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INTERNATIONAL ASSOCIATION for ENERGY ECONOMICS

IAEE Energy Forum

Third Quarter 2008 International Association for Energy Economics

President's Message

In the month of June 2008 two historical records have been achieved: the price of oil and the extraordinary attendance at the 31st IAEE International Conference in Istanbul. Let me start with the latter: the Conference has undoubtedly been the most important event of our Association in the first part of the year.

We had a record number of attendees (525) and a magnificent organisation up by the local Turkish Association (TRAEE). The quality of the papers presented during the parallel sessions was very high and this shows the vitality and the intellectual richness of our Association.

Let me also mention to our international colleagues that for the first time IAEE is organising a joint session with AEA (American Economic Association) at the Annual ASSA Meeting, which will take place in January 2009 in San Francisco. This is a very important achievement for us, because the AEA has a very strict policy and very high internal standards for session organisation. The issues to be discussed include the macroeconomic and financial consequences of the oil price increase.

Two more regional Conferences will take place this year: one in Asia, hosted by Australian Association, in Perth in November and the other in the U.S., organised by the USAEE in New Orleans in December. So, there are ample opportunities to meet and discuss crucial energy issues!

I now turn to global world problems: in the month of July, on a Tuesday the G8 leaders set a long term objective of curbing emissions by 50% by the year 2050. However, the targets appear to me as non-binding and without a precise course of action and without concrete instruments necessary to meet them. The G8 leaders recognised, and this is a novelty, that serious results could be accomplished only if newcomers in the industrial and energy intensive world, such as China and India, would be fully involved in the overall technological progress. On a Wednesday, an aggressive counter-group led by China and India declared that they would not endorse such a strategy. Reading between the lines, I think I see a clear message: you have polluted the world so far, to grant growth and affluence to your populations; do not ask us to clean up after you; now it is our turn and we want our share. The irony is that the official language has been: your plan is insufficient and you should do more and sooner, cutting emissions by 25-40% by 2020, in order to reach a 90% reduction by 2050.

The crucial question is now what about Kyoto? Should it be buried once and for all? Or should it be amended, changed, developed and adapted?

I pose the question in economic theory terms; when a policy has to be made there is usually a dilemma: on the one hand there is the gradualism approach, on the other hand there is the sudden jump approach. This is typical of monetary policy debate. The first approach usually takes into consideration costs and benefits to those involved in the adjustment process. Advocates of gradualism think that information sets are imperfect, that adjustment is costly and that those involved have heterogeneous response behaviours. In this case, a gradual policy action will bring a smoother and better transition. Imagine a gradual interest rate policy that changes the relevant interest rate bit by bit every quarter. On the other hand, advocates of sudden change often believe in rational behaviour: if you see a new and different equilibrium, you better immediately jump on it. This will accomplish the final (and hopefully, better or more efficient) result sooner, and many adjustment costs will be avoided. Think about a sudden and large variation in interest rates set by the Central Bank: it would be a strong signal to damp inflationary

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Editor: David L. Williams

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

expectations, to induce more efficient investment, to crush speculative bubbles and so on.

In our case, I would like to stimulate the discussion along similar lines.

Let's analyze the oil market shock. Demand and supply imbalances and other determinants have induced a price shock. Is it preferable to wait for market forces to develop the necessary adjustments for larger investments on capacity, to elaborate the new information needed to form appropriate expectations on future quantities of energy demand, and so on? Or would it be preferable to "decide" in an influential meeting, e.g., OPEC or the G8, what is the new course of policy strategies to accommodate a plausible development path and, then, immediately take action?

The EU Ecofin (Council of economic and financial Ministers) has started to raise its eyebrows against speculation on oil prices, considering possible antitrust actions against oligopolistic behaviour. Is the international dialogue energy producers-consumers enhanced or impaired by such ideas? Others think that the mere announcement of a new nuclear strategy may curb oil price increases. The concept is, in this case, based on the surprise announcement effect: expectations of a credible energy diversification policy toward nuclear and away from hydrocarbons in the industrialised world would immediately trim financial speculation in oil prices.

So, turning back to Kyoto policy, some questions remain unanswered. Is it really worthwhile to reform and renegotiate the details of the quota allocation system among several countries, squabbling around few tons of permits? Is it efficient to let the, say, the European taxpayer pay for energy efficiency investment in a developing country, getting in return more competition in domestic industrial productions and/or domestic employment reduction, when all these flows of resources are intermediated by some international bureaucracy? Would it be sensible to turn from quantity mechanism to price mechanism, in order to attack the global warming problem?

In conclusion, at the risk of being impertinent and provocative to our readers, allow me to set forth a proposal for the G8 next year, like a sort of "SALT Treaty" proposal. Instead of launching separate press communiqués, G8 vs. G5 and alike, we developed and developing economies agree to reduce, in a balanced manner, our "armament" of energy intensive consumption. How? We agree on new energy saving standards for our industrial production and population life-styles and we support technological research toward low-carbon actions. Today nobody is missing all those nuclear missiles cancelled by the nuclear disarmament talks. Maybe, tomorrow, nobody will regret all those tep (tonns of oil equivalent) saved, thanks to new available technologies.

Andrea Bollino

Energy Forum to Accept Letters to the Editor

As reported in the Editor's Notes section of the newsletter, the Board of Editors of the *Energy Forum* encourages members to comment on material in the newsletter via "letters to the editor". A regular column reprinting these will be carried from now on. The editors reserve the right to condense and edit letters as necessary.

IAEE Mission Statement

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

We facilitate:

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

We accomplish this through:

- Providing leading edge publications and electronic media
- Organizing international and regional conferences
- Building networks of energy concerned professionals

Editor's Note

This issue continues our focus on electricity generation and transmission.

Gerald Westbrook has been writing on the global warming issue for over 20 years. In has latest paper, the careers and vies of seventeen physicists/mathematicians on the subject are presented.

Nate Gorence, Sasha Mackler and Tom Bechte explore the potential to utilize coal and biomass to produce a suite of domestically sourced, economically competitive, low-carbon energy products such as transportation fuels and electricity. They examine the ability to leverage existing assets by retrofitting pulp and paper facilities and conclude that this configuration holds great promise.

Luciano Losekann and Adilson de Oliveira review the reforms of the Brazilian electricity sector taken following the 2001-02 power crisis and again in 2004 and note that given the dominance of hydroelectric plants the management of water use in the hydropower reservoirs determines the security of supply and the attractiveness of thermo-power investments. They argue that the current Brazilian model is not conducive to investments in natural gas infra-structure and the Brazilian electricity system is, therefore, still vulnerable.

Edgard Gnansounou discusses the need for a competitive electricity market in West Africa in order to stop the continuing spread of electricity crises throughout the region. He proposes a change from a national approach to a regional one which should provide investors with more confidence and garner the needed investment.

Deepak Sivaraman outlines the various public policy choices available to facilitate increased investment in the renewable electricity sector (reducing both CO_2 and other pollutant emissions).

Sara Nso notes that since the EU has decided to address the issue of energy, and it is doing it from the general framework of its external relations, it is of a interest to analyse the appropriateness of this new approach – most of all when applied to oil rich regions, such as Central Africa.

DLW

Council Approves Dues Increase

As energy and other items have become more expensive so has the cost of running our Association.

Over the past 5 five years your Association has developed several new products and services which has created increased value for our members. These include:

- Conference Proceedings are now carried online and accessible for all members regardless of whether they have registered for the conference.
- More regional conferences provide an increased opportunity to present your research.
- Support to students has been significantly increased.
- The Association is actively reaching out to new membership markets, specifically in developing countries (e.g., 1st Nigerian conference and the 1st Latin American conferences were recently held) thus providing a broader area for networking.

In order to cover the increases in operating costs associated with these and other enhancements, Council approved a modest $15.00 dues increase per regular Affiliate/Direct member and $5.00 increase for student members at its meeting in Istanbul. Further, a $500 increase in Institutional Member dues was approved. Even with these increases (which are effective immediately), IAEE dues remain among the lowest of professional associations.

The 2nd IAEE Asian Conference 2008

5-7 November 2008
Perth Convention Exhibition Centre
Perth, Western Australia

"Energy Security and Economic Development under Environmental Constraints in the Asia/Pacific Region"

Call For Papers

We are pleased to announce the Call for Papers for the 2nd IAEE Asian Conference entitled *Energy Security and Economic Development under Environmental Constraints in the Asia/Pacific Region*. The conference, hosted by the Australian Association for Energy Economics (AAEE), Curtin University, and the IAEE, is scheduled for 5-7 November 2008 at the Perth Convention Exhibition Centre (PCEC), Perth, Western Australia. There will be four plenary sessions and at least 12 concurrent sessions. Concurrent sessions will be organised from accepted abstracts.

Papers are invited on a wide variety of topics, and not limited to those listed in this flyer. Authors who are interested in organising special sessions are also encouraged to propose their topics, objectives, and confirmed speakers to the Conference Chair by **2 June 2008**. Abstract submissions on any other topics of likely interest to IAEE members are welcome.

Papers with focus on Asian energy issues are particularly welcome.

Please submit abstracts of up to two pages in length, comprising:
1. Overview **2.** Methods **3.** Results **4.** Conclusions.

Format

- Prepare abstracts in standard Microsoft Word format or Adobe Acrobat PDF format.
- Attach a short CV.
- The lead author submitting the abstract must provide complete contact details: affiliation, mailing address, phone, fax, and email. At least one author of an accepted paper must pay the registration fee and attend the conference.

Conference Themes and Topics

The conference will cover the main issues which are likely to be globally topical in 2009. A highlight of possible topics includes:

- Oil price volatility
- Non-conventional oil reserves
- The changing nature of the LNG trade
- Energy and poverty in the Asia/Pacific region
- Regional growth and energy demand under carbon constraints
- Nuclear power
- Economics of climate change
- Carbon capture and sequestration
- Regional oil markets: security of supply
- Economic viability of renewable energy technologies
- Experience in creating markets for emissions trading
- Energy nationalism
- Green energy taxes
- Life cycle emissions from energy technologies
- The structure of competitive electricity markets
- Geopolitics of energy
- The transition to clean coal
- Energy efficiency for a sustainable world

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AAEE AUSTRALIAN ASSOCIATION for ENERGY ECONOMICS

Curtin University of Technology

Submissions

Abstracts, CVs and contact details should be submitted through the conference web site: www.cbs.curtin.edu.au/aaee2008

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

Abstract Submission Deadline: 14 July 2008

Authors will be notified by **28 July 2008**, of their paper status. Authors whose abstracts are accepted will have to register and submit their full-length papers before **1 September 2008**. Accepted abstracts will appear in the proceedings, which will be distributed at the conference. Other related documents are available on the conference website: www.cbs.curtin.edu.au/aaee2008

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About Perth…

Perth is a fast growing city with a young cosmopolitan outlook. Home to internationally renowned beaches, a budding café scene and modern bars and restaurants, the city has something for everyone.

During your stay you may wish to enjoy a cappuccino on one of our most famous "café strips" in Fremantle, which also boasts an array of unique shops, arts and craft, and street performances. If you have a preference for wine, than you can travel to Margaret River, home to some of our most prized vineyards, old growth forests and coastal beauty.

Only a short ferry trip away is Rottnest Island, well known for its historical and heritage significance, white sandy beaches, surfing, snorkelling and scuba diving.

Perth has more hours of sunshine than any other Australian capital city, therefore you will have plenty of time to see more of what this vibrant city has to offer.

Conference Venue

Opened in 2004, the Perth Convention Exhibition Centre (www.pcec.com.au) is a state-of-the-art venue centrally located in the heart of the city, which capitalises on its unique riverside location.

Accommodation

The official conference hotel is the Medina Grand Perth, an apartment hotel which is adjacent to the conference venue. However, there is a widely-priced range of hotels situated within a short distance of the PCEC.

How to get to Perth

Qantas, Australia's international carrier, operates a comprehensive network of international flights in association with its One World alliance partners. From the USA, flights are routed through Australia's east coast gateway cities, giving participants the opportunity to visit Sydney, Melbourne, or Brisbane. From Europe, one stop flights to Perth involve a change of plane in an Asian hub. Emirates offer direct flights from the Middle East, whilst a host of national carriers offer direct flights from Asian capital cities.

I look forward to seeing you in Perth

Professor Tony Owen
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Hosted by:
Australian Association for Energy Economics (AAEE)
International Association for Energy Economics (IAEE)
Curtin University of Technology

UNVEILING THE FUTURE OF ENERGY FRONTIERS

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

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

NORTH AMERICA has new **energy frontiers:** Ultra-deepwater and unconventional production of oil and gas, evolving global markets for LNG, and a "smarter" continental delivery system for electricity from clean coal, renewable, and nuclear generating systems, with efficiency ever a goal. Conference Plenaries will address progress and challenges; concurrent sessions will amplify economics in implementation. There will be workshops, public outreach and student recruitment. We'll ask:

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

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

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

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

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

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

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

Energy Efficiency
- Supply side; demand side

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

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

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

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

For questions please contact USAEE:
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Students: Submit your paper for consideration of the USAEE Student Paper Awards (cash prizes plus waiver of conference registration fees). Students may also inquire about our scholarships for conference attendance. http://www.usaee.org/usaee2008/students.html for full details.

Accommodations: The Sheraton New Orleans, our conference venue, is located on Canal Street in the French Quarter. We have a special room block at the following rates per night: Single/Double Room -- $159.00. Details about accommodations can be found on the conference website at http://www.usaee.org/usaee2008/accommodations.html

Travel Documents: All international delegates to the 28th 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/USAEE2008/

Global Warming: Witnesses for the Defense of the Skeptical Perspective: Physicists

By Gerald T. Westbrook*

Introduction

I have written on this subject of Witnesses before.[1] That report highlighted:

- Selected authors, primarily non scientists, but authors with some unique perspective on the issue;
- Distinguished Veterans (DVs), mostly scientists, mostly retired, with incredible accomplishments;
- Others including brief inputs from active scientists, TV Meteorologists and State Climatologists.

Two of the selected authors were Michael Crichton a former medical researcher, writer and movie maker, and Alex Kozinski, a judge on the U. S. Court of Appeals for the Ninth Circuit.

I have also written on the Distinguished Veterans before.[2] These are individuals with incredible credentials. Many of them are retired scientists, some with the word emeritus, in their title. These individuals do not have to play the game of chasing after grant money. These are scientists that do not have to curry favor with the department chair-person, or other university/institute/agency brass. They are free to state their convictions, and to speak their mind. The careers and convictions of eleven DVs were reported on. These DVs were presented as individuals that understand the sciences involved. And they were presented in the spirit that the odds that they will deal in hype or propaganda or lies on this issue, are much lower than with any other group.

These key authors and distinguished veterans are all agreed that the big picture on global warming (GW) and anthropogenic GW (AGW), as painted by the climate alarmists, is seriously flawed. Some of these witnesses further argue that the Greenhouse Gases (GHGs)[3] may not be the cause of any warming.

There is a minor overlap between this paper and the above two papers. However, this essay will focus, almost exclusively, on the physicists/mathematicians inputs in much greater detail than before.

The Importance of Physics

When I, or others, have written or talked about physicists, climate alarmists frequently point out that physicists are not climatologists and hence their views are simply invalid and can be ignored. However, the exact opposite is more likely the truth. To argue that such scientists cannot possibly understand climatology and contribute to resolving the current bottleneck on this subject is spurious at best.

It has been felt for sometime, by this writer and others, that the science of physics offers an excellent window into the forces that drive our climate. Indeed this may be the very best window. Such scientists have been interested in forces over their entire career. What causes things to move, to attract, to repel and so forth? They have been equally interested in processes. And they have been equally interested in equations that couple the variables.

More specifically physicists have been interested in the energy budget of the Earth. High on their list has been radiation. This includes solar radiation and the way it penetrates down to the surface, along with the phenomenon of thermal radiation and IR rays. An analogous problem[4] is how energy moves through the "interiors and atmospheres" of stars. Physicists have been heavily involved in the study of the sun and solar radiation, including UV rays that are emitted by the sun. And they have been heavily involved in the study of astrophysics and such subjects as the "solar wind" and Galactic Cosmic rays.

This examination of forces and processes and equations inevitably uses the highest of mathematics. Indeed mathematicians are frequently involved in this field, either assisting or even in leading the investigation. A few of these will, therefore, be included in the following listing of key scientists.

