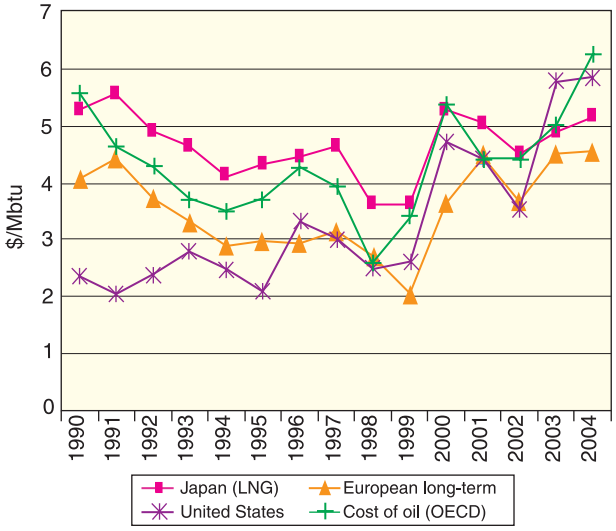
Natural gas prices, expressed in constant 2004 dollars for the three largest markets (Europe, Japan and the United States), are currently situated at especially high levels.

From a range of $2 to 3/Mbtu, the gas price in Europe rose to over $4//Mbtu where it has remained since 2000. It is expected to reach an average of close to $6 for 2005. The price keeps rising because it is indexed on the price of petroleum products.

In Asia, the price, indexed on crude oil, also followed oil market trends. Since 2000, it has hovered around $5/Mbtu, up from its earlier range of $4 to 5/Mbtu. It is expected to near $6 for 2005. As in the past, it remains higher than the European price, but with a lower differential: some Asian formulas limit increases above a given crude price (S curves).

In the United States, the year 2000 marked a real turning point that nobody anticipated: the price of gas gradually increased and exceeded $5/Mbtu, compared to $2 to 3/Mbtu before that date. It is expected to exceed $7 for 2005. Market tensions (high demand, impact of the hurricanes) are responsible for this uptrend. 2005 may be an exception, but the basic trend for this market seems to be towards a high price.

**Figure 4**
**Annual Average Price of Gas on the Three Key Markets**




# Endogenous Technological Change and the Economics of Atmospheric Stabilisation

*Guest Editors: Ottmar Edenhofer, Carlo Carraro, Jonathan Köhler and Michael Grubb*

Few dispute that technology innovation will be central to tackling the diverse energy challenges of this Century – but the economics of innovation remain poorly understood and inadequately represented in most economic models.

Nevertheless, empirical and theoretical developments in the field of "endogenous technological change" (ETC) are increasingly being incorporated in energy-economy models, which are rapidly gaining complexity and salience in the global debate. In both 'top-down' and 'bottom up' lines of analysis, a much richer menu of technologies and innovation processes are being modeled, for example with introduction of strategic R&D investments and R&D spillovers, crowding out effects between different R&D investments, joint modeling of learning by researching and learning by doing, and endogenizing dynamics of a backstop technology.

It is time to assess the state of the art, with a comparative study traversing both 'bottom-up' and 'top-down' perspectives in relation to the most over-arching, long-term and global policy question in the field: the implications of trying to stabilize atmospheric $CO_2$ concentrations. This Special Issue brings together the results from the Innovation Comparison Modeling Project, representing early and extensive efforts to do just that. Edited by Ottmar Edenhofer, Carlo Carraro, Jonathan Köhler and Michael Grubb, the 284-page volume contains a Synthesis Report that examines and compares the influence and dynamics of ETC in ten different global models (ENTICE-BR, FEEM-RICE, AIM/Dynamic-Global, DEMETER-1CCS, MIND, DNE21+, GET-LFL, MESSAGE, IMACLIM-R and E3MG), applied to assess the economics of stabilising atmospheric $CO_2$ concentrations.

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**CONTENTS**

## Furthering Adaptation Measures and its Synergies with Mitigation Measures

***By Phillia Restiani****

It becomes more apparent nowadays that climate change is happening, despite the debate about to what extent anthropogenic activities have contributed to the severity of the problems. The Third Assessment Reports (TAR) of the Intergovernmental Panel on Climate Change (IPCC) states that even with the best possible scenario of measures to reduce greenhouse gases and $CO_2$ emissions climate change including climate variability and extremes still occur. Furthermore, mitigation measures that have and will be taken to deal with climate change will also bring about changes which require societies to adjust. On this ground, adaptation is needed to moderate the negative impacts and exploit the opportunities resulting from climate change.