This assessment on the importance of physics on this issue is not limited to the skeptics side. For example a recent news story[5] in the Houston Chronicle reported on an interview with a Dr. C. Rapley, of the British Antarctic Service. He asked: "If carbon is increasing, how can you really deny there's going to be warming?" Rapley challenged the readers: if you really knew how physics worked, you would essentially stop arguing on the AGW issue and get on board our band-wagon. Hence this essay, which will review how selected scientists in physics/mathematics see the AGW issue.

Three DVs that are also Experts in Physics

The previous report[2] on DVs included three physicists.

- Robert Jastrow, Columbia PhD, ultimately formed the Goddard Institute

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See end of text for references and notes.

for Space Studies;

• William Nierenberg (1919 - 2000), a former director of the Scripps Institute of Oceanography;

• Frederick Seitz (1911-2008), Princeton PhD in solid state physics, later president of Rockefeller University.

The UN, through the Intergovernmental Panel on Climate Change (IPCC), in their 1990 and 1995 reports, provided inputs on the potential GW for the next century at 1.5 to 4.5ºC. A rather simplified analysis of the 1990 IPCC assessment was used[6] to assess this range by the above scientists. These physicists viewed the GW of 1.5 to 4.5ºC for the next century, as alarmist. They charged, in 1990, that the UN range for the next century, of 1.5 to 4.5ºC, was far too pessimistic.

They based their analysis only on *observational data, e.g., no computer modeling.* It included:

(1) *assuming* the temperature increas–from pre-industrial levels ~1880 to 1990–was 0.3 to 0.6ºC;
(2) *assuming* this rise was all due to a 50% increase in GHGs from pre-industrial levels;
(3) *assuming* a 100% increase in GHGs, from 1990 to 2100;
(4) as openers, one could then see twice the warming, or 0.6 to 1.2ºC (That would seem logical–double the increase in GHGs gives double the warming. However, there is a well known logarithmic relationship on warming–successive additions of GHGs will have a lower impact versus the preceding addition. However, these three scientists did not incorporate that into their analysis.);
(5) *assuming* a correction of 0.2ºC for ocean thermal lag, would give a revised range of 0.8 to 1.4ºC;
(6) *finally assuming* an allowance of ± 0.4ºC for natural climate variability, would give 0.4 to 1.8ºC.

This simple analysis was the basis for their conclusion that the IPCC was far too pessimistic, and represented a major exaggeration of the actual physical situation. These three physicists don't deny there is going to be a warming, but no where as big as the IPCC would like the public to believe.

However, the IPCC ignored their critique, as the 2001 IPCC report changed the range to 1.4 – 5.8ºC.

An Overview of Selected Physicists/Mathematicians

There are a great number of candidates that could be listed, even after selected pruning. However, the general public is particularly uneducated on this community. Albert Einstein and perhaps Richard Feynman and John Forbes Nash might represent the spectrum of familiar names. Further, many of the scientists reviewed here are Europeans, which makes the identity problem even worse. Hence their inclusion on this listing will not be based on their name, but on a broad assessment of their career: their educational, scientific and other accomplishments. Some of these witnesses express their concerns on the GW issue in a relatively professional and dignified manner. Others are much less polite. In any event, the fact that there are a large number of highly qualified physicists/mathematicians who are skeptical on this issue is surely food for thought. These testimonies will be listed in alphabetical order.

● ***Abdussamatov*** Dr. Habibullo Abdussamatov obtained his undergrad education at Samarkand University in physics and mathematics and his doctorate from the University of Leningrad. He is the head of the space research laboratory at Saint Petersburg's Pulkova Astronomical Observatory and of the International Space Station's Astrometria project. Abdussamatov argues "the common view that man's industrial activity is a deciding factor in global warming has emerged from a misinterpretation of cause and effect relations."

Dr. Dan Luss, Cullen Professor of Engineering at the University of Houston, Department of Chemical Engineering, was the first to draw my attention to Abdussamatov. He sent me an email that contained two references:

(1) An editorial[7] by Lawrence Solomon: *Look to Mars for the Truth on Global Warming*. This editorial is Part IX of a series that is part of the referenced book.
(2) A commentary[8] by Dr. Oleg Sorokhtin for RIA Novosti entitled *A cold spell soon to replace global warming.*

Solomon wrote that the climate of Mars is the warmest it has been in decades, even centuries. He quoted a NASA scientist, William Fieldman, to the effect that Mars could be just coming out of an ice age. "With each passing year more and more evidence arises of the dramatic changes occurring on the only planet…….apart from Earth, to give up its climate secrets."

He quotes Abdussamatov: "Mars has global warming, but without a greenhouse and without the participation of Martians." He went on: "These parallel global warmings—observed simultaneously on Mars and Earth—can only be a straight-line consequence of the effect of the one same factor: a long term

change in solar irradiance."

"The Sun's increased irradiance over the last century, not CO_2 emissions, is responsible for the global warming we are seeing", says the celebrated scientist.

Sorokhtin noted that two specific solar cycles are involved, one of 11 and another of 200 years. This scientist cited data from Abdussamatov's lab, that reports Earth has passed the peak of it's warmer period and a fairly cold spell will set in quite soon.

Today, Abdussamatov believes that solar irradiation has hits its peak, and has begun to fall, and that ocean surface temperatures are also starting to fall. He expects protracted cooling by 2012 and deep cooling around 2041 that will last for 50 to 60 years.

Abdussamatov, and the Russian and Ukranian space agencies will build and install special equipment in a space station module, to be installed in 2009, to permit a regular survey of the sun, to monitor and verify this cooling phenomenon.

● ***Baliunas*** Dr Sallie Baliunas has an MA and PhD from Harvard in Astrophysics. She has worked primarily at the Harvard-Smithsonian Center for Astrophysics and has served as Deputy Director of the Mount Wilson Institute and has over 200 scientific papers to her credit. She has been recognized via the Newton Lacy Pierce Prize in Astronomy from the American Astronomical Society in 1998 and the Derek Bok Public Service Prize from Harvard. In 1991, *Discover* magazine profiled her as one of America's outstanding woman scientists.

Her research interests have focused on the visible and UV spectroscopy of stars and solar variability. She has studied the variability in sun-like stars, and argues our sun is currently in an unusually stable phase. In contrast, the total radiative variability for sun-like stars, in her sample, exceeded the currently observed solar variations by a factor of four. She has argued that the output of our sun has changed in the past and could change in the future.

She is a very strong and outspoken skeptic of the AGW hypothesis. She has been frequently attacked as a "stooge" of the oil and coal industries.

● ***Friis-Christensen*** Dr. Eigils Friis-Christensen is director of the Danish National Space Centre and vice-president of the International Association of Geomagnetism and Aeronomy. He argues that changes in the Sun's behavior could account for most of the warming attributed by the UN to man-made CO_2.

● ***Gerlich*** Dr. Gerhard Gerlich is a physicist at the Institute of Mathematical Physics at the Technical University Carolo-Wilhelmina in Braunschweig, Germany. Gerlich obtained his undergraduate degree in physics at the Christian-Albrechts University in Kiel and his doctorate at the Technical University Carolo-Wilhelmina. His research has included such fields as statistical optics, imaging, kinetic theory and quantum theory. His publications include numerous scientific articles critical of the greenhouse hypothesis. His latest work[9] is titled *Falsification of the Atmospheric CO_2 Greenhouse Effects within the Frame of Physics.* The full paper (114 pages) is based on rather advanced mathematics. While this paper looks rather impressive it probably should be filed under a "work in progress" status.

● ***Gould*** Dr. Laurence Gould obtained his doctorate from Temple University and is a Professor of Physics at the University of Hartford. He has also served as chair of this department and as a visiting fellow at Yale. He has been very active in the American Physical Society including the New England Section. He writes extensively on GW in their newsletter. In particular, the fall 2007 issue[10] provides a detailed and strong critique of the handling of the AGW debate. More specifically this editorial is a very strong critique of the mishandling, of the "debate" on the AGW issue. This mishandling is by the media (publishers, editors, journalists, etc.), and by the physics and other scientific associations. Gould argues this "debate" needs to be "aired", regardless of what is being presented to scientists and to the public as the "truth" about AGW.

● ***Idso*** Dr. Sherwood Idso was reported on in the past publication[2] on DVs.. While a holder of a PhD in physics, Idso was included in the Agriculture/ Botany & Food Production group, reflecting his support for increase photosynthesis due to the higher CO_2.levels. His web site: www.co2science.org provides a highly useful, weekly, set of situation reviews, editorials and journal reviews, on a wide array of issues on climate change, including increased plant production.

Idso spent much of his early career on solar radiation and the sensitivity of our climate. However, he was attacked ruthlessly by many warmers for his views. One of his inputs was his reaction to the point that GW will lead to more H_2O_V which will lead to more warming etc., etc. Idso argued if one started at 15 ºC, and had an initial GW of 0.25 ºC, this would increase vapor pressure by 0.2 millibars, which in turn would add a further warming of 0.07 ºC, and that warming would add a little more moisture, which would add a further warming of 0.01 ºC. In total this would end up with an overall warming less than 0.3 ºC.

● ***Lindzen*** Dr. Richard Lindzen is an atmospheric physicist and the Alfred P. Sloan Professor of Meteorology at MIT. He is, perhaps, the leading academician in the GW debate. Lindzen is a member of the National Academy of Sciences. He is a recipient of the AMS Meisinger, and Charney Awards, and AGU Macelwane Medal. He is a member of the National Research Council Board on Atmospheric Sciences and Climate.. Yet he has been attacked as a shill of the oil industry and incapable of having his own views. He has over 229 publications on such subjects as Hadley circulation, monsoons, planetary atmospheres, hydrodynamic instability, mid-latitude weather, global heat transport, the water cycle and ice ages. Lindzen is skeptical on the GW issue. He noted that the existence of skepticism on this issue has only recently been recognized. He also noted: there is an unusual level of extremism associated with this issue. While environmental scares are not new, few have been accompanied by recommendations that skepticism be stifled.

Three of his reports are noted below:

1990: *Some Uncertainties with respect to water vapors role in climate sensitivity*.[11] Here Lindzen argues that it is futile to talk about climate change without a deep understanding of the behavior of H_2O_V, and our present knowledge of the behavior of H_2O_V is inadequate to this task. H_2O_V has the dominant role in the radiative budget of the troposphere through its impacts on short and long wave radiation and its ability to form stratiform clouds. Clouds are not only important in the IR, but are also the key determinant of the Earth's albedo. He addresses two areas of uncertainty in this paper: (1) heat transport to higher latitudes and altitudes; and (2) the response of H_2O_V in the upper troposphere to climate forcing. This property is now unmeasured and the parameterizations used in large models, are clearly wrong on physical grounds.

1993: In a National Geographic paper[12], Lindzen notes that model predictions of a large GW depend on large increases in CO_2, and mechanisms within the models that greatly amplify the climatic response to increasing CO_2. These mechanisms (positive feedbacks) depend on what is likely a severe misrepresentation of the key physical processes: moisturization of the atmosphere and cloud formation. Indeed these processes may be acting in a manner opposite to what current models produce. Lindzen notes, that while the possibility that a large GW has not been disproved, it is without a meaningful scientific basis.

2006: A rather broad editorial[13] by Lindzen in the WSJ was titled *Climate of Fear*. The secondary headline noted the GW alarmists intimidate dissenting scientists into silence. In this editorial:

- Lindzen asks "how can a barely discernable, one-degree [ºF] increase since the late 19th century possibly gain acceptance as the source of recent weather catastrophes?" His answer is that "ambiguous scientific statements about climate are hyped by those with a vested interest in alarm ....." He asks who puts money into science where there is nothing really alarming? He notes that "scientists who dissent from the alarmism have seen their grant funds disappear, and their work derided and themselves libeled as industry stooges."
- Lindzen noted how the process of new papers, letters by critics and letters in response by the original author all in the same journal was changed. He noted several hastily prepared papers appeared, claiming errors in our study, with our response delayed months or longer, allowing it to be noted as "discredited".
- He also noted that alarm, rather than genuine scientific curiosity, "is essential to maintaining funding. And only the most senior scientists today can stand up against this alarmist gale, and defy the iron triangle of climate scientists, advocates and policy makers."

● ***Simpson*** Dr. Joanne Simpson obtained her Bachelors, Masters and PhD degrees from the University of Chicago, in Meteorology, in 1949. She was the first women to achieve this degree, but her early career was somewhat comparable to the reception that Rachael Carson received. However, she persevered. She focused her 50 year career on the study of clouds and violent storms. It took about half her career, but recognition finally came for her efforts, starting in the '80s. For example, Roger Pielke, Sr., called Simpson among the most preeminent scientists of the last 100 years.

Some of her comments on GW follow.

- Since I am no longer affiliated with any organization, nor receive any funding, I can speak quite frankly.
- The main basis of the claim that society's release of GHGs is the cause of the warming is based almost entirely upon climate models. We all know the frailty of models concerning the air-surface system. We only need to watch the weather forecasts.
- Even the term "global warming" itself is very vague. Where and what scales of response are measurable?

- One distinguished scientist has shown that many aspects of climate change are regional, and some of the most harmful impacts are caused by changes in human land use. No one seems to have properly factored in population growth and land use, particularly in tropical and coastal areas.
- As a scientist I remain skeptical. I decided to keep quiet in this controversy until I had a positive contribution to make. Both sides (of climate debate) are now hurling personal epithets at each other, a very bad development in Earth sciences.

● ***Singer*** Fred Singer did his undergraduate work in electrical engineering at Ohio State University and holds a PhD in physics from Princeton University. Singer is an atmospheric physicist and professor emeritus of environmental sciences at the University of Virginia.

He is perhaps the first skeptic on the GW issue.

Honors include: U.S. Department of Commerce Gold Medal Award for the development and management of weather satellites; (First) Science Medal from the British Interplanetary Society and Honorary Doctorate of Science from Ohio State University, 1970. He has been elected Fellow at the: American Association for the Advancement of Science; American Geophysical Union; American Physical Society and the American Institute for Aeronautics and Astronautics.

A pioneer in the development of rocket and satellite technology, he devised the basic instrument for measuring stratospheric ozone and was principal investigator on a satellite experiment retrieved by the space shuttle in 1990. He was the first scientist to predict that population growth would increase atmospheric methane–an important greenhouse gas.

Singer is president of The Science & Environmental Policy Project, a non-profit policy research group he founded in 1990, Singer is also Distinguished Research Professor at George Mason University . He was first Director of the National Weather Satellite Service (1962-64); and Director of the Center for Atmospheric and Space Physics, University of Maryland (1953-62).

Singer has a web site, "The Week that Was", and prepares and presents many essays each month. He is the author or editor of more than a dozen books and monographs, and has published more than 400 technical papers in scientific, economic, and public policy journals, as well as numerous editorial essays and articles in such papers as *The Wall Street Journal, New York Times* and the *Washington Post*.

An example of his concerns on GW is his 1999 commentary[14] where he noted "the observational evidence suggests that any warming from the growth of greenhouse gases is likely to be minor, difficult to detect above the natural fluctuations of the climate, and therefore in-consequential."

● ***Solanki*** Dr. Sami Solanki is the director and a scientific member at the Max Planck Institute for Solar System Research in Germany. He argues that changes in the Sun's state, not human activity, may be the principal cause of global warming: "The Sun has been at its strongest over the past 60 years and may now be affecting global temperatures."

● ***Tennekes*** Dr. Hendrick Tennekes is the former director of research at the Royal Dutch Meteorological Institute and currently a professor of aeronautical engineering at Penn State. He has written two books on aeronautics including one on turbulence, a field of importance in fluid mechanics and boundary layer considerations. As such he is a strong proponent of scientific modeling. However, he is an equally strong opponent of climate modeling. The major models used in the climate field are called General Circulation Models (GCMs). Tennekes was forced out of his Dutch post due to his very strong comments on climate science in general, and the GCMs in particular.

I first came upon Tennekes's work in an essay[15] posted on the Roger Pielke Sr. Web site. Pielke is a scientist that I have come to respect and admire and as such I periodically peruse his site. The essay by Tennekes is: *A Personal Call For Modesty, Integrity and Balance*. Although posted in 2007, Tennekes' plea goes back 17 years. Today, Tennekes' concerns and anger seems more focused on the IPCC. This falls in two areas:

- their CO_2 fixation and their pre-occupation with CO_2 emissions.
- the monopoly position that GCMs have achieved in climate research. He sees this as strategy, not science. He notes there are many other areas demanding more research, but not necessarily by more, or bigger GCMs. He notes that GCMs have been running for 20 years now, but that they can't be made to agree on anything except a possible relation between GHGs and a slight increase in globally averaged temperature, and a likely link to fossil fuels use. But that is the end of the consensus.

Tennekes notes one example, out of many, of a major short-coming: the GCMs do not include feedbacks between changing farming and forest practices and the atmospheric circulation. For this and other reasons they can't agree on precipitation patterns. But precipitation is far more relevant to global food

production than a slight increase in temperature.

Tennekes states "there exists no sound theoretical framework for climate predictability studies" used for global warming forecasts. Solomon wrote, in *The Deniers Part VIII*, an editorial entitled *The Limits of Predictability*, that Hendrik Tennekes, more than any other critic, has challenged the GCMs that climate scientists have, and are still constructing. He argues what is needed is a different approach to this science, an approach that recognizes inherent limits in such scientific tools. Perhaps his most famous statement is: "No Forecast Is Complete Without A Forecast of Forecast Skill."

Modeling is the basis of forecasts of climate change. Tennekes argues this modeling has little utility. He states: "There exists no sound theoretical framework for climate predictability studies." He concluded: "We only understand 10% of the climate issue."

Tennekes concludes his critique on the monopoly position that GCMs have achieved He sees this as strategy, not science. He notes there are many other areas demanding more research, but not necessarily by more, or bigger GCMs.

All of the above is food for thought on the GW and AGW issues and on the role of the huge GCMs. It paints a markedly different view than that generally expressed earlier. Further comments on the GCMs will be reported later. Now it is time to move on to other inputs.

● ***Wallace*** John M. Wallace is a Professor of Atmospheric Sciences at the University of Washington. He also has been Co-Director of the Program on the Environment at this university. He has been a Member of the Committee on the Science of Climate Change for the National Research Council/National Academy of Sciences.

As a related item, Tennekes has commented on such phenomena as the jet stream, the Polar Vortex and the Arctic Oscillation (AO). He has quoted Wallace that "there is not a beginning of a consensus on a theory of the AO." Without an established relationship between rising GHGs and systematic changes in the AO it is impossible to make inferences in changing precipitation patterns. As a result, Tennekes went on, "we do not know, and for the time being cannot know anything about changing patterns of clouds, storms and rain."

● ***Wegman*** Dr. Edward Wegman obtained a BS Degree at Saint Louis University in mathematics and an MS and PhD degrees at the University of Iowa in mathematical statistics. He was on the faculty at the University of North Carolina for ten years and at George Mason University since 1986. He is the author of over 160 papers and five books. He is the former chairman of the Committee on Applied and Theoretical Statistics of the National Academy of Sciences

In 2006 he was asked to present a report[16] to the House on the statistical validity of the Hockey Stick temperature reconstruction. There are literally thousands of papers, commentaries and so forth on this subject, both for and against the Hockey Stick. This temperature profile is, perhaps, the most highly controversial subject on the GW issue.

- It was named for the Northern Hemisphere temperature profile, developed in 1998, that claimed a fairly linear period from ~ 1000 to ~ 1900 AD (the stick), then a dramatic and rapid temperature jump from ~ 1900 to ~ 1995 AD (the blade).
- It was presented at that time as a replacement for an earlier graph, that was similar to a sine wave, with three key periods included: The Medieval Warming Period (MWP, ~ 800 to 1325AD), The Little Ice Age (LIA, ~ 1325 to 1850 AD) and the Modern Warming Period (~ 1850 up to the present). This chart was included in the 1990 and 1995 IPCC reports, and was the conventional wisdom up to ~ 1998. Then the *Hockey Stick* came out of nowhere. Backers of this work unilaterally declared it was the correct profile and sought to flush the MWP and the LIA from any further discussion.

While the *Hockey Stick* was featured prominently in the IPCC 2000 report, it was conspicuously absent in the IPCC 2007 report. In short the IPCC had literally and figuratively with drawn all support for this work. As such we might choose to ignore it in this report. However, since this subject dominated the scene from 1998 to early 2007, and since the conclusions of this work by Mann et al have generated such a highly polarized debate over the nature of GW and AGW, it deserves reporting here.

Proponents of the *Stick*. This profile was developed by a Dr. Michael Mann in 1998, along with Raymond Bradley and Malcolm Hughes. They developed the *Hockey Stick*, through the use of the Principal Component Analysis (PCA) statistical technique, to meld together a variety of highly diverse temperature proxies. These included time series for: tree rings, ice cores, lake sediments, marine sediments, pollen and coral reefs. The contemporary instrumental based temperature data was also included in this analysis. Their key papers (see references 17 and 18) will not be addressed directly here.

The supporters of the AGW issue state the degree of warming of the 20th century is larger than any other period over the past millennium. And they state the degree of warming over the 1990s is likely to have produced the warmest decade over these 1000 years.

Opponents of the Stick. The opponents, of the AGW issue, believe the proponents of the *Hockey Stick* are guilty of high sticking and playing with a broken stick. Two Canadians have led this fight:

- Ross McKitrick, Associate Professor, Economics, University of Guelph; and
- Stephen McIntye, retired mining engineer and expert on statistics, Toronto.

McKitrick and McIntyre have written many papers on this subject. (See references 19, 20 and 21 for their key papers). In addition, the individual paper by McKitrick, *What is the Hockey Stick Debate About?*[22], is recommended. Their work will not be addressed directly here.

In particular McKitrick and McIntyre challenged the way in which PCA was used, based on rather subtle mathematical nuances.

Finally a book, Taken by Storm[23], by McKitrick and a third Canadian, Christopher Essex, Professor of Applied Mathematics, University of Western Ontario, is recommended.

Conclusions of the Wegman Report

- The Mann, Bradley and Hughes 1998 and 1998 reports (references 17 and 18) are somewhat obscure and incomplete and the criticisms of McKitrick and McIntyre in their papers are valid and compelling.
- Mann, Bradley and Hughes are major participants in the paleoclimate community, but a community in isolation. Even though they rely on advanced and subtle statistical techniques they do not seem to be interacting with the statistical community.
- The sharing of research materials, data and results was haphazardly and grudgingly done.
- There was too much reliance by Mann, Bradley and Hughes on peer review, but this peer review may not have been sufficiently independent.
- Mann, Bradley and Hughes's assessments that the 1990s was the hottest decade of the millennium and that 1998 was the hottest year of the millennium cannot be supported by their analysis.
- Temperature reconstructions do not provide insight and understanding of the physical mechanisms of climate change. What is needed is deeper understanding of such mechanisms.

● ***Zichichi*** Dr. Antonino Zichichi is one of the world's foremost physicists and former president of the European Physical Society. He is credited with the discovery of nuclear antimatter. He calls global warming models "incoherent and invalid."

Conclusions

The views of 17 physicists/mathematicians have been noted directly and several others indirectly. Some of these are also Distinguished Veterans. All are skeptical on the GW issue. Their lifetime publications, speeches and comments give the nature of this groups views on this issue. Their views are more proof that a serious and valid debate exists on the GW issue.

While not absolute proof that the GW issue is heading down the wrong highway, their views are food for thought. It suggests it is time to stop and get off this speedway, and double check one's directions.

It is proof that the claim that "all scientists agree" is rather juvenile at best, fraudulent at worst.

It is time for all scientists to reconsider the position of Thomas Huxley. He stated that for him, skepticism is the highest of duties for scientists and blind faith the one unpardonable sin.

Our country needs to improve the way it supports such research. As Richard Lindzen has noted, alarm, rather than genuine scientific curiosity, is essential today to maintaining funding. This has to change.

The claim that we face an imminent catastrophe is unfounded and inappropriate. The extensive use of alarmism in general, by the supporters of the warming position, do their case a major disservice.

Today there is a huge problem in getting to learn both sides of the AGW debate. There is a lack of transparency on a variety of issues. This debate needs to be aired.

Today, only the most senior scientists can stand up against this alarmist gale, and defy the establishment of climate scientists, advocates and policy makers. This needs to be changed.

In closing one might return to the teaching, or is it preaching, of Dr. C. Rapley, of the British Antarctic Service. He asked: "If carbon is increasing, how can you really deny there's going to be warming?" And "if you really knew how physics worked, you would stop arguing on the AGW issue and get on board our band-wagon. Well, the witnesses presented here, Dr. Rapley, know their physics, and their answer is while there may be some minor warming, there is nothing pending that can't be handled by minor

adaptations.

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3 GHGs – Greenhouse Gases include: CFCs an abbreviation for chloroflourocarbons, a complex mixture of chemicals containing carbon, chlorine, fluorine and hydrogen; CH_4 – Formula for methane; CO_2 – Formula for Carbon Dioxide; CO_2e – Expression for Carbon Dioxide equivalents. A calculated value based on the levels of all GHGs in the atmosphere, and their relative warming characteristics; CO – Chemical formula for Carbon Monoxide; H_2O – Chemical formula for water; H_2O_v – Used to refer to the vapor or gaseous water; N_2O – Chemical formula for dinitrogen monoxide.

4 In the 1940s an S. Chandrasekhar, a great astrophysicist, studied the problem on how energy moved through the "interiors and atmospheres" of stars. As an indicator on the complexity of this field, it takes fusion energy thousands to millions of years to work from the core to the surface of the sun. However, this problem was so subtle and complex that Chandrasekhar regarded his work as a mere starting point.

5 *Scientist rebuts global warming critics*, interview of C. Rapley, British Antarctic Service, Houston Chronicle, February 7, 2006.

6 Jastrow, R., Nierenberg, W. and Seitz, F., *Scientific Perspectives on the Greenhouse Problem*. The Marshall Press, Jameson Books Inc., Ottawa, IL, 1990

7 Solomon, Lawrence, *The Deniers: The World Renowned Scientists Who Stood Up Against Global Warming Hysteria, Political Persecution and Fraud: And those who are too fearful to do so*, Richard Vigilante Books, February 28, 2008.

This book is based on a series of editorials called: *The Deniers* by Solomon. Solomon is a writer for the National Post/Financial Post in Toronto. Solomon, in addition to being a columnist, is also a world renowned environmentalist and conservationist. He is the founder of Energy Probe Research Foundation and executive director of its Urban Renaissance Institute and Consumer Policy Institute divisions.

What follows are three of the *Denier* editorials, that now extends to Part XXVII..

(a) The limits of predictability: The Deniers Part VIII

(b) Look to Mars for the truth on global warming: The Deniers Part IX

(c) Limited role for $C0_2$ -- the Deniers Part X

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9 Gerlich Gerhard and Tscheuschner, Ralf, Falsification of the Atmospheric CO_2 Greenhouse Effects within the Frame of Physics. The full paper (114 pages) is available at:http://xxx.lanl.gov/abs/0707.1161

10 Gould, Laurence, American Physical Society, New England Section Newsletter, Volume 13, No. 2, Fall 2007. See http://uhaweb.hartford.edu/lgould/NESAPS_Fall07_GLOBAL%20WARMING.doc or at: http://Units.aps.org/units/SNENG/nes/news-fall07.cfm.

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13 Lindzen, R., *Climate of Fear,* The Wall Street Journal, April 12, 2006.

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15 Tennekes, Hendrick, *A Personal Call For Modesty, Integrity, and Balance*, January 31, 2007. See: Roger Pelke, Sr. Web site The Website will feature comments by a Dr. Hendrick Tennekes.

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19 McIntyre, Stephen and McKitrick, Ross, (2003), *Corrections to the Mann et al. (1998) proxy data-*

Emirates Association for Energy Economics Holds Second Luncheon Address

The Emirates Association for Energy Economics (EAEE), the UAE affiliate of the IAEE, held its second luncheon address at Dubai's World Trade Centre Club on 29th May. Attended by over 65 professionals from the oil and gas industry, key speakers from the International Energy Agency and OPEC gave presentations on the outlook for world energy markets, as well as the challenges and trends facing global oil trade.

The leading industry experts participating in the session included Dr. Fatih Birol, Chief Economist at the International Energy Agency; Dr. Hasan M. Qabazard, Director of the Research Division at OPEC; and Johannes Benigni, Managing Director of JBC Energy in Vienna. The session was chaired by EAEE President Ali Obaid Al Yabhouni, General Manager at Abu Dhabi's National Gas Shipping Company and the UAE's Governor for OPEC.

At the gathering, Dr. Birol elaborated on three major strategic challenges facing the global energy sector in the coming years: growing concerns over energy security, the consequences of global climate change and energy poverty in Sub-Saharan Africa and South Asia.

Dr. Hasan M. Qabazard spoke about OPEC's role in meeting future challenges in global oil markets. Johannes Benigni addressed challenges for both the upstream and downstream oil industry.

The speeches were followed by a question and answer session between the audience and the panellists, stimulating interesting debate on the issues raised by each of the speakers.

From l to r, Dr. Fatih Birol, Chief Economist, International Energy Agency, Mr. Ali Obaid Al Yabhouni, General Manager, Abu Dhabi National Gas Shipping Company, UAE Governor for OPEC and President of the EAEE, Dr. Hasan M. Qabazard, Director, Research Division, OPEC and Mr. Johannes Benigni, Managing Director, JBC Energy.

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David Knapp Wins Journalism Award

Editor's Note: David Knapp was selected as the recipient of the 2007 Energy Journalism Award, for his contribution to written energy journalism. The award was presented at the International Conference in Istanbul. His acceptance speech follows.

It is with profound humility that I accept the IAEE award for Energy Journalism. As a longtime energy economist, and a founding member of this group, I have always thought of myself as more of an analyst than a journalist. But my time at the IEA editing the monthly *Oil Market Report*, with considerably help from a dyed-in-the-wool journalist Scott Sullivan, made my aware of just how intertwined these two supposedly very different disciplines are. Good journalism not only benefits, but also -- I think requires -- good analytical skills, just as good analysis, to be used and useful needs to be solidly and appropriately presented. As someone early in my education said -- probably after one of my typically tortured attempts to explain something off the top of my head -- "what you cannot explain clearly, you don't truly know." Or in the words of my analysis mentor David Nissen, "Don't make it up, look it up."

Journalists and analysts both need to know, and both need to explain clearly. The ethics of journalism and economic/market analysis are not exactly the same, but certainly share a number of common values regarding the sanctity of intellectual property, and the same purity of intent to serve the common good rather than to garner personal gains. "You don't poach someone else's story, you don't steal someone else's analysis." You don't invest in either what you write about or what you analyze, if your analysis or writing might have an effect on it.

Maybe the hardest part of coming from an analytical background and being a good journalist is how to use your opinions to structure a story without influencing its conclusions. "Balance" is an important part of reporting on and presenting an issue. Leaving the conclusion to the reader is essential. Otherwise the story belongs on the editorial page or in a publication where it explicitly and clearly represents the opinion of the writer. I'm lucky enough in my position at Energy Intelligence Group to do both and, after seven-plus years, maybe I'm starting to get the hang of it, with a lot of help from my colleagues, especially John van Schaik.

John and I made a deal several years ago when he began working with me on our monthly oil fundamentals publication *Oil Market Intelligence*; "You teach me how to be a good journalist and I'll teach you how to be a good energy analyst," I said. Well, John, we're halfway there -- he's become a pretty good energy analyst -- and I continue to learn from him every day.

I would also be remiss if I didn't thank a number of previous winners of this award with links to EIG and its predecessors PIW and Oil Daily, especially Sarah Miller who took me under her wing when I first joined EIG to help her edit PIW in late 2000, and Barbara Shook who has been a steady friend and sounding board throughout my time at EIG. I also want to thank EIG President and past winner Tom Wallin for nominating me, and several others who supported my nomination for the award.

In accepting his award in Taipei in 2004, Tom stressed how much energy journalists needed to interact with good energy analysts and how fundamental their input is to good energy reporting. Last year, the USAEE set up a committee, chaired by Mary Barcella, to foster the relationship between the USAEE/IAEE and the media at an organizational level. But energy analysts need to establish individual relationships with journalists as well, not only to help them better understand the technical issues, but also to learn more about how to communicate these issues to the broader public.

Domestic Energy Parks: An Approach to Producing Low Carbon Energy Products from Domestic Resources by Leveraging Infrastructure at Existing U.S. Pulp and Paper Mills

By Nate Gorence, Sasha Mackler andTom Bechtel*

Abstract

Faced with growing energy demand, national energy security concerns, and looming legislation to regulate CO_2, the U.S. must grapple with a multitude of issues when examining its future energy supply. The current political focus is on a strong push to develop an industry around domestically sourced and produced, low-carbon liquid fuels and electricity. In this essay, we investigate the potential to retrofit the equipment of an existing pulp and paper facility with gasification technologies to create an "Energy Park" that cost effectively blends coal and biomass to produce a suite of low-carbon energy products in addition to its core fiber industry outputs. Historically, the pulp and paper industry has been one of the most energy intensive industries in the U.S, and currently confronts increasing competition in the expanding globalized marketplace. The system model presented here explores options for the industry to become a first mover of a technology platform that offers significant potential benefits but currently faces deployment hurdles.. By utilizing existing infrastructure and energy handling capabilities, and taking advantage of important access to transmission, rail, and markets, the pulp and paper industry could provide a unique, albeit limited, opportunity to commercially demonstrate advanced gasification technologies that could then be applied on a larger scale in new greenfield applications.