Discussions about adaptation to climate change so far are mostly tied to mitigation strategies. This approach recognises adaptation as a strategy to complement mitigation strategy in climate change policies. Unfortunately, research and discussion regarding adaptation are thus conducted mainly using the framework of mitigation, particularly the impact assessment approach. However, adaptation to climate change embraces a wider societal perspective that requires the use of a different approach, other than just physical impact assessment.

This article will discuss the general framework of adaptation in climate change policy and approaches to conducting adaptation studies. Further, the potential synergy between adaptation and mitigation is assessed as an alternative solution to enhance countries participation in the climate change arena, with an illustrative case in the energy sector.

### The Role of Adaptation in Climate Change Policy

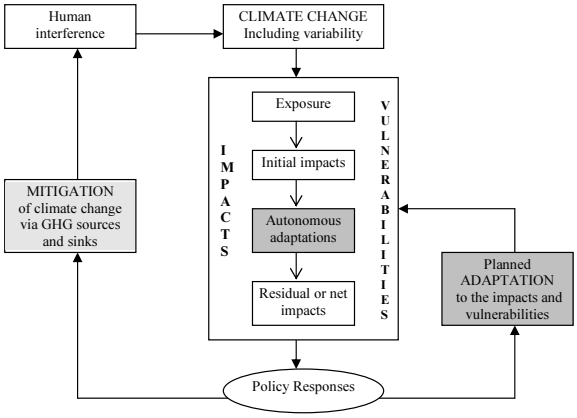
The concept of adaptation was recognised since the Intergovernmental Panel on Climate Change Third Assessment Report (2001). In that report, the emergent findings show that both natural and human systems are vulnerable to climate variability and change due to limited adaptive capacity in coping with changed climate. Energy is one of the main sectors which are sensitive to climate change and its vulnerability varies across geographical position, time, as well as economic, environmental, and social conditions. The role of adaptation within climate change policies is illustrated in Figure 1[1]. In this framework, adaptation is considered as a necessary policy response to complement mitigation in dealing with climate change.

Adaptation is defined as adjustment in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impact in order to lessen the damages or to take advantage of the opportunities associated with climate change. Understanding of this adaptation concept is important in assessing the impacts and vulnerability related to a given mitigation level and consequently the costs and benefits of the corresponding strategies.

Smit, et al (2000) proposed "an anatomy of adaptation" which elucidates three main questions with regard to adaptation[2]:

1. Adaptation to what? (climate-related stimuli).
2. Who or what to adapt? (corresponding systems and their characteristics)
3. How does adaptation occur? (adaptation types with regard to its process and outcome)[3].

**Figure 1.**
**Adaptation as an Element in the Climate Change Issue (Smit, et al, 1999)**




Evaluation of the adaptation policy should be carried out to understand the effectiveness of the chosen adaptation policy and to obtain more knowledge and input of the undertaken measures. This evaluation process answers the question of "how good is the adaptation?" based on criteria such as cost, benefit, equity, efficiency, urgency, and implementability. Some analytical tools that can be employed to assess adaptation options are Cost-Benefit Analysis (CBA), Cost-Effectiveness Analysis (CEA), and Multi-Criteria Analysis (MCA).

As can be seen from Figure 1, adaptation and mitigation are both the main responses in climate change policies. Within the mechanism of United Nations Framework on Climate Change Convention (UNFCCC), adaptation contributes to the goal of preventing dangerous human interference to climate in two ways[4]. Firstly, adaptation determines the extent of impacts which can be reduced for a particular mitigation level. In this sense, the higher the effectiveness of adaptation in reducing vulnerability, the less urgency is needed for mitigation, although adaptation will not totally avoid the occurrence of negative impacts. This point of view assumes that adaptation and mitigation have a substitutability relationship. Secondly, adaptation is also linked to the attainment of development goals and related policies by taking into account climate risks in the implementing activities. As mentioned in UNFCCC Article 4.4 that the developed country parties to the UNFCCC have committed to "assist the developing country Parties that are particularly vulnerable to the adverse effects of climate change in meeting the costs of adaptation to those adverse

* Phillia Restiani is a student at the School of Economics, the University of New South Wales, Sydney, Australia and one of the 2006 IAEE student advisors. See footnotes at end of text.

effects". In line with both ways, research conducted in adaptation also differs as discussed in the next section.