Introduction

Energy demand in the United States continues to grow along with an ever expanding reliance on imported sources, such as crude oil, natural gas, and refined petroleum products. With current oil prices at all time highs and with increased volatility in the global oil marketplace, there is heightened anxiety concerning the energy and economic security of the U.S. Consequently, there is increasing political and public momentum to diversify both the nature and geographic disposition of the U.S. energy mix, in particular focusing on domestic, low-carbon supply alternatives to petroleum. This is evidenced by the recent passage of the Energy Independence and Security Act of 2007, which includes an ambitious renewable fuel standard (RFS) in addition to important fuel efficiency and conservation measures. Although recent efforts to expand domestic supply have focused on corn-fermentation ethanol, by specifying a requirement for advanced biofuels, the Energy Independence and Security Act of 2007 demonstrates mounting recognition that corn-based ethanol has limited potential in the long term. Because corn ethanol offers only marginal net energy benefits and small GHG emissions reductions, imposes upward pressures on food prices, and draws large subsidies, other low carbon, domestic fuels will be needed. While advanced biofuels, like cellulosic ethanol, hold tremendous potential in terms of the net energy gains and GHG reductions, technological and economic hurdles have thus far limited commercial production. Even with a mandated market, advanced biofuels, too, will most likely face economic and scaling challenges, at least in the infancy of commercial deployment. At the same time, domestic electricity demand continues to escalate while siting new electricity generation projects faces mounting hurdles. Cleary, there is a critical need to find and develop secure, domestic energy resources that can simultaneously supply both electric power and transportation fuels in a manner that limits emissions of GHGs and is cost effective without subsidies.

Two of the most abundant energy resources found in the U.S. are coal and biomass. The Department of Energy estimates U.S. recoverable reserves of coal at more than 250 billion short tons. Although more speculative, DOE and USDA estimate that over 1 billion dry tons of biomass could be available in the U.S. with modest changes in land use and agricultural and forestry practices. For context, in 2006, the U.S. consumed over 1.1 billion short tons of coal and over 200 million dry tons of biomass for product and energy production. Because coal intrinsically contains a large amount of carbon and other impurities, energy projects relying on coal as the sole energy feedstock face considerable obstacles in siting and financing. This is evidenced by strong public opposition to both new pulverized coal electricity plants and coal to liquids projects. Conversely, biomass theoretically offers many carbon advantages if advanced energy conversion techniques can be

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See footnotes at end of text.

commercialized, particularly if its use is coupled with carbon capture and storage (CCS). Because of this, co-utilizing biomass with coal could offer climate and security enhancing energy products. The challenge is to bring these products into the marketplace at a competitive cost.

One avenue holding particular promise is to produce liquid fuels and electricity building on equipment already in place in the pulp and paper (P&P) industry. The P&P industry provides a well suited infrastructure to incorporate advanced technologies and expand production into energy products such as transportation fuels, electricity and other chemicals in addition to its core products. The industry also has substantial experience with handling large quantities of biomass and ready access to fuel and electricity marketing infrastructures. Several recent studies have explored the idea of producing energy products such as liquid fuels and electricity at P&P mills by processing additional biomass—a concept referred to as a *biorefinery*. The results from these studies are positive: liquid fuels and electricity can be produced at costs comparable with current market prices and with high environmental standards, including low lifecycle GHG emissions. However, because of technology limitations and biomass availability constraints, the scale of energy production would be relatively small. But an area identified as deserving of additional analysis was the idea of scaling up the size of the facility through co-firing coal and biomass to increase the output of energy products at lower unit costs. Such a system would also need to employ carbon capture and storage (CCS) to minimize the additional GHG emissions stemming from coal. This type of facility is referred to as an *energy park* and, in our view, shows great potential as a platform for first-movers of biomass and coal gasification technologies. Preliminary analysis of the energy park concept finds that this business model has the potential to produce greater volumes of liquid fuels and larger amounts of exportable electricity at lower unit costs compared with a biorefinery. Further, combined with CCS, an energy park also is capable of producing energy with GHG intensities potentially better than conventional petroleum and power generated from a typical pulverized coal plant, respectively. The bottom line is that by utilizing innovative technologies—such as gasification, steam reformation, and CCS—domestic coal and biomass have the potential to contribute to the country's energy demands, environmental objectives, and energy security imperatives concurrently. Implementing these technologies at an existing P&P facility could provide the circumstances for leveraged efficiencies and capital that push these systems in the realm of economic competitiveness, even in an environment without subsidies.

Why Pulp and Paper Mills?

Several attributes make the P&P industry uniquely positioned to be a first mover in testing advanced gasification systems. For instance, the P&P industry represents one of the most energy-intensive industries in the United States, but, unlike other industries that fall into this category, such as manufacturing and chemical production, the majority of the energy consumed is generated from renewable biomass by-products from the pulp production. In fact, the P&P industry is by far the largest producer and user of biomass energy in the country. Because of this, the P&P industry has core competencies harvesting, transporting, and processing biomass. Furthermore, the P&P business model generally ensures that mills are surrounded by large land buffers, which represents an underutilized capital asset that could be very important in this era of infrastructure siting challenges. Also, P&P mills are typically on major road and waterways, which provide robust access to the electrical and transportation grid and are often in close proximity to oil refineries or other markets.

Additionally, the significant majority of Tomlinson boilers—a key capital component of a P&P mill—are over 40 years old and need to be replaced over the next decade. This capital turnover creates an opportunity for basic process changes and the implementation of new technologies such as gasification and steam reformation technologies both of which can dramatically increase the thermal efficiency of the pulping production process. In fact, the demand for steam at a P&P mill creates a significant heat sink that cogeneration of steam and electric power can fill. Also, by adding extra capacity to the gasifier system, it is possible to process additional biomass—such as mill waste, agricultural by-products, or municipal sewage sludge—and coal in order to create synthetic energy products for exportation thereby expanding into nontraditional P&P markets. This additional gasification capacity enables the mill to produce a syngas—a synthetic fuel that is readily converted to liquid fuels (such as diesel), electric power, or some combination of the two. In essence, this process—integrating oversized gasifiers at existing P&P mills for synthetic fuel and electricity production in addition to its traditional paper products—is the biorefinery/energy park concept. But because U.S. P&P mills have recently experienced diminishing financial performance as a result of global paper overcapacity and tough price competition from importers, this capital expansion has been slow to attract investors. However, it is our view that domestic P&P mills should seriously explore these options to reduce energy and chemical costs and leverage existing assets to build new revenue streams. To

date, most industry investments have focused on restructuring existing production assets, but by making strategic investments in gasification technologies and process integration, the P&P industry has an opportunity to stabilize its core business while expanding into new markets. This experiment could provide a fertile testing ground for advanced gasification technologies, while also increasing domestic energy supplies in a climate sensitive manner. Furthermore, this expansion could also help rekindle rural economic growth in areas where the P&P production has declined.

Building on the Biorefinery Business Model

A comprehensive study by Larson et al. (2006) entitled "A Cost-Benefit Assessment of Gasification-Based Bio-refining in the Kraft Pulp and Paper Industry" assessed the engineering and financial potential of upgrading existing Kraft-process P&P mills by replacing their Tomlinson black liquor boilers with high pressure gasification or steam reformation technologies and using kraft black liquor and other biomass to create liquid fuels, electricity, and other chemical products.[1] Gasification technologies permit a biorefinery to produce a syngas that can meet the thermal energy and steam requirements of the P&P mills and generate liquid biofuels on the order of 1,500-4,500 barrels per day and a small amount of exported electricity as supplementary products. Depending on plant configuration, the biorefinery can produce three types of liquid fuels—Fischer Tropsch liquids (FTL), dimethyl ether (DME), and mixed alcohols—in addition to generating electricity. Because biomass serves as the key energy input for a biorefinery, important environmental benefits, in particular GHG emissions, reductions can be realized, even without CCS. In fact, the total CO_2 emissions and criteria pollutants are lower than modern Tomlinson boiler configurations because of higher overall thermal efficiencies. Furthermore, all of the component technologies needed for gasification-based biofuel production at a biorefinery are either already commercially used or are undergoing pilot-scale demonstration. The authors concluded that while the biorefinery mill modifications would require substantial capital investment, they would reduce the mills energy cost vulnerability, help control product cost, and increase product cash flow.

The authors of this study focused on a biomass only approach and highlighted the possibility that larger scale biorefinery plants, realizing economies of scale by blending the biomass with coal feedstocks, could actually be more conducive to producing large quantities of liquid fuels in the long-term. They note that an important element of this configuration would be the ability to include CCS. Sequestering CO_2 is essential given coal's carbon intensity – and if combined with the potentially large carbon benefits associated with CCS of biomass of recent photosynthetic origin, the carbon balances could become quite attractive. This system model is explored more below.

The Farmer and Coal Miner Could Be Friends: Energy Parks

Building on the biorefinery model, a study conducted by Rezaiyan, A.J. et al. (2007) entitled "Domestic Energy Parks – Filling the Transportation Void" and sponsored by the University of North Dakota Energy and Environment Research Center and in part by our organization, the National Commission on Energy Policy, sought to assess the business model of the so-called *energy park*—a scaled-up biorefinery co-utilizing coal and biomass with CCS to maximize the production of liquid fuels while adhering to strict CO_2 controls.[2] Such a facility would produce on the order of 14,000-17,000 barrels of FT diesel and 350-550 MWhr of exportable electricity per day. This study assessed the engineering potential and financial viability of different energy park plant configurations in four U.S. regions (South, Northeast, Midwest, and West). Regional variation enabled differences in local markets (such as coal and electricity prices), environmental regulations, water use restrictions, and product demand to be reflected in the assessment. In almost all cases, the expectations put forth in the Larson study were confirmed: typically, larger facilities that co-utilize coal and biomass exhibit economies of scale, allowing for lower cost production of liquid fuels, chemicals and electricity in addition to the traditional pulp and paper products. The study also found that capturing CO_2 and co-utilizing biomass as an energy feedstock help to offset the carbon intensity of the system, resulting in a transportation fuel and electricity product with a lower GHG intensity than their conventional counterparts.

In the biorefinery model, Larson et al. (2006) conducted a detailed assessment of lifecycle CO_2 emissions using the GREET model, which confirmed that reliance on biomass as the sole feedstock generates significant emissions reductions relative to conventional fuels production. In an energy park, however, which relies on coal as a key fuel source, CO_2 management becomes a serious design and cost issue. In some locations, petroleum coke or other opportunity fuels could supplement or displace coal as the fuel source, but, even so, management of carbon emissions still poses an important challenge. Therefore, reflecting the need to limit CO_2 emissions, the energy park design incorporates carbon capture and pressurization. We

recognize that without a regulatory framework for long-term geologic storage, CCS is probably not a viable technology today. However we emphasize that, in concept, this configuration could be attractive. In addition, there are potentially enhanced oil recovery opportunities today that could provide markets for the CO_2 in a limited number of cases. In a similar vein to the "well-to-wheel" analysis of the biorefinery, Idaho National Laboratory (INL), also using the GREET model, examined a 50,000 bbl/day standalone synthetic fuel facility and found that a 70% coal/30% biomass feedstock split delivers a fuel with a carbon intensity equivalent to conventional petroleum.[3] Specifically, the INL study found that this biomass/coal feedstock mix without CCS produces synthetic diesel with GHG emissions almost identical to petroleum diesel; with CCS, at an 85% carbon capture rate, the plant generated synthetic diesel with 40% less GHG emissions than its conventional counterpart. Although a rigorous well-to-wheel analysis of the carbon balances associated with the energy park concept has not yet been conducted, the INL analysis suggests that the energy park configuration examined—using from 10-35% biomass, capturing 90% of carbon during production, and delivering high thermal efficiencies from the co-located P&P plant—would produce GHG emissions similar, if not lower, than those found in the INL study for synthetic energy products. The product costs also look attractive, mostly due to the ability to take advantage of energy and siting efficiencies. The economic results from the biorefinery and energy parks studies are summarized in the adjacent table and compared against national average prices as reported by the U.S. Energy Information Administration for context.

Product	Biorefinery	Energy Parks (with CO_2 Capture)	Conventional Fuels
Synthetic Crude Oil ($/bbl of oil equivalent)	51.00-82.00	43.00-57.00	94.77 November 2007 Monthly Average WTI Spot Price][4]
Power ($/MWh)	NA	38.00-57.00	57.00 [2006 EIA National Average Wholesale Electricity Price][5]

Comparative Prices of Energy Products

Because preliminary analysis of the energy park design directionally indicates that both liquid fuels and electricity can be produced with a lower carbon content than the conventional alternatives at attractive costs in the current market place without subsidies, we believe the concept deserves deeper exploration. Furthermore, the blend of coal and biomass examined in the initial energy parks study was one based on the current economics of markets for fuels and electricity. As synthetic fuel technologies evolve and as programs to regulate CO_2 materialize, presumably greater ratios of biomass to coal will become more economically viable, thereby improving the carbon footprint of this approach.

Conclusion

In an era of constrained energy supplies, increasing energy demand, and national energy security and environmental concerns, domestic resources that can meet our nation's vital energy needs in the liquid fuels and electricity markets—in a climate sensitive manner—deserve serious attention. P&P mills provide an attractive platform to integrate advanced gasification technologies to produce liquid fuels and electricity while managing CO_2 emissions. Though low volumes of liquid fuels can be produced cost-effectively using biomass alone at so-called biorefineries, energy parks, which co-utilize coal and biomass, provide an avenue to produce higher volumes of liquid fuels and significant quantities of electricity with GHG emissions lower than their conventional fuel-based counterparts. It should be emphasized that due to the number of P&P mills in the U.S., energy parks are essentially limited in their deployment potential and their ability to displace conventional petroleum. However, the energy parks design holds tremendous promise in providing a platform to test a system of technologies that could ultimately provide a pathway for large-scale, low-carbon synthetic fuel production in the U.S based on biomass feedstocks and CCS. Therefore, because energy parks could be cost-effective today without subsidies while effectively managing life-cycle CO_2 emissions, we believe they deserve strong consideration for further exploration, deeper analysis, and potential development.

Footnotes

[1] Larson et al. A Cost-Benefit Assessment of Gasification-Based Bio-refining in the Kraft Pulp and Paper Industry. December, 2006; Final report under DOE Contract DE-FC26-04NT42260

[2] Rezaiyan, A.J. et al. DOMESTIC ENERGY PARKS – FILLING THE TRANSPORTATION VOID. Energy and Environmental Research Center, University of North Dakota: May, 2007.

[3] Broardman, R. Plant Modeling and Emissions Comparative Analysis Approach Coal/Biomass Gasification with Fischer-Tropsch Diesel Production. Idaho National Laboratory: May 2007.

[4] Energy Information Administration

[5] ibid

Supply Security in the Brazilian Electricity Sector

By Luciano Losekann and Adilson de Oliveira*

Background

Security of supply in electricity systems is an important topic in electricity sector reform. Around the world, different mechanisms are employed to perform this task in a competitive environment (Turvey, 2003; Joskow, 2006; Cramton e Stoft, 2006).

According to Joskow (2006) this is a complex task due to the unusual characteristics of electricity supply and demand. The author argues that usual approaches to remunerate generating capacity are not efficient and don't create enough revenues to stimulate new investments. Due to institutional restraints, the energy price in scarcity moments doesn't reach the level that fully covers the power plants capital cost. Joskow calls it the "missing money" problem, and considers it the main deterrent to investments in generating capacity in the U.S.

Joskow (2006) focuses on the U.S. electricity sector, where supply security results from an excess of generating capacity during peak demand (or a reserve margin). In electricity systems based on hydropower, as Brazil, supply security has other determinants.

First, hydropower production depends on water inflow, which can be highly volatile. It adds uncertainty to the supply security problem, an aspect that is not emphasized by Joskow (2006). Second, water stored in reservoirs can be transformed into electricity almost instantaneously. So, it is easier to provide a real time balance and, depending on the amount of energy that can be stored in the reservoirs, security of supply can be determined by reservoirs levels.