**Approaches to Adaptation Studies**

Burton, et al (2002) argue that there are two main approaches to adaptation:

***Type 1 (First generation): impact-and-mitigation related adaptation studies***

This approach stems from the first way of adaptation contribution in climate change policies. Most of research in adaptation is mainly conducted in this type 1 category. The direction of studies in this first generation adaptation is more impact-driven than vulnerability-driven. This direction is also called the adaptation research for mitigation policy. The emphasis of this approach is on assessing the gross and net impacts of a particular climate policy. Since the focus is on impact assessment and mitigation, the methodology employed is also related to that context. As the substitutability assumption is used, this first generation research will lead to trade-offs between adaptation and mitigation.

An example of the methodology used in this approach is the Seven Steps of IPCC guidelines or "Standard Approach" which uses only assumptions based on climate change scenarios and overlooks future adaptation choices and changes in socio-economic conditions. Some problems raised in using this approach relate to the first and second elements of anatomy of adaptation by ignoring the stakeholders'roles in adaptation (who or what to adapt?) and the conditions of the corresponding systems (adaptation to what?), which will be impacted and likely to change according to those impacts.

It is argued that type 1 adaptation studies can be inappropriate due to:

1) The impact assessment is not designed to take into account a range of adaptation options, especially at the public policy level.
2) The incorporation of adaptation into climate impact studies is based on assumptions about the adoption of possible measures, without considerations of the social and behavioural or other obstacles in the adaptation process.
3) Standard approach heeds less attention to the policy context of adaptation and key stakeholders' roles in reducing vulnerability.

In line with those shortcomings of the type 1 adaptation studies, the direction needs to be shifted more to type 2 adaptation studies which view adaptation as a process involving wider socio-economic human systems.

***Type 2: Development-and-policy related adaptation studies***

This more recent approach to adaptation embarks from the second viewpoint of adaptation contribution. This category is called adaptation research for adaptation policy, which focuses more on the integrated economic, environmental, social, and cultural approach in reducing vulnerability. The emphasis of this approach is how and where to deploy adaptation responses. The type 1 adaptation research includes more fundamental science such as biology, geophysics; while adaptation research for policy (type 2) has to be more responsive to economic, social, political, and environmental contexts. The adaptation framework must begin with an assessment of current policy, instead of future climate.

As adaptation involves more locally specific measures, it is fairly more difficult to assess the benefits of adaptation options with CBA analytical tools as in type 1 adaptation research because the impacts are more heterogenous in nature and more difficult to be compared in a common unit. With type 2 adaptation research, the top down approach used in type 1 adaptation research is not appropriate because the effective adaptation policy has to be responsive to a wide variety of economic, social, political, and environmental circumstances. Thus, what is needed is a common framework that should be considered in conducting research to reduce vulnerability, which involves:

a. Assessing current vulnerability to present day climate and the way existing policy and development practice can reduce the vulnerability.
b. Design of policy initiatives and alternatives and their assessment and prioritisation

The development of type 2 adaptation research does not state that type 1 adaptation research is not needed. It means that further research in type 2 adaptation studies should be conducted to ground adaptation research in real world context and to make them more responsive to the actual human systems in question. With type 2 adaptation research, more opportunities are open to integrate adaptation and mitigation efforts into more general development and climate policies (mainstreaming). Mainstreaming of adaptation policies is not only a more effective way to implement adaptation options but can also be the solution of deadlock between developed countries and developing countries in climate negotiation. Furthermore, there can be synergies to be gained in mainstreaming both mitigation and adaptation strategies as will be discussed in the next section.

**Creating Synergy between Adaptation and Mitigation in the Energy Sector**

The mainstreaming of adaptation and mitigation policies into higher development context needs to take into account the interrelationships between adaptation and mitigation strategies. In general, adaptation and mitigation measures share some similarities but also involves different features in implementation, mainly in effective temporal scale and spatial scale, estimation and comparability of costs and benefits, secondary benefits, the level of actors and types of policies in implementation, and the nature of public/private good elements. Thus, the design of any mainstreaming initiatives should consider those features and analyse how the implementation of each will affect the effectiveness of the other strategy.

Under the UNFCCC Developed Article 4.4, both the developed countries and developing countries should have

*(continued on page 36)*

## Comments by Edgardo Curcio on Receipt of the Outstanding Contribuitons to the IAEE Award

I would like to thank the IAEE, especially Arnie Baker, for this most prestigious award given to me in recognition of my contribution to the energy sector in general and in particular to the International Association to which we all belong.

In the few minutes at my disposal, I would like to go over with you, in a few words, the long way the Association which I chair and I have come during these last years.

It was 1988 when I found out about the 10th International Conference of IAEE, which. was to take place in Luxemburg. It looked very interesting to me for the relevance of its themes and for the level of the speakers and I decided to participate. At that time I was General Manager of Agip, in charge of strategies and investments, and the oil and energy economic themes aroused my interest.

At the end of the conference I met some IAEE representatives, particularly Peter Odell, and I asked them why there wasn't an Italian Affiliate of the IAEE, considering that our country was very involved in energy problems. The answer was: it is difficult to deal with Italians and have precise and reliable answers: some contacts had already been established (and they gave me the names) but without any result.

I said I was willing to set up an Affiliate in Italy and I suddenly noticed in my interlocutors' eyes a flash of mixed scepticism and benevolence, which could almost be translated as their mistrust in my "adventurous" declaration of being able to do things where other people failed.

Back to Rome, I spoke with a few colleagues and friends who were also interested and involved in energy matters, about my idea to create the Italian Affiliate of IAEE, and they all agreed.

And I did even more. In order to understand how an Affiliate functioned I decided to go to London to find Jane Carter who at the time was Chairperson of the BIEE and I asked her advice, which she gave me in a very simple, effective way.

At my return to Italy, I gathered my friends and we founded the Italian Association of Energy Economists (AIEE). We were ten people (some of them are still AIEE members) who paid the fees and the expenses and also created a small fund, with our money, necessary to start our activity.

It was 1989. Two years later, very enthusiastic about this new activity, I decided to dedicate myself completely to the AIEE, becoming its President. To tell the truth, I was all alone, in a small room in an office shared with other people, doing everything by myself, with a part-time secretary.

Step by step, other members joined us, as Seminars and Conferences were organized and new contacts gradually developed. In 1994 I organized the second IAEE European Conference in Rome, which was a great success and an occasion for other national and international appointments. In 1999 AIEE organized in Rome the 22nd International IAEE Conference, with more than 300 participants from all over the world.

From then on, our Association started to grow and since 2000 it has developed a series of activities in various directions.

We have now become the 2nd IAEE Affiliate in number of members and, I suspect, the first for the range and quantity of its activity (seminars, conferences, Masters courses, consultancy, publications, etc).

Last year with the proceeds of our association, which is non-profit, we decided to create a Foundation, called The Energy Foundation, assigning it capital, a library and an ethical mission.

Today, the Energy Foundation gives scholarships to students and graduates, carries out studies and research and sponsors important events.

In the last months, we created an AIEE Student Section formed by graduates that participated in our university Masters courses. Today our Student Section has 33 members and some of them came to Potsdam with the contribution of the AIEE, to take part in the IAEE life.

Next year, as you already know, we will organize in Florence the 9th IAEE European Conference with the support of our Foundation.

In conclusion, I would like to say that thanks to the IAEE I found a better way to express my interest in energy economics and, at the same time, I think I gave my contribution to the growth of this important institution, to make it known in our country and abroad, and to the dissemination of energy culture.

I thank again all the persons who selected me to receive this award, which is very important to me, and I hope to meet all of you next year in Florence, one of the most beautiful cities in the world, where I will help you discover how the culture of energy may live in harmony with the culture of art and good food. **Thank you all again.**

## Careers, Energy Education and Scholarships Online Databases

IAEE is pleased to highlight our online careers database, with special focus on graduate positions. Please visit http://www.iaee.org/en/students/student_careers.asp for a listing of employment opportunities.