The particular features of the supply security problem have implications for electricity sector reform and a similar "missing money" problem exists in Brazil. This article analyzes the results of energy auctions, the main instrument to promote investments in generating capacity in the new institutional model of the Brazilian electricity sector.

The Brazilian Electric System

The predominance of hydropower is the main feature of the Brazilian electric system. Hydropower plants amount to almost 80% of the installed capacity (101 GW). As many hydro plants share the same river basin most of the decisions are interdependent. The Brazilian hydro plants count on reservoirs with large storage capacity that operate in a pluriannual scheme[1]. In the whole set of reservoirs it is possible to store an amount of energy equivalent to half of the annual electricity consumption of Brazil.

Another consequence of a predominantly hydroelectric system is that the average cost rises through time (marginal cost in the long-term is higher than average cost), as the most attractive hydroelectrics are used first. Another point is that the hydroelectric plants have a functional life that is longer than the amortization period and today the capital costs of a large portion of the hydro plants have been amortized and their operation costs are low. Meanwhile the new plants that are starting to work have to cover investment and operational costs that are higher (especially the thermoelectric ones). These characteristics make the coordination of the Brazilian electric system very unique and raise restrictions to the process of reform.

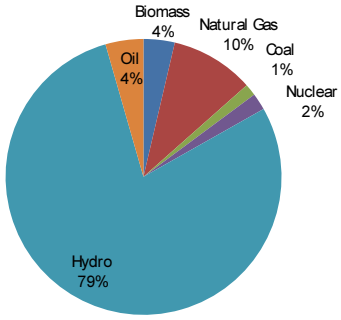

Figure 1
Brazil Installed Capacity
(Dec. 2006)

Note: Hydro includes the Paraguayan capacity of the bi-national hydro plant, Itaipu, that is oriented to Brazil (5.6 GW). The Brazilian electricity system also comprises 0.2 GW of wind power. It refers to the Brazilian interconnected system, which embraces 98% of total capacity.
Source: EPE

The First Reform and the Rationing

Until the 1990s, the electricity sector in Brazil was based on state ownership. The 1990s reform meant to broaden private participation in the Brazilian electricity sector and to introduce incentives to efficiency, mainly through liberalization of electricity generation. Following the international experience with electric sector reform, an independent regulatory agency was established (Aneel), an independent operator of the system (ONS) and a wholesale energy market (MAE).

The liberalization of power generation in Brazil tends to increase prices as they align with the long run marginal cost, which is higher than the average cost (reference to tariffs in the cost of service regulation). In order to avoid a sudden rise of prices the government opted for a steady and slow transition to a competitive energy market. The prices were kept regulated until 2003 and were supposed to be gradually liberalized (25% a year) until 2006.

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See footnotes at end of text.

Even before the transition to the competitive model was completed, Brazil faced a major crisis in electricity supply. Since the late 1990s the level of storage in the hydro-electric reservoirs has progressively diminished (Figure 2). In the beginning of the dry period of 2001 (May), the Southeast and Northeast reservoirs operated with only one third of their full capacities, an amount that is not sufficient to meet the demand until the start of the next rain season[2]. In May 2001, in order to avoid the complete depletion of the reservoirs[3], which would possibly happen in August in the Southeast (red line on Figure 2), the government made rationing mandatory at a rate of 20%[4] of electricity consumption in the sub-systems of the Southeast/Mid-West and Northeast.

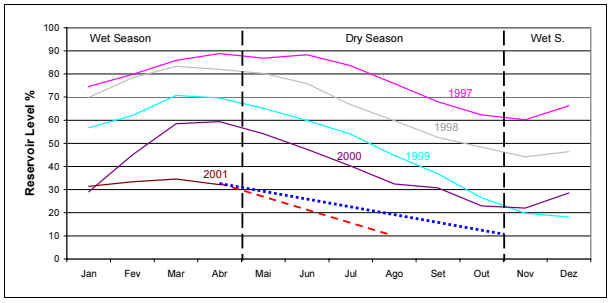

Figure 2
Reservoirs Depletion and Estimated Rationing Impact
Reservoir level in SE/MW sub-system (%) - 1997- April 2001

Note: The red dashed line represents estimated evolution if the rationing measures were not adopted. The blue dotted line represents the evolution intended by the rationing measures, even with poor hydrology.
Source: Author / ONS data

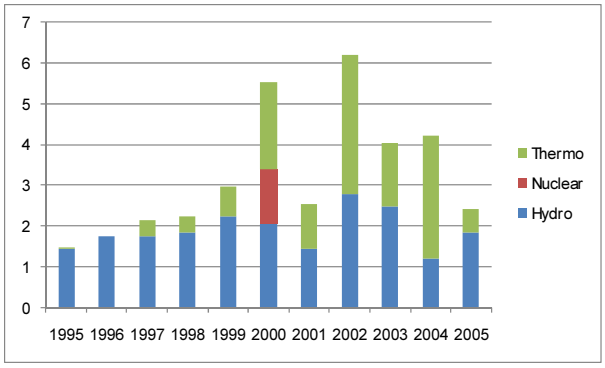

Figure 3
Generating Capacity Expansion 1995 – 2005 – GW

Source: EPE

The reservoirs' depletion was the result of the imbalance between supply and demand. Installed capacity has expanded at a slower pace than that of the demand, since the late 1980s[5]. Those who lead the reform expected the natural gas thermo-power plants to dominate the generation expansion. The thermoelectric expansion had two advantages in providing energy security: it would make the Brazilian electricity system less dependant on hydrology and it would correct the imbalance between supply and demand in a shorter time than hydropower. However, the thermoelectric plants represented a small part of the generating capacity expansion in the second half of the 1990s (Figure 3).

This was a result of a deficient integration between the electricity and natural gas industries, the latter is still evolving in Brazil. The Brazilian electric system operation is based on the principle of using thermoelectric plants only during low hydrology periods. When a series of high hydrology periods happens, a thermoelectric plant can spend years without dispatching, resulting in negative cash flow and blocking gas industry development. On the other hand, gaps in the regulation of the gas industry, mainly those related to prices, raise uncertainty around the thermoelectric projects. The program created by the government to stimulate investments in thermoelectric plants (Priority Thermo-electricity Program, PPT in Portuguese) could not cope with this scenario. When the power plants included in the program came on line, it was too late to avoid power rationing.

Rationing lasted until May 2002. The consumption of electricity was drastically reduced, resulting in major economic consequences. The estimated social cost of the rationing was close to 3% of the GDP (Sauer et al., 2003).

The Second Reform of the Brazilian Electricity Sector

The second reform aimed at avoiding a new supply crisis with a concurrent rise of electricity prices. In 2004, the new regulatory framework re-established the planning role of the State and drastically altered the wholesale market.

The Energy Research Company (EPE, in Portuguese) was created to assist the Energy Minister in sector planning, playing an important role at the expansion auctions. It was decreed that all energy trade must be carried out by long-term contracts. The only function of the short-term market (Chamber of Electric Energy Trade – CCEE) is to correct imbalances. Agents that are systematically exposed to this market (contract less than necessary) are subject to penalties.

Two trade environments were created in the wholesale market: regulated contracting environment (ACR) and free contracting environment (ACL). At the ACR, distribution companies buy energy in public auctions. They submit demand projections in a five-year horizon to EPE. Based on those projections, EPE sets the total market that will be offered in the auctions. In these auctions, generators compete making bids ($/MWh and $/MW) to satisfy the distribution market. The winners then sign contracts with all the distribution companies that were part of the auction. Then the energy from each generator is divided among the distributors in the proportion that their market represent in the total amount negotiated. The energy sell price is defined by the bids of generation companies (pay as bid) and the purchase price, paid

by the distributors, is unique and corresponds to the average of the sell price.

The model distinguishes the energy coming from already existing plants ("old energy") from the energy coming from the new ones ("new energy"), both being negotiated in the ACR in different ways. The old energy was intended to respond to the existing market. In the auctions of "old energy" eight-year contracts were negotiated.

The "new energy" is aimed at the expansion of the distribution market. The "new energy" auctions are done with a view of three to five years ahead and they define the generating capacity expansion in Brazil. 15 to 30 years contracts are negotiated in the auctions.

At the ACL, large consumers[6] are free to choose their suppliers outside the centralized auctions. The energy is negotiated through bilateral contracts with generators and traders.

Auctions

Since late 2004, there have been five auctions of old energy. They negotiated contracts that start from 2005 to 2009 (Table 1).

Since December 2005, five new energy auctions have been carried out. Hydro and thermo power plants did not get the same treatment. Whereas the hydropower plants competed with prices for the generated energy, the thermoelectric plants made bids for the generating capacity[8]. The operational cost of thermoelectric plants that won the auctions will be passed to the final consumer.

In December 2007, an auction was carried out specifically to license a large hydropower plant. The Santo Antonio hydropower plant will be located in the Amazonian Forest with 3,150 MW of installed capacity. The project was the subject of a long debate and it was approved by the environment agency (IBAMA) after some adjustments to mitigate its impact on a very senstive environmental spot.

Results Evaluation

The new energy auctions are the touchstone of the new model of the Brazilian electricity sector. Concerning the energy tariff, the low prices in the old energy auctions made it possible for the energy buy price (average price) at the ACR to be maintained at a low level in coming years. Even though the prices have risen substantially throughout the auctions (7% yearly), the expected values in the next five years are considerably lower than long-term marginal cost (prices obtained in new energy auctions).

Figure 5 shows the generating mix resulting from the new energy auctions, including Santo Antônio's auction. They resulted in 12.4 GW of new generation capacity. Hydropower plants represent 55% of the total. However, only 0.6 GW will start operation before 2011[9]. Until 2010, the expansion is concentrated in oil fuelled power plants (63%).

The second reform did not address the deficient integration between natural gas and electricity industries. It may have severe consequences on electricity supply security in Brazil, as those of the 2001-2002 power crises. Even though the capacity payment

	Starting Year	Contracts Length	Price (US$/MWh)[7]	Quantity (MWmed*)
1st auction	2005	8	26.75	9,054
	2006	8	31.32	6,782
	2007	8	35.09	1,172
2nd auction **	2008	8	38.67	1,325
3rd auction	2006	3	29.28	102
4th auction	2009	8	44.15	1,166
5th auction	2007	8	48.71	204

* 1 MW average = 8,760 MWh/year

** It was offered contracts starting in 2009 but no dealer was interested.

Source: CCEE

Table 1
Old Energy Auction Results

		Starting Year	Contract Length Years	Average Price (US$/MWh)*	Quantity (MWavg**)
1st Auction					
(A – 5)	Hydro	2008	30	49.74	71
	Thermo	2008	15	61.52	561
	Hydro	2009	30	53.15	46
	Thermo	2009	15	60.12	855
	Hydro	2010	30	53.51	889
	Thermo	2010	15	56.66	862
2nd Auction					
(A – 3)	Hydro	2009	30	58.96	1,028
	Thermo	2009	15	61.58	654
3rd Auction					
(A – 5)	Hydro	2011	30	56.22	569
	Thermo	2011	15	63.93	535
4th Auction					
(A – 3)	Thermo	2010	15	62.64	1,304
5th Auction					
(A – 5)	Hydro	2012	30	60.07	715
	Thermo	2012	15	59.71	1,597
Sto. Antônio		Hydro	2013	30	3 6 . 6 8

Notes: * The average price of the thermopower plants is calculated on the basis of the dispatch and fuel prices expectations made by EPE.

** 1 MW average = 8,760 MWh/year

Source: CCEE

Table 2
New Energy Auction Results

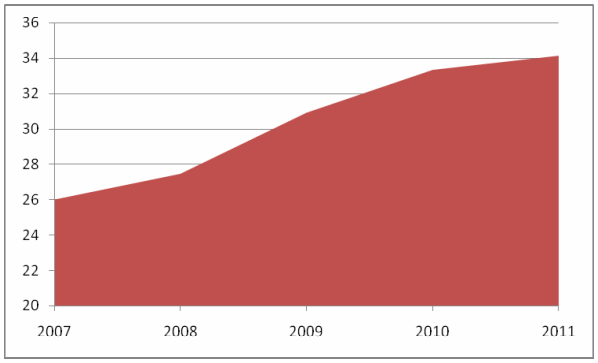

Figure 4
ACR Expected Prices (US$/MWh)

Source: Estimated by the author

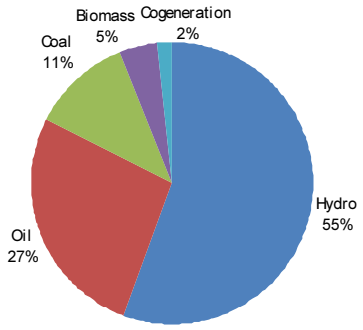

Figure 5
Structure of Generating Capacity Expansion

could stimulate investment in thermoelectric plants, it does not assure sufficient remuneration to the natural gas infrastructure.

Indeed, the very low rate of dispatch of gas power plants after the rationing led Petrobras, the company which controls the natural gas industry, to orient the fuel to other markets (industry and transport, mainly). Today, only 30% of existing natural gas capacity has sufficient fuel to operate.

The oil fuelled power plants that dominated the new energy auctions are not adequate to solve the energy security problem in Brazil. As thermoelectric plants are dispatched intensely during adverse hydrology periods, their high operational cost would mandate an unbearable bill. Considering the plants selected in the auctions, we estimate that the yearly cost can reach US$ 2 billion resulting in a 10% increase in energy tariffs. And, as the recent ONS report indicates, it could be insufficient to avoid a new rationing. In 2009, the risk of an energy deficit is near to 10% in the Northeast region, where the Brazilian electricity system is more fragile (ONS, 2007).

So, a better integration of electricity and natural gas industries is needed to provide energy security in Brazil. It involves a redefinition of the role of thermoelectric plants, which must be dispatched on a regular basis to afford an attractive remuneration to natural gas infrastructure. Using the terms of Joskow (2006) and Cramton and Stoft (2006), it would be the way to solve the "missing money" problem in Brazil.

Footnotes

[1] Water can be stored to respond to demands of over a year ahead.

[2] Specialists point out that reservoirs should retain at least half of their capacity filled up in the beginning of the dry period.

[3] For technical reasons, reservoirs can't operate with less than 10% of their capacity.

[4] This percentage would be enough to ensure that the reservoir reaches the end of the dry period on the level that allows the plant to operate (blue spotted line on Figure 3).

[5] This was one of the reasons of the first reform. A crisis did not occur before because investments were intense in early 1980s resulting in over-capacity in that time.

[6] Demand greater than 3 MW.

[7] All the currency conversions are made using the exchange rate 1 US$ = R$ 2.15, which corresponds to the average exchange rate in 2006.

[8] The bids related to the producers' fixed income. To order offers EPE calculated the dispatch that would be expected from the central.

[9] The government decided to auction only the hydropower sites that already have environmental licenses to operate so as to reduce investors' risk. However, the government faced many difficulties when licensing the centrals and it took longer than anticipated.

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Boosting the Electricity Sector in West Africa: An Integrative Vision

By Edgard Gnansounou *

To improve peoples' living conditions, Western African countries need to considerably reinforce their electricity supply infrastructures. Retrofitting the existing installations and constructing new generation and transmission facilities require significant financial resources which are very difficult to attract due to the countries specific economic and political conditions. This paper discusses the low performance of the electric power sector of the West African countries and the solution they envisaged to cope with their present electricity crisis. It turns out that the cooperative approach the electricity systems are undertaking within the West African Power Pool project, although positive in number of initiatives, is not sufficient to cope with the challenge of attracting the required funds to meet future regional electricity demand. Another concept is proposed, based on an integrative approach that attempts to solve the capacity needs for the whole region through a competitive market. The restructuring underlying that vision is discussed. It is concluded that implementation of the proposed concept will require a necessary voluntarism and a strong commitment of the countries.