Employers are invited to use this database, at no cost, to advertise their graduate, senior graduate or seasoned professional positions to the IAEE membership and visitors to the IAEE website seeking employment assistance.

The IAEE is also pleased to highlight the Energy Economics Education database available at http://www.iaee.org/en/students/eee.aspx Members from academia are kindly invited to list, at no cost, graduate, postgraduate and research programs as well as their university and research centers in this online database. For students and interested individuals looking to enhance their knowledge within the field of energy and economics, this is a valuable database to reference.

Further, IAEE has also launched a Scholarship Database, open at no cost to different grants and scholarship providers in Energy Economics and related fields. This is available at http://www.iaee.org/en/students/ListScholarships.aspx

We look forward to your participation in these new initiatives.

## The Turkish Association for Energy Economics

The Turkish Association for Energy Economics (TRAEE) was founded on February 15, 2005, in Istanbul by a group of academicians from all over Turkey as a non-profit professional organization. Even though the founding members have all been of academic origin, TRAEE aimed to become an effective non-governmental organization in the energy sector by enrolling predominantly energy professionals from the sector. This has partly been achieved through a rapid growth over the last year. The current member profile of the association is as follows: 90 individual members, 40% of which are of academic background and 15% of which are students. Thus, the majority (45%) of the members are professionals from private and public institutions. There are four institutional members including private sector market leaders in petroleum products distribution, electricity distribution, electricity production, and environmental protection and waste materials valuation. The bid that TRAEE has made to organize an upcoming international conference is expected to boost both the local and IAEE membership numbers through increased exposure and interaction that the international conference will provide.

Among ongoing activities of TRAEE are working group initiatives, seminars, energy talks, and an electronic forum for professional discussion.

Any member in good standing can propose the establishment of a working group. There are currently three working groups working actively on the following topics:

- Willingness to Pay for $CO_2$ Emission Reduction in Turkey
- Emission Certificate Trading Opportunities for Turkey
- Applicability of GEF funds for Projects from Turkey

Working groups start out as more or less informal discussion groups, but have the potential to turn into more involved collaboration through developing joint project and research proposals. In fact, two of these working group activities have recently resulted in joint research projects proposed to and accepted by the Scientific and Technological Research Council of Turkey.

In the last year, TRAEE organized two seminars and three energy talks. The seminar topics were:

- Sustainable Development in Turkey: Exergy Conscious Optimization Requirements of the Energy Sector; *presented by Prof. Dr. Birol I. Kılkış Fellow ASHRAE, Distinguished Lecturer, Watts Radiant & Green Way Intern., Vienna, VA.*
- World Energy: Needs and Requirements; *presented by Prof. Dr. Jack Barkenbus, Executive Director, Energy, Environment and Resources Center, The University of Tennessee.*

The energy talks are more informal than seminars and do not necessarily involve a presentation nor a topic. The aim is to provide a forum for exchanging news and views with an invited guest about topical issues on energy economics. The first three talks have attracted quite a lot of attention. Invited guests included the general manager of Turkey's leading petroleum product distribution company, the Chairman of the Energy Commission of the Turkish Parliament and a professor working on electricity market reform. Detailed information on past and prospective activities is regularly posted on the local website of TRAEE (http://www.traee.org), including transparencies of the seminar presentations as well as press reports on both the seminars and energy talks.

TRAEE places special importance on the growth of student membership and has formally agreed upon establishing a student chapter at its last Executive Committee meeting.

The picture below shows Executive Committee members together with student representatives at the party to celebrate TRAEE's 1st birthday.

From left to right: Prof. Ilhan Or (Treasurer); Nihan Karali (Student representative), Assoc. Prof. Yıldız Arıkan (Member); Assoc. Prof. Gürkan Kumbaroğlu (President); Assoc. Prof. Filiz Karaosmanoğlu (Vice President), Kemal Sarıca (Student representative) and Assoc. Prof. Ünal Zenginobuz (Member).

## Book Review

**Sustainable Fossil Fuels: "The Unusual Suspect in the Quest for Clean and Enduring Energy"**, by Mark Jaccard, Professor Simon Fraser University, Vancouver. (Cambridge Univ. Press, U.K. 2005). 380 pages, ISBN – 13 978 – 0 – 521 – 86179 – 3 hardback (or 4 for paperback).