Introduction

For several decades, the populations of West African countries have suffered from limited access to electric power and endemic electricity shortages. This situation constitutes a bottleneck to their socio-economic development. The electricity crisis in West Africa has worsened during recent years in spite of the efforts made to construct new electric power plants and transmission networks. The gap is still large between the present trend of investments and actual needs. Reforms in the electricity industry have been gradually undertaken in the region under the initiatives of donors who sponsored them. The ongoing restructuring consists mainly in privatising the public electricity utilities in order to attract private funds to the electricity sector. Early in 2000, a regional strategy was launched seeking to reinforce these reforms, to exploit domestic primary energy resources and to improve the electricity interconnections between the national grids. The aim is to build up a West African Power Pool (WAPP), the objectives of which are defined as follows: to enhance cooperation among West African countries for developing electricity infrastructures, promote investment in the sector, improve electric system reliability, provide a forum for policymakers to share their views concerning the electricity sector, share the benefits of trade and investment and agree upon common rules to protect the public and the environment. After a few years of operation, the WAPP has succeeded in providing a forum for policy issues and in setting up some institutional organizations. Interconnection projects are also in process, financed by the World Bank and other international financial institutions. However, the role of the WAPP in attracting investment in West African electricity generation systems will remain small as long as it embraces the conventional vision of cooperative electricity import/export between national electricity sectors. The objective of this paper is to contribute to a new concept on the nature and direction of reforms in the electricity industry in West Africa. A model of electricity sector restructuring is proposed which allows for integrated development of the electricity supply industry at the regional level in West Africa. Two strategies are compared. The first strategy is based on adequate expansion of the national power systems and the electricity exchanges among the countries in sub-zones. It aims at optimising the management of national electricity generation systems. The second strategy, recommended in this article, leads to developing a regional electricity market in order to boost investment.

The remainder of this paper is structured as follows. Section 2 is devoted to a performance analysis of the region's electricity sector; the ongoing reforms in West Africa are reviewed as well. The WAPP project is presented in section 3 and its ability, as currently structured, to achieve its main goal is discussed. In section 4 a new concept is proposed for the future of the West African electricity sector and section 5 concludes with the need to develop a political voluntarism in order to meet the electricity demand of the West African economies in the future.

Performance of Electricity Supply in West Africa

A Low Quality of Service

During the last decade, the number of electricity supply interruptions increased dramatically in many countries of West Africa. In 1998, because of the drought, the lack of water in the Akossombo reservoir caused an electricity crisis

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in Ghana as well as in Benin and Togo. The latter two countries then suffered from electricity supply disruptions during several months and this led to an economic recession. A similar crisis of less severity occurred from late 2006 to September 2007. In 2001, Nigeria experienced rolling blackouts due to drought and draining of Kainji, the largest hydro power reservoir in the country. Senegal, Mali and Guinea have suffered for several years from frequent disruptions of electricity supply due to insufficient generation capacities and the low reliability of power plants. With the notable exception of the Ivory Coast, which somewhat adapted supply to demand, all other countries of the sub-region suffered from under-investment in electricity supply capacity. Furthermore the electric generating systems are structurally imbalanced. In countries like Ghana, Nigeria, Benin, Togo, Guinea and Mali, electricity supply relies significantly on hydropower, and this is subject to strong multi-annual variability because of fluctuating hydrological conditions. Meanwhile, other countries like Senegal, with electricity generation mainly based on oil, have experienced frequent power plant outages due to low reliability and the difficulty of fuel procurement stemming from the international oil price surge.

This situation impacts the economic development in multiple ways. For example, big companies, especially industrial consumers, have to install self-generation facilities as a complement to the unreliable supply from the grid. It results in a higher electricity supply costs and entails a loss of competitiveness. The low quality of electricity supply caused a direct increase in the companies' production costs and had a negative effect on capital productivity, in comparison with other developing regions such as Asian or South American countries. These factors caused significant losses of economic growth opportunities that resulted both in low capacity use by existing enterprises as well as less attractiveness to new ventures. That makes the deficiency of electricity supply in West Africa a strong barrier to poverty alleviation in the region which has the world's highest proportion of poor people.

Prescribed Solutions

The heavy debt of most of the utilities in the region, and their low financing capability, mainly explain the under-capacity of electric generating systems in West African countries. In addition, the governments are unable to provide the necessary funding for renovation and further development of electricity infrastructures. The obsolete equipment and management dysfunctions, in turn, help cause a weak performance of the whole electricity industry. The donor institutions led by the World Bank have offered many solutions: management consulting, bilateral aid, contracts for management and leasing (Hammons et al., 2000; Reyl, 1996). A complete privatisation of state-owned electricity companies was recommended to all countries of the region. This solution succeeded in the Ivory Coast but so far has been unsuccessful in several other countries, in particular in Guinea and Senegal. The efficiency of such a single solution is thus questionable. In some cases, privatisation was restricted to the management and operation of the utilities, their ownership remaining in the hands of the state. An important criterion in the selection of private operators was their capability to attract the necessary investments. The privatisation experiences that are ongoing consist in selling the utilities to private investors. However, experience in a West African context has shown that if priva-

Country	Fina Consumption 2005 (TWh)	Generation 2005 (TWh)	Share of Thermal Power Plants %	Share of Hydro Power Plants %	Installed Capacity 1/12005 (GW)	Thermal Capacity % of total	Hydroelectric Capicity % of total
Benin	0.59	0.11	99.05	0.95	0.122	45.08	54.92
Burkina Faso	0.48	0.52	80.54	19.46	0.180	82.22	17.78
Cape Verde	0.04	0.05	100.00	0.00	0.078	100.00	0.00
Ivory Coast	2.90	5.31	73.18	26.82	1.084	44.28	55.72
Gambia	0.13	0.15	100.00	0.00	0.029	100.00	0.00
Ghana	5.85	6.65	20.64	79.36	1.490	19.60	80.40
Guinea	0.71	0.77	45.10	54.90	0.274	52.92	47.08
Guinea-Bissau	0.06	0.06	100.00	0.00	0.021	100.00	0.00
Liberia	0.30	0.32	100.00	0.00	0.188	100.00	0.00
Mali	0.41	0.44	45.95	54.05	0.280	44.64	55.36
Niger	0.44	0.23	100.00	0.00	0.105	100.00	0.00
Nigeria	16.88	22.53	65.06	34.94	5.898	67.14	32.86
Senegal	1.46	2.22	87.94	11.88	0.300	100.00	0.00
Sierra Leone	0.23	0.25	100.00	0.00	0.118	96.61	3.39
Togo	0.58	0.18	58.52	41.48	0.021	85.71	14.29
Regional Total	31.05	39.76	60.58	39.41	10.19	59.46	40.54

Table 1
Overview of Electricity Generation Sector in West Africa
Source: EIA (2007)

tisation can be a solution to improve management and operation cost, it does not constitute a panacea for financing electricity sector expansion. Under the current state of national electricity infrastructures and regulations, private investors are not willing to heavily invest. Another option envisaged in this paper is the development of a more open integrated framework that could ensure the electricity security of supply by progressively opening the market to competition at the regional level.

Description of the Existing System

The situation presented in this section is mainly derived from statistics of the U.S. DOE, Energy Information Administration (EIA, 2007). In 2005 the total installed electricity generating capacities in Western Africa amounted to 10.2 GW, constituted by 59.5 % of thermal power stations and 40.5 % of hydroelectric plants (see Table 1).

Total electricity generation amounted to 39.8 TWh of which 61% was from thermal power plants; the main electricity producers being Nigeria, Ghana and Ivory Coast with, respectively, 22.5, 6.7 and 5.3 TWh. Total electricity consumption was 31.0 TWh with the following main consumers Nigeria (16.9 TWh), Ghana (5.9 TWh), Ivory Coast (2.9 TWh). These three countries were responsible of 87% of electricity generation and 83% of the consumption.

Nigeria

Only 40% of the Nigerian population has access to electricity, mainly in urban areas. It is estimated that the supply deficit is about 80% of the potential electricity demand of the country. The public authorities planned to boost the 4 GW available capacity in 2005 to 10GW by the end of 2007. Instead, the available power has decreased in 2007, fluctuating between 0.80GW and 3.5 GW whereas the country's peak electricity consumption was estimated to 7.60 GW; self-generation and back-up systems are used, leading to expensive electricity supply for the economy. This situation is due to unreliable power plants as well as irregular primary energy feed caused by frequent vandalism to condensate pipelines. Power sector restructuring in Nigeria started in March 2005 with the enactment of the law of the Electric Power Sector Reform. So far the main effect of the reform is on the sector's organization: corporatisation of the state owned utility that changed from NEPA to Power Holding Company of Nigeria (PHCN); unbundling of the PHCN with 18 descendant companies that are being privatised. A regulatory commission has been established and new power plants are projected by IPPs. The reform, however, has not proved to be attractive to private investors who still perceive the Nigerian electricity sector as significantly risky.

Ghana

The electricity industry in Ghana is dominated by three companies. The Volta River Authority (VRA), a state owned utility, is the main generation and transmission company. A small share of the generation is attributed to few IPPs and to the Takoradi International Company (TICo), a joint venture between VRA and CMS Energy Inc. of the U.S.A. The Electricity Company of Ghana (ECG) and the Northern Electricity Department, a subsidiary of the VRA, are two state owned companies that are responsible for distribution (RCEER, 2005).

The power generation system in Ghana is largely dominated by hydroelectricity. From late 2006 to September 2007, due to a severe drought and underinvestment in power capacity, Ghana's consumers were affected by endemic power cuts. The government has planned to expand national hydropower capacity by approximately 630 MW through a Build – Operate – Transfer (BOT) financing scheme. In addition to increasing the domestic electricity supply, this will allow the export of excess electricity to Burkina Faso, Mali and Ivory Coast. Ghana also plans to increase its thermal generating capacity. These projects, supported by the International Finance Corporation, will become feasible with the construction of the West African Gas Pipeline, which will deliver low priced natural gas from Nigeria and will allow the conversion of existing oil-fired facilities to natural gas. The present regulatory framework of the electricity sector in Ghana results from a reform in 1997 when the parliament enacted two laws which created the Public Utilities Regulatory Commission and the Energy Commission. The former is responsible for competition regulation and quality of service monitoring while the latter is in charge of technical standards and licensing of electricity utilities. There is no significant privatisation programme.

Ivory Coast

In Ivory Coast 73% of the country's annual electricity production in 2005 was generated by natural gas-fired power plants. Further expansion of natural gas-powered facilities is pending a satisfactory increase in domestic and regional electricity demand through the West African Power Pool (WAPP).

The capacity of hydropower plants in the Ivory Coast is also significant (about 27 % of the country's electricity production in 2005), although they no longer run at full capacity. The use of small scale fuel oil-fired power generators is also widespread throughout the country. The present institutions of the electricity sector have been in place since the restructuring of 1990 and 1998. The Compagnie Ivoirienne d'électricité (CIE) was created in 1990 and received from the government a 15 year concession for management and operation of the generation, transmission, distribution, retail and international trading of electricity; the ownership of the infrastructures remaining public. The reform of 1998 organised the public regulation of this private monopoly. The electricity supply of the Ivory Coast has been improved by the two restructurings with better performances compared with those of Nigeria and Ghana. However, deteriorating relations between the electricity institutions have raised concerns about the financing of the infrastructures' expansion. The concession was extended in 2005 for 15 years with new provisions, including regular monitoring of contract execution, creation of an infrastructures' development fund and the possibility of a revision of the contract every 5 years.

Senegal

Senegal has suffered in recent years from massive blackouts due to fuel shortages and low performances of its thermal power plants. Urgent measures have been undertaken, with the help of the international community, to return the national electricity system to normal operation. These measures include the shipment of fuel to Senegal's national power company, SENELEC, construction of fuel storage facilities and an examination of the possibility of building a new oil terminal in Senegal. However, the electricity crisis in Senegal continued in 2007. The government recently set up an ambitious investment programme in electricity generation that would add, by 2010, a 130 MW diesel plants and 125 MW coal fired power plant. According to December 2007 negotiations between the Senegalese Government and bilateral and multilateral financing agencies, the latter will fully participate in the funding of this programme only if institutional reform of the electricity sector is achieved. SENELEC, a state owned and vertically integrated utility, has a monopoly on electricity supply in Senegal. Two attempts in 1999 and 2001 to privatise this company resulted to failure and SENELEC is presently facing severe difficulties due to underinvestment in infrastructure, the increase of international oil prices and inappropriate electricity tariffs. In 2005, Senegal relied on oil fired power plants for 88% of its electricity consumption. The new investment programme will increase the dependence on oil even if the relative share will be more diversified with the introduction of coal.

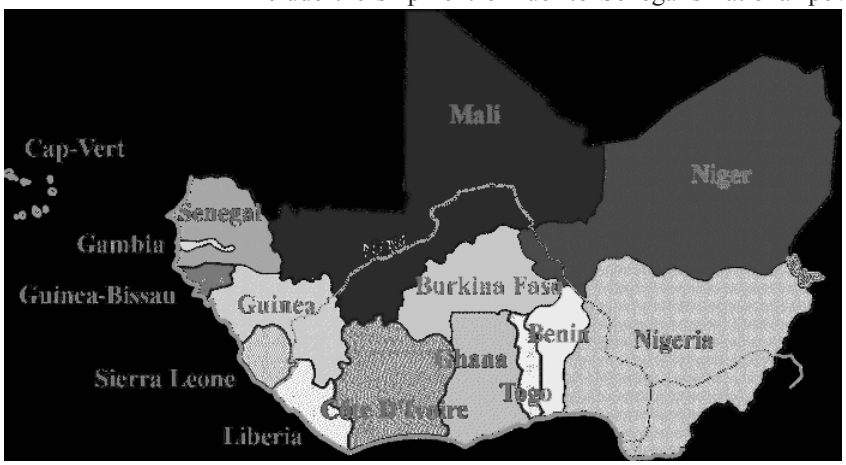

Figure 1
Countries of West Africa Sub-region
Source: Gnansounou et al., 2007

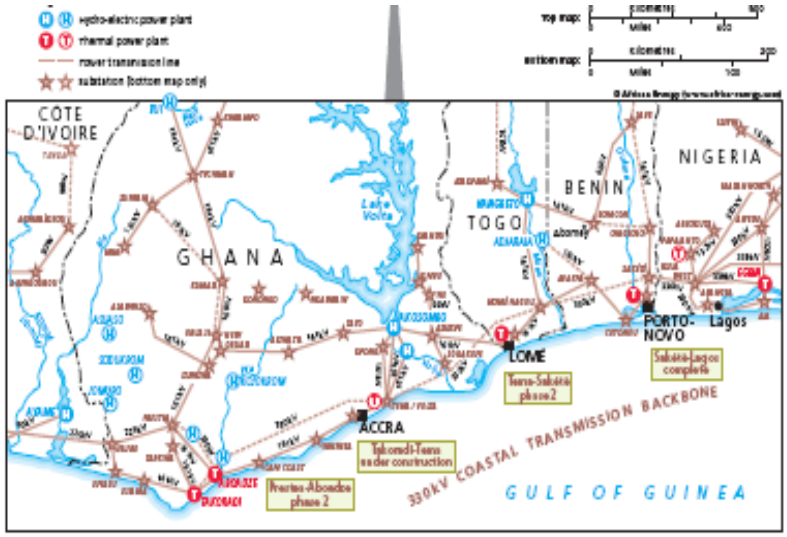

Figure 2
The Coastal Transmission Backbone (CTB) Along the Gulf of Guinea
Source: A E, 2007

Guinea

As a source of several major West African rivers (including the Gambia and Niger rivers) Guinea has a huge hydroelectric potential, estimated by EIA (2006) at 19400 GWh per year (technically feasible). Only ≈ 1% of this potential has been exploited. The major obstacle for construction of

large-scale hydropower facilities is the lack of financing capability and the reluctance of international organisations to be involved in projects with serious societal consequences such as displacement of 50000 inhabitants in the case of the 975 MW dam project in Souapiti Kaleta.

Other Countries

The electricity generation and distribution facilities in countries like Liberia and Sierra Leone were seriously damaged during recent military conflicts and construction has been disrupted. They are still seeking opportunities to rebuild their infrastructures with the help of the international community. Other countries of Western Africa are either without coastal access, such as Mali, Burkina Faso and Niger, which do not possess important energy resources and are likely to be dependent on electricity imports; and small countries of the coastal region (Benin, Togo) which already have established an integration of their bulk electric energy supply that can serve as a predecessor to an integrated regional approach.

The Ongoing West Africa Power Pool (WAPP)

The WAPP project was launched in October 2000 with the aim of enhancing development of the electricity generation and transmission infrastructure in the Economic Community of West African States (ECOWAS)[1], and to facilitate a well-functioning, cooperative and power pooling mechanism. An investment programme was set up with the World Bank (as financial leader), other international cooperation partners and financial institutions. This 20-year programme was divided into four phases. The first one, the completion of which was set for 2006, concerned the design of the interconnection regulation within and between zone A (Benin, Burkina Faso, Ivory Coast, Ghana, Nigeria and Togo) and zone B (Cape Verde, the Gambia, Guinea, Guinea Bissau, Liberia, Mali, Senegal and Sierra Leone). The second phase (2007-2012) involved completion of the interconnection within zone A and development of institutions for the management of international electricity trading. Phases three and four (2012-2023) were viewed as full and improved operational periods. The positive results of the WAPP include: the existence of a shared concept between the ECOWAS country members and their traditional international financial partners; and the achievement of an important programme of interconnection.

The successful progress of the Costal transmission backbone (see Figure 2) is a key factor for the interconnection of the zone A.Without this interconnection, the actual electricity exchanges between the countries of zone A will be severely restricted. However, the capacity of the designed transmission lines will not be sufficient to boost electricity supply in that zone which is facing a major barrier of underinvestment in generation. The design of the WAPP project does not fully cope with the challenge of attracting private investment into the region's electricity generation sector, even though the interconnection will create the necessary favourable conditions. The WAPP appears, in its concept as well as in its deployment, as mainly a loose pool oriented towards electric power import/export among the countries. As an example, in the Coastal Transmission Backbone (CTB) project, the import and export countries are labelled taking only into account the availability of local primary energy and the infrastructures are designed accordingly (see Table 2).

Maximum Transfer Capability (MW) for 330 kV operation

Exporting System	Existing 2003	Target 2011	Importing System
Ivory Coast	200	200	Ghana
Ghana	120	700	Benin/Togo
Ghana		500	Nigeria
Nigeria		650	Benin/Togo
Nigeria		450	Ghana

Table 2
Electricity Transfer Capability of the CTB

Source: http://web.worldbank.org/external/pro-

This design precludes a possible export from Benin/Togo to Nigeria which is less likely within a conventional cooperative concept but highly possible in the case of the proposed integrative concept.

Proposed Integrative Regional Electricity Market (IREM)

Description of the Proposed Concept

In the Integrative Regional electricity market (IREM) it is assumed that the restructuring of the regional electricity sector, instead of following the historical steps (from cooperation among countries to regional integration) jumps to the integrative model addressing the region as a whole. This leap can be justified first by the lessons learned from the present situation in industrialised countries where the interconnection previously designed with a cooperative vision is becoming a major barrier for optimising transactions in an open and competitive environment. Second, in the case of the availability of natural gas, as it is being experienced in West Africa, the location of the generation will mostly depend on the risk perception of the investors. Third, while integration is the ultimate goal of the process, going through a long process based on cooperative systems will be more costly than adopting an integrative approach from the begin-

	Cooperative Strategy		Integrative Strategy			
	Total Costs	Levelised Electricity Cost	Total Costs	Absolute Levelised Electricity Cost	Relative Benefit of Integration Strategy	Reduction of Electricity Cost
	Mil US $	*Cents/kWh*	*Mil US $*	*Cents/KWh*	*Mil US $*	*%*
Benin	522	6.1	513	6.0	9	1.6
Burkina Faso	506	7.2	436	6.2	70	13.9
The Gambia	280	14.1	152	6.9	128	51.1
Guinea Bissau	170	12.4	83	5.4	87	56.5
Liberia	987	7.4	788	6.4	199	13.5
Mali	720	5.0	273	2.0	447	60.0
Niger	622	9.7	253	2.9	369	70.1
Senegal	3393	10.6	2375	5.9	1018	44.3
Sierra Leone	92	5.4	39	1.9	53	64.8
Togo	961	7.5	800	6.1	161	18.7
Ivory Coast	4637	5.9	3503	3.1	1134	47.5
Ghana	4763	4.0	3634	2.5	1129	37.5
Guinea	8563	10.6	4829	3.3	3734	68.9
Nigeria	23627	6.6	13766	2.7	9861	59.1

Table 3
Economic Comparison of "Cooperative" vs "Integrative" Strategies (2010-2030)

Source (Gnansounou et al., 2007)

ning. A previous study (Gnansounou et al., 2007) compared the two West African strategies and concluded that the integrative strategy results in an electricity cost reduction for all country members of ECOWAS. In that study, a similar assumption was made as for WAPP on import and export countries.

In the IREM concept the regional electricity sector will follow a three-phase model as is outlined in Figure 3. The first phase will be devoted to retrofitting and improvement of management of the existing electricity companies, completion of the regional interconnection and acceleration of rural electrification within each country. This phase should be completed in 2012. Then the addition of new power generation units will be ensured preferably by new producers such as IPPs in order to increase competition.

The second phase during 2012-2017 will be characterized by the separation of production and transmission activities and the opening of the electricity market to competition at the wholesale market level. The assumed model during this second phase is "single buyer model". The activities of the national transmission companies will be limited to purchasing, transmitting and selling electricity to the distribution companies and to big consumers which in turn will be responsible for distribution as well as for retail. The concept is neutral concerning the ownership of infrastructures (public, private or mixed) because what is important is the management capability of the companies and especially their competitiveness at the regional level.

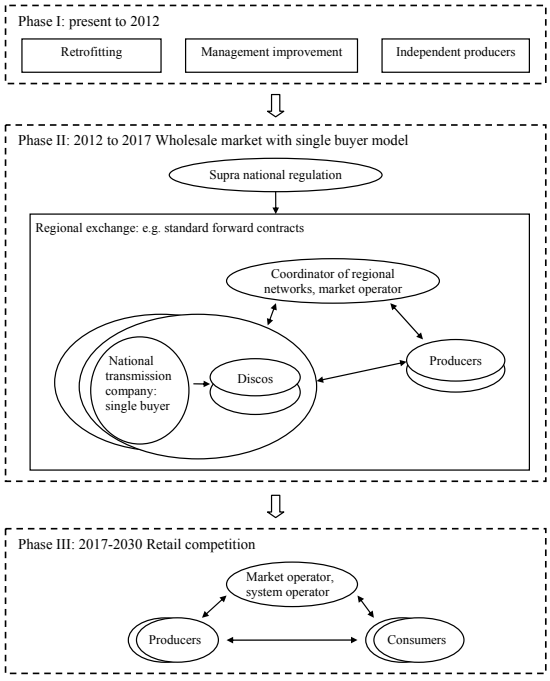

Figure 3
Three-phase Restructuring of Electricity Sector in the IREM

The electricity market will be structured around a regional power exchange offering standardized contracts as well as facilities for setting up forward contracts. The objective is to create a sufficiently large and transparent regional market in order to attract the private investment in electricity generation. A coordinator of the regional interconnected network will be established and will serve as market operator as well. National regulation commissions will supervise, on the one hand, the security of supply at the national level, and on the other hand, a fair transfer of the gain in productivity over the electricity selling prices to the consumers. Lastly, a regulation commission at a supra-national level will take charge of the efficient operation of the regional market and in particular insure the absence of collusion between the market operator, the producers and the national single buyers, especially in the case of the standardized market.

The third phase of the restructuring during 2017-2030 will be the market opening to retail competition. After this phase, all the consumers of the productive sectors will be able to purchase electricity directly at the regional market without having to pass through an intermediary, i.e., as is the case in the second phase with the manager of the national transmission grid.

Advantages of the Proposed Concept

The advantages of the IREM concept are as follows: private investors in electricity generation will address the whole market in investing where their perception of country-risk is more favorable; competition between generators will hasten the retirement of obsolete power plants and their replacement by more efficient plants; fast interconnection between the systems will reduce the quantity risk and irreversibility which characterize investments made on national basis; the sharing of the risk will be more favorable to consumers, contrary to the present power purchase agreements linked to BOO or BOT concessions; eventually a clear and complete concept, strengthened by a readable, even progressive implementation, will make investors more comfortable and confident in a stable and faith worthy restructuring process.

Conclusion

In spite of its present poverty, West Africa has a brilliant economic future. Nigeria on its own can be the driven-country of the whole ECOWAS. This populated country (50% of the region's population) is also potentially the richest with its high resources of natural gas and oil. Presently Nigeria is viewed as risky due to the turmoil in part of the country, a bad reputation of corruption and other governance malfunctioning. Despite the efforts of the public authorities to solve internal problems and to improve the international image of this big country, the positive results may be a long time coming if its neighbours do not share a regional strategic view with it. Through the West African Gas Pipeline Project, Nigeria will provide its natural gas to Benin, Togo and Ghana at an inexpensive price compared to the international market. This will create an opportunity to generate electricity at low cost not only for these countries but for the whole zone A, including Nigeria itself. Such a new concept will necessitate reinforcing the pipeline capacity in the coming years. With the perspective of the long-term depletion of oil and gas, West Africa can become attractive for those industries such as petrochemicals which need these raw materials. It will create the opportunity to develop the economy of West Africa based on value added products instead of reliance on raw material exports to industrialised countries. This perspective also addresses the issue of the optimal use of natural gas and the need to introduce other more sustainable energy sources. Such an industrialisation perspective, if based on credible and shared commitment, will enhance the economic value of the whole region and increase the willingness of investors to be involved in the development of the electricity infrastructures of the region. The integrative concept proposed in this paper, departing from the conventional approach by its ambition to accelerate regional integration, is in accord with the WAPP and the WAGP projects. Furthermore, by signing the energy protocol, all the ECOWAS country members agree *that open and non-discriminatory access to power generation and transmission encourages investment in generation and distribution facilities, and thereby increases competition in such subsectors of the power industry, in turn leading to reduced cost for power* (ECOWAS, 2003). Although the proposed IREM concept is in accord with that protocol, it will require a strong but necessary voluntarism and political commitment to be shared by all the West African countries.

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The Economic Community of West African States (ECOWAS) comprises the following countries: Benin, Burkina Faso, Cap-Vert, Ivory Coast, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo. The research of Purdue University did not consider Cap-Vert but took into account Mauritania, previous member of ECOWAS.

Scenes from the First Annual NAEE/IAEE Conference

Pictured from left to right: Adeola Adenikinju, NAEE/IAEE Program Chair, Carlo Andrea Bollino, IAEE President, David Williams, IAEE Executive Director, Wumi Iledare, USAEE President and IAEE Council member, Georg Erdmann, IAEE President-Elect, Olugbenga Adesanya, NAEE/IAEE Conference Head Repertoire and Akin Iwayemi, NAEE President.

Pictured from left to right: Georg Erdmann, IAEE President-Elect, David Williams, IAEE Executive Director, Olugbenga Adesanya, NAEE/IAEE Conference Head Repertoire, Chief M. Olorunfemi, Former Head of Research, OPEC Secretariat and Carlo Andrea Bollino, IAEE President.

Report from the First Annual NAEE/IAEE Conference in Africa: Held on 29-30th April 2008 at the Transcorp Hotel, Abuja, Nigeria.

Introduction

The Inaugural Conference of the Nigerian Association for Energy Economics (NAEE) was held in Abuja, Nigeria on 29th and 30th April 2008. The Theme of the Conference was: "Developing and Supporting Critical Energy Infrastructure: Challenges, Constraints and Prospects in Nigeria for Vision 2020".

The Conference was actively supported by the International Association for Energy Economics (IAEE). The IAEE Delegates at the Conference were:

Prof. Andreas Bollino	2008 IAEE President
Prof. Georg Erdmann	2009 IAEE President Elect
Prof. Wumi Iledare	2008 USAEE President
Mr. David Williams	Executive President, IAEE

The 2 day Conference attracted delegates from within and outside Nigeria. Delegates at the Conference came from Ghana, United Kingdom, Sweden, Republic of Benin, Canada, USA, and Hungary. The Conference attracted senior Government Officials, energy experts, Academia, Journalists, members of Diplomatic Corps and Students. Total attendance at the Conference stood at 158, which consists of:

NAEE/IAEE Members	54
Non-Members	80
Students	24

The 2 day Conference had seven plenary sessions including a Roundtable Discussion at the close of the Conference. The Conference enjoyed good publicity in both the electronic and print media. IAEE and NAEE officials attended a popular Television Morning Show and addressed a Press Conference. The proceedings of the Conference were aired on both the local and national news.

The 2008 NAEE Conference sponsors include: Shell Petroleum Development Company, Nigerian National Petroleum Corporation, National Petroleum Investment Management Services, Nigerian Petroleum Development Company, Elf Nigeria Petroleum Limited (a subsidiary of Total), and Addax Petroleum. A cocktail reception for delegates was sponsored by Total. IAEE also sponsored a Breakfast Forum for NAEE Delegates and Delegates from the Region.

Opening Ceremony

The Conference was declared open by Ambassador Babagana Kingibe, the Secretary to the Government of the Federation who represented the President of Nigeria at the Conference. Also present at the opening ceremony were the Special Adviser to the President on Petroleum Matters, Dr. Emmanuel Egbogah, the keynote Speaker, Chief Philip Asiodu, a former Chief Economic Adviser to the President and Secretary (Minister) of Petroleum, the NAEE President, Prof. Akin Iwayemi, the IAEE Delegates and Chief Michael Olorunfemi, former Head of Research of OPEC.

In his address, the NAEE President welcomed delegates to the Inaugural Conference and underscored the determination of the Association to contribute to energy debate in Nigeria. The IAEE President, Dr. Bollino in his opening remarks praised the efforts of the NAEE in organizing the first ever Conference of an IAEE Affiliate in Africa. He enjoined the government to avail itself of the expertise available in the NAEE. The Representative of the Nigerian President noted that the theme of the Conference was apt and timely and that the government will be glad to have the recommendations from the Conference, as the energy sector is fundamental to realizing the government vision of making Nigeria one of the 20 largest economies in the world.

In his keynote address, Chief P.C. Asiodu (CON) chronicled the key problems and challenges in the energy sector, for instance, the installed capacity for power generation was only 6000MW for a population of 140 million. The low generation capacity, low electricity access and unreliable power supply, have more than any other factor contributed to the unfriendly investment environment for private investors. Addressing the power sector problem will lead to the emergence of vibrant small and medium scale sectors that will facilitate progress in poverty reductions and help to achieve the Millennium Development Goals. He sees the commitment of the current President of the country as a positive development. However, he wants the senior echelon of the Civil Service to be strengthened and reoriented in order to

facilitate the process of modernization and national development.

Session by Session Report

Session 2: Critical Energy Infrastructure for Economic Growth: International Experiences.

This session was chaired by Prof. Wumi Iledare, the 2008 USAEE President. Members of the panel include, Dr. Michelle Foss, Dr. Gurcan Gullen, Dr. Andrea Bollino, Dr. Georg Erdmann and Dr. Omonbude. Speakers at the session gave international perspectives on energy infrastructure development in other regions of the world. Prof. Erdmann gave the German experience, Dr. Bollino shared the experience in Italy, and Dr. Foss spoke on the USA experience while Dr. Gullen outlined some developments in energy infrastructure development in the ECOWAS region.

The session Chairman, Prof. Iledare, presented a paper focusing on providing a good understanding of how the top 20 world economies sustained economic growth through adequate energy infrastructure development and also to demonstrate the role of energy infrastructure in sustainable economic development. The paper argues that for Nigeria to be among the top 20 largest economies in the world there is need for her GDP to increase exponentially, energy production and consumption must also increase rapidly without sacrificing efficiency and conservation. There must also be massive increase in energy infrastructure investment.

Dr. Erdmann spoke on the German experience. He noted that some of the challenges faced by the German electricity sector are similar to those shared by Nigeria: declining power capacities, power pricing under insufficient investment and economics of power plant investment. The main conclusion of his paper is that government ownership will most likely fail to solve the problem confronting the electricity sector, hence a more intelligent demand side market is necessary.

Dr, Michelle Foss spoke on the North American experience. Her paper characterized the structure of the North America market and concludes that price signals are powerful motivators for infrastructural investment. Dr. Gullen paper examined the link between capital flows and commercial frameworks. He argued that prevailing power outages in Africa have imposed significant costs on their economies. The paper explored various options to resolve the power paucity of the sub-region. He called for increased investment in gas development, grid interconnection and generation capacity. In addition, the commercial framework should be finalized and local capital markets must be mobilized.

Dr. Omoibude's paper described the economics of Transit oil and Gas Pipelines. He identified both the technical and economic factors in transit pipeline economies, including issues of cost, load factors, pipeline sizing as well as entry specifications of pipeline systems and the cost of reducing quantity. He posited that the central challenge was how shifts in bargaining power to cross border pipelines are managed with positive impacts on potential disputes and security of supply.

Session 3: Energy Infrastructure and 2020: Issues and Challenges

The session was chaired by Chief Michael Olorunfemi, an ex- Deputy Managing Director of Nigerian National Petroleum Corporation (NNPC) and former Head of Research of OPEC. Speakers at the session include Alhaji Shuaibu Magida, the National Coordinator of the National Electricity Utility, the Power Holding Company of Nigeria. He gave perspectives on the challenges facing the national electricity company and highlighted reasons why the unbundling of the national monopoly has not translated into improvement in electricity delivery. Ms. Machunga spoke on Infrastructure development on the upstream and downstream sector. Dr. Ige's paper on the Nigerian Gas Master Plan was delivered on his behalf by Mr. Rabiu of the NNPC.