This book should become required reading for those trying to reconcile the impact of energy on climate change and the developing countries need for economic advance.

The author is well placed to deal concurrently with these issues and does so, as one review has already noted on the sleeve jacket, in an optimistic fashion – in itself a refreshing rarity. Coming initially from an IPCC involvement and then to economic development programmes, Jaccard deals even-handedly with the needs and interactions of both these issues and does so in a clear and easy to read style that gives the reader a sense of direct dialogue while never allowing the main thrust of the book to become obscured by detail. This is no mean feat since the main thrust is no less than an overview of potential energy needs and their environmental implications to the end of this new century. So despite containing some three dozen tables and figures the numerate content in the text is kept to a minimum compatible with the conversational style. The key to this is to maintain a top-down holistic perspective. The key elements in this holistic approach are the author's previous knowledge of IPCC scenarios, current wisdom on targets for $CO_2$ emissions, demographic trends from the UN and others and business-as-usual energy projections required if the developing world is to aspire to parity with average OECD living standards (that is to say European levels rather than USA).

There are of course enormous uncertainties, but according to Chapter 2, p.45 the aim is "not to get too fixed on specific numbers. This only leads to disagreements when what is important is the big picture". The same paragraph goes on to assert that alternative estimates will "show that our energy system is headed for dramatic expansion…….whether the exact size is doubling or quadrupling, most observers would agree that the system is likely to be significantly larger in 100 years……that is sufficient for the rough assessment of system sustainability …. at the end of this chapter". The intention here is to give a dimension, not precision, to the size of the task in reconciling the need to contain the rise in $CO_2$ emissions with the business-as-usual consequences of energy growth. And although other forms of energy related pollution are considered – the subtitle of the book refers to "the Quest for Clean and Enduring Energy" – the $CO_2$ implications of the energy supply needed to meet any targeted level of demand are at the nub of this book. Because the sheer volume of energy required is so vast that we are going to need everything we have got, or are going to have available, so either quantity overrides environmental quality or the target for sustainability in economic and demographic terms is left in crisis. This will be anathema to those with strong dislikes of various forms of energy.

However there are other seemingly inevitable implications of a bitter-sweet nature for proponents of all "exclusive" solutions. Despite a projected tenfold increase in nuclear power – beyond which is considered infeasible in this century – proponents of renewables will be consoled by the projection that their contribution will be 400% larger than nuclear by the end of the century (again, more is only considered feasible after 2100). However they will have to balance this with the likelihood that two-thirds of global energy in 2100 may have to come from fossil fuels and that as oil and natural gas are also seen to have feasible limits the lions share will fall upon coal – a reminder of the trend for fossil fuels to become heavier, dirtier, more carbon intensive as resort has to be made to lower quality liquids and solids and impurities in gases.

If this seems an unnecessary turn towards "dirty" fuels out of some perverse choice, may I point out that the total renewables predicted for 2100 by this current trends scenario offered by Jaccard is equal to total world energy consumption a decade ago. Today, apart from hydropower, the BP Statistical Review cannot graphically depict the role of renewables in the total mix because it is too small to be visual. Contrast the two and consider whether Jaccard is frugal or lavish with his renewables projection.

The clear message is that further growth in fossil fuels is as unavoidable as the need to do something radical to alleviate the effect of this growth upon climate change; so while it is unavoidable it is not insuperable if instead of trying to rely solely upon alternatives the problem with fossil fuels is tackled head-on with a global carbon capture programme. This is the core message of this book.

For me, the core of this book is in this Chapter 2. After an opening chapter clarifying "energy sustainability" Chapter 2 asks if our current energy path is sustainable. The next three chapters deal with (3) the prospects for clean secondary energy focusing equally on electricity and transport fuels including hydrogen; (4) the potential for increased energy efficiency, nuclear; renewables; and (5) the issue of depletion of fossil fuels. Chapter 6 goes on to ask if we can develop technology and economic incentives/instruments to clean up fossil fuels and to give an assessment of the practicality of storing CO2 in ultra large volumes on the planet: the geological answer is that sub-aquifers etc. are available if the logistics and incentives are developed.

It is worth noting that in conversation earlier this year Jaccard looked to Europe as a leader in such developments viz: the EU trading system for carbon permits to establish commercial values and incentives for carbon reduction between member states and their key industries: the UK/Norwegian accord to promote a program of carbon capture for hydrocarbon producers in the North Sea: the stick-and-carrot tax regimes such as in London whereby hybrid cars and LNG (yes LNG) powered heavy road transport vehicles are exempted from the central area traffic Congestion Charge of US$12 per day and economy cars generally pay less annual vehicle road tax. Interesting as these are I had to point out

we were at an early stage and that our tendency was still to keep a close eye on the US and California in particular for transport developments.

The next two chapters draw the threads together for a sustainable and environmentally compatible energy programme: Chapter 7 deals with the options and Chapter 8 with the thorny problem of a future policy framework .Suffice to say that the holistic thrust of the approach is maintained throughout, including in each chapter a "warm-up" resume of what has gone before. Indeed it is possible to perceive each of the eight chapters as a "stand alone" and with the directness of approach to the reader redolent of a series of interconnecting lectures. The logic is trailed across each chapter that this interconnection is vital so as (and I repeat the quote) "not to get too fixed on specific numbers" (or indeed specific topics) "when what is important is the big picture".

In the final chapter (9) there is a note of warning that in the truly long term sustainability of systems is not just about energy so that energy sustainability might have to accommodate itself to the wider perspective. This may be so: but happy the day when, having perhaps achieved energy sustainability and climatic stability, we can focus directly on such problems.

Meanwhile the hope that Mark Jaccard's book will achieve the wide circulation and discussion it merits will, if realised, help to cut through the myopia, special interests and public confusion that tend to obscure and delay the essential progress that is already within our potential grasp without the need for any radical technological fix. Such optimism is justified provided we recognise one key element of shortage: time.

*Tony Scanlan, London 2006*

**Adaptation and Mitigation Synergies** *(continued from page 32)*

interest in adaptation. However, currently developed countries have very low interest in undertaking adaptation due to the fact that they assume they have the financial and technical resources to adapt as and when necessary. On the other hand, developing countries, which are mostly more vulnerable to climate change and variability due to both the condition of their natural systems and lower adaptive capacities, view the UNFCCC mechanism as an opportunity to get international funds to finance their development activities. If the mechanism of Adaptation Fund is obligated to developed countries, they will also have the need to ensure that the funds will be used in the most efficient way. On this ground, there is an opportunity to create an integration of adaptation and mitigation measures to higher development agenda in an efficient way.

A case of integrated development and climate change policies in Sub-Saharan Africa illustrates how development activities for food and energy security to achieve Millenium Development Goals can also have positive climate impacts in the region[5]. Another case in Canada shows that the implementation of mainstreaming policies produced synergies both between mitigation and adaptation. This example shows how developed countries can take the full benefits of anticipatory or planned adaptation. In Canada, a number of initiatives have been generated for integrating adaptation and mitigation measures[6]. Some initiatives that have both positive adaptation and mitigation effects are:

- Change urban development pattern to higher densities and mixed uses in urban areas, thereby reducing embodied emissions from infrastructure and from commuting transport
- Maintain or improve operating energy performance requirements of new and existing buildings through regulation (e.g., the Model National Energy Code for Buildings) (NRC/CNRC, 1997)
- Develop new generations of high-efficiency chillers/ cooling systems
- Improve the energy efficiency of buildings in operation through training and education in improved management and maintenance techniques

While some of the initiatives in adaptation measures are initiated by government, some of them are created by market forces. Most of those adaptation measures are compatible with mitigation measures. By recognizing some of the possible negative effects of adaptation to mitigation from the beginning, the synergy will most likely occur.

**Concluding Remark**

Most of the adaptation research are closely linked to impact and mitigation studies (type 1 adaptation studies) and thus are undertaken using the same approaches. As adaptation issues embrace wider socio-economic human systems, more research should be conducted toward adaptation policies research (type 2 adaptation studies). Furthermore, this latter type of adaptation research also opens more opportunities to integrate adaptation and mitigation measures into a higher development agenda and to create synergies between both measures. Some initiatives of integration policies in Canada show that there is a large potential in creating synergies between both strategies.

**Endnotes**

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**Volume 15, Third Quarter 2006**

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