Dr. Ige's paper highlighted the structure of the gas market in Nigeria and the challenge of gas supply responding to meet the rapid expansion in domestic market for gas. This creates significant supply/demand imbalance in the short run. This is aggravated by the poor gas infrastructure in the country. He pointed out that the gas master plan has been approved by the government. This will provide a structured platform for gas sector growth in Nigeria. The next phase, therefore, is to commence the implementation of the master plan as well as secure legislative approval for key components of the masterplan.

Ms. Laraba Machunga, MD/CEO of JALZ Energy Ltd's paper discussed infrastructure development in the upstream and downstream sectors. Her paper reviewed the E&P structure in Nigeria, highlighted existing domestic transmission infrastructure for supply of natural gas and discussed the opportunities available for exploiting Nigerian gas. She also profiled existing domestic facilities, noting that the government owned most of the infrastructure in the downstream sector. The large supply gap in the downstream sector has been filled by imports which have been rising in recent years. She identified the

stumbling blocks to optimal oil and gas infrastructure development in Nigeria. These include lack of responsibility and confused role of government, "business as usual" attitude by operators, oil price volatility, lack of internal expertise, and community crisis in the Niger Delta, among others.

Alhaji S. Maigida, the National Coordinator of Power Holding Company of Nigeria presented a paper titled, "Infrastructure Development for the Power Sector and 2020: Issues and Challenges". He identified the following key challenges facing the power sector in Nigeria: inadequate generation capacity, aged/obsolete plants, diversification of energy sources, development of human capacity to match the rapid growth facing the sector, alternative funding sources, etc. After tracing the myriad of challenges facing the power sector in Nigeria, the author proffered some recommendations for moving the power sector forward. These include, fast-tracking the completion of all on-going projects – power stations, transmission and distribution projects – putting in place mechanisms for attracting significant private sector investment, implementation of the Multi Year Tariff Order, gas sector reforms and capacity building, among others.

Session 4: Geopolitics of Energy Supply and Infrastructure Development

The last session of the day was chaired by Prof. Erdmann. Papers presented in this session include the role of PPP by Dr. Mrs Irene Chigbue, the Director-General of Bureau of Public Enterprises (BPE) who was represented at the Conference. The last speaker for the day was Hon. Tam Brisibane, Chairman of the House of Representatives on the Upstream Sector. According to him there are still a number of laws in the statute book that need to be reviewed to make them encourage private investment in energy infrastructure.

The first paper was delivered by Dr. (Mrs) Irene Chigbue. Her paper was titled, "Public Private Partnership in Energy Infrastructure Provision". The author acknowledged that the massive investments needed in the energy sector to realize the goals of Vision 2020 makes seeking alternative source of funding outside of government imperative. According to her, the power sector is projected to require about $18-20 billion and the oil and gas sector another $60 billion in new investment in the next six years. The PPP, therefore, provides an important opportunity for the country to bridge the funding gap. The author reviewed various PPP options opened to the country and also reviewed important milestones already recorded in the privatization strategy of the government. In her conclusion, she recommended that the country should develop a National Master Plan that will provide willing investors information about the infrastructure plan for Nigeria. She also challenged the private sector to see the current infrastructure inadequacy in the country as an opportunity for investment.

Day 2

The second day started with a Breakfast Discussion Forum sponsored by the IAEE for Delegates from Nigeria and the West African sub-region. The forum was addressed by the NAEE President, the Conference Chairman, IAEE President 2008, and IAEE President Elect and the 2008 USAEE President. The forum allowed delegates to know more about the IAEE as well as how to move the Nigerian Association forward.

Session 5: Energy and Sustainable Economic Growth

This session was chaired by Dr. Bollino. In their paper on "Energizing Vision 2020", Prof. A.O. Adegbulugbe and Dr. A. Adenikinju discussed the energy implications of becoming one of the 20 largest economies in the world. They estimated that current electricity availability must increase from 3615MW in 2007 to about 60,000MW by 2020, implying an annual addition of 4646MW. This implies that investment in electricity generation, transmission and distribution will increase by about $9.3 billion per annum. In conclusion, the authors made several recommendations on positioning the energy sector to meet the vision 2020 challenges. These include improving sector funding, rehabilitation of existing power plants, massive capacity development, encouraging local production of electricity supply equipments, encouraging small power producers, etc.

The second paper was prepared by Prof. A.S. Sambo (OON), Director General, Energy Commission of Nigeria. The paper was presented by Engr. Ojosu, a Director in the Commission. The paper was titled, Energy Demand and Energy Supply Projections for Sustainable Economic Growth of Nigeria". The author presented the results of on-going modeling efforts in the Commission aimed at determining the energy demand required to meet Vision 2020 as well as the corresponding optimal energy supply mix. Using models developed by the IAEA, the paper projected energy demand under three scenarios – reference, high growth and optimistic growth. Their findings showed that electricity generation by 2020 will

increase to 50,817MW, 58,175MW and 70,764 MW under the reference, high growth and optimistic growth scenarios respectively. The implied investment cost under the high growth scenario is US$471.3 billion. This is definitely beyond the government's capacity. Hence, they recommend giving incentives to motivate the private sector to invest in the sector.

The third paper delivered during the session was also prepared by Professor A.S Sambo. It was the draft National Energy Masterplan for Nigeria (NEMP). He gave a highlight of the draft plan. The NEMP for Nigeria is an implementation plan and roadmap for the realization of the energy policy objectives given the strategies enunciated in the National Energy Policy.

Prof. Iledare delivered a Paper on Oil and Gas Industry and Vision 2020 in Nigeria: Challenges, Constraints and Opportunities. The author in his presentation highlighted the important challenges ahead of the country in order to realize its ambition of being of the largest economies by the Year 2020. He noted that the Nigerian economy is currently dependent on the oil and gas sector, which contributes about 40 per cent to GDP, and over 95 per cent to foreign exchange earnings of the country. The country must however find ways of effectively utilizing her abundant human and natural resources. He called for a re-orientation of oil and gas policy objective from maximization of foreign exchange earnings and income redistribution to making economic growth as the underlying objective function.

Session 6: Energy and Sustainable Development

The session was chaired by a Representative of the Managing Director of Shell, Mr. Mutiu Sunmonu. The first paper was delivered by Prof. Felix Dayo on "Some Necessary Energy Sector Paradigm Shifts for a Sustainable Energy Path in Nigeria". He argued that Nigeria must diversify her energy base from sole reliance on conventional energy sources and utilize the varied energy endowments of the country. He listed several options to achieving this.

Prof. S.B. Elegba, Director General, Nigerian Nuclear Regulatory Commission (NNRA) discussed the role of nuclear energy in realizing the Vision 2020 goal. The paper was titled, "Nuclear Energy in the Nigerian 2020 Vision: Opportunities and Challenges. The author provided the justification for adding nuclear power to the Nigerian energy mix. Given the massive power requirement to meet Vision 2020, nuclear power has an important role to play. He outlined key elements for a successful nuclear power project. He also discussed the outcome of a SWOT analysis of the Nigerian Nuclear Power Project. He traced the role of NNRA in delivering on the mandate of harnessing the power of nuclear energy to meet the country's electricity requirements. He concluded that with the political support at the highest level of government to the nuclear power project, the problem of inadequate electricity supply can be resolved.

Mr Gbenga Adesanya's paper dwelt on exploring hydrogen fuel in Nigeria. He argued that hydrogen being the fuel of the future and given the vast advantages should be given priority attention by policy-makers. Hydrogen offers a panacea to issues of energy security, urban pollution and climate change. He called for the establishment of the Nigerian Hydroelectricity Commission. The government should also invest in hydrogen infrastructure, funding R&D from crude-oil revenue, provide economic incentives to the private sector and collaborate with key stakeholders.

The Roundtable Discussion.

This session was chaired by Prof. Iledare on behalf of the Minister of National Planning, Senator Sanusi Daggash. The roundtable involved a number of key players in the country. Members of the Panel include, Prof. Felix Dayo, Prof. Akin Iwayemi, Chief Phillip Asiodu, and Representatives of the Special Adviser on Petroleum Matters and Special Adviser on Power.

Members agreed that the challenge of Vision 2020 can be realized given the vast resources available to the country. However, they called for massive investment in energy and social infrastructure, situating energy at the centre of the development process, strengthening the capacity of legislators, policy makers and energy professionals; restructuring and reorienting the civil service, create incentives for the private sector to be actively engaged in the energy sector and promoting peace and stability in the country, especially in the Niger Delta.

Prof. Akin Iwayemi

What Policy Choices Do We Have? – The Normative Side of the Story

By Deepak Sivaraman*

Introduction: About 70% of electricity consumed in the United States is generated from fossil based resources. Even though the usage of renewable options such as wind, solar and geothermal, etc. have generally followed an increasing trend in the past decade, it is not nearly enough to address the ever-looming Climate Change problem. With Mr. Kevin Rudd, the newly elected Prime Minister of Australia pledging to join the Kyoto treaty, it is inevitable that the United States will soon be alone in waging a losing battle against the reduction of carbon emissions. Undoubtedly, a turn towards a more sustainable direction is required. As alluring as it is to carry on with a 'Doomsayer's Theory' for the U.S., I actually wanted to present a more Normative side of the story. This article looks at possible policy frameworks that would increase the usage of renewable technologies and the investment in the clean technology sector. What follows is a brief description of each economic policy option considered, its expected influence on the investment in renewable electricity market, and actual real world examples of such a policy framework being instituted. The purpose of this article is to highlight the range of options available to the U.S. in their impending crusade to increase investment in the renewable electricity markets.

Emissions Tax

An Emissions Tax is not a popular policy option, i.e., no one likes taxes, but it is effective and highly controversial, nonetheless. By regulating a pollutant tax ($ / unit pollutant released) all the Government intends to accomplish is to create a level playing field between the fossil based and renewable sources. It is one of the ways in which the fossil based resources are forced to internalize at least a part of their negative externalities. Let us just consider a simple example without getting into too many details, the carbon emissions factor (grams CO_2 / kWh electricity generated) for crystalline PV electricity is ten times less than that of the average national U.S. grid.[1] On the other hand we also know that the price of electricity generated from photovoltaics is much higher than that of grid electricity. Comparing these two prices is akin to comparing apples to oranges, because the environmental attribute (lesser carbon emissions) of the PV technology has not been considered in such a comparative analysis. An emissions tax addresses such a market failure; it increases the cost of fossil fuel based electricity generation thus creating more of a level playing field between the two electricity generation options. Creation of such a level playing field will eventually promote increased investment in renewable electricity production, because now there is more of an incentive to invest in this market.

European countries have different CO_2 tax rates for different sectors, e.g., Sweden has a tax rate of $ 56 – 189 / ton CO_2 depending on the sector considered.[2] Thus, establishing tax rates in the United States (for carbon and other pollutants) is an effective mechanism to encourage investment in renewable electricity production. A certain amount of discretion needs to be exercised however, while setting the tax rate for various pollutants.

Production Subsidies for Renewable Sources

The biggest difference between a subsidy and tax is the answer to the important question of 'Who Bears the Cost?'. Industry pays the Government in a tax world, the opposite prevails in the case of the subsidy. When the Government provides a subsidy to the renewable electricity generators, it will decrease the marginal cost of generating electricity and with all other things remaining equal, will decrease the overall price of electricity in the market. [3] The decrease in price can actually increase electricity demand. A tax scenario penalizes the fossil based generators; a subsidy on the other hand aids the renewable electricity producers thus providing a strong incentive for increased investment in cleaner technologies.

In the United States, DSIRE [4] is an excellent source of information about the incentives provided for clean technologies, both by the federal and state Governments. The state government of California has traditionally been very aggressive in promoting cleaner technologies. The California Solar Initiative for instance contributes $ 3.25 for every watt of photovoltaic capacity installed (for specific sectors), the Emerging Renewables Program provides the $ 2.50 for every watt power of wind capacity installed. Michigan on the other hand provides a one time grant of $ 50,000 for large scale PV installations in schools. The federal Government provides a tax credit incentive of 2 ¢ for every kWh of electricity generated from wind, geothermal and biomass sources. Similar incentives for a number of cleaner technologies exist

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See footnotes at end of text.

from various states in the U.S. It is important to keep in mind that subsidization, while it does promote renewable technologies and investment in the sector, it does not impede the pollutant emissions from the fossil sector.

Fossil Energy Tax

The Energy Tax is akin to the emissions tax discussed above, except for the fact that it imposes a tax not on the pollutant emissions but on the total fossil energy output (e.g. $ / MWh). In most cases, the primary objective of this policy framework is not to completely internalize the damage costs exerted by the carbon emissions externality, but to only reduce the carbon emissions from what it is at present. In Europe a fossil energy tax rate of € 0.5 / MWh electricity generated exists at present. [5] This tax does not promote the use of comparatively less carbon intensive fossil fuels (such as natural gas over coal) because it is the energy output that is being taxed and not the actual emissions, where as the emissions tax scenario would promote the use of lesser carbon intensive fossil fuels.

An energy tax would indirectly promote investment in the renewable electricity sector. Imposing a fossil energy tax will increase the overall market price of electricity (thereby reducing demand to a certain extent) consequently encouraging investment in clean technologies. It has the potential to reduce more emissions from the fossil power sector than when compared to the renewable subsidy framework discussed above.

Allowance Trading Markets

The three policies discussed above operate on a fixed framework (the tax rate or subsidy rate is fixed), on the contrary the permit prices in this policy option change every day. Emissions Trading System (ETS) is a powerful market mechanism that rewards the renewable technologies for their Environmental Attribute. The underlying theme of the ETS is to achieve the same amount of emissions reduction (as in a command – control framework) at a comparatively much lower total cost. This is achieved by taking advantage of the different marginal pollutant abatement costs (MAC) [6] existent among different sectors, industries or even countries. The regulatory agency sets a cap on the total amount of emissions that are allowed annually from the electricity sector. In this framework, the fossil industry would be a net buyer of permits (to adjust the additional amount of emissions it released above its regulated limit), the renewable industry would be a net seller of permits, both industries will trade permits at the existent market price at that time. Hence, the total amount of emissions still binds to the cap.

It is efficient because it achieves the same result at a much lower cost. The renewable technologies can sell their environmental attributes in the market and obtain monetary gains from the trade. This is a definite incentive for increased investment in the clean electricity sector. It is, however, very interesting to note that, as investment increases and the renewable sector expands; it would eventually drive the permit price down. So the regulatory agency needs to set more stringent caps over time to maintain a constant permit price, which in the long run will aid the renewable sector. Well established CO_2 trading markets exist in Europe, in the United States the CO_2 trading market is in its nascent stages.[7] At present the CO_2 allowance price in Europe is 15 – 16 times higher than in the U.S. However, the SO_2 and NO_X trading markets in the U.S. have proved to be very successful over the years. Establishment of a trading market is definitely one of the ways to promote increased investment in the renewable electricity sector.

Renewable Portfolio Standards (RPS)

RPS is a policy mechanism that regulates the energy portfolio of each state, making it binding that a certain fraction of total electricity generation in the state be derived from renewable sources. Not all the states in the U.S. have ratified a RPS framework; conventionally the local state government (e.g., California Energy Commission, Delaware Energy Office, etc.) institutes the policy framework in the relevant state. For instance, at present the state of California and Illinois require 20% and 25% of their energy demand to be generated from renewable sources, respectively, the EERE also contains the list of states in the U.S. that have ratified the RPS until now.[8]

A coal power plant can either install wind turbines or photovoltaics to satisfy its fractional renewable electricity requirement, or it can purchase Green Certificates (GC) in the market. A single GC normally represents one MWh of electricity generated from a renewable source; the coal power plant when it purchases a GC needs to pay a premium (additional price for every unit of electricity) in recognition of the product's environmental attribute. GC's generated from different renewable sources are sold in the market at different premium rates.[9]

Such a premium is a strong driver for increased investment in renewable electricity markets. As long

as a state has instituted a RPS framework, there will always be demand for GC's, which is an incentive to invest in the renewable industry. It raises the very interesting question of 'When will the U.S. be ready to adopt a national RPS framework?' The expansion of the renewable industry will decrease the price of GC's, hence the state needs to establish more stringent RPS over time, to prevent the price of GC's from descending too low.

R&D Subsidies for Renewables

Research & Development subsidies are very unique in the fact that they look at future long-term technological development. They neither influence the emissions nor the energy output from either the fossil or renewable sector in the current time (quite contrary to all the other policy frameworks discussed above). Their predominant objective is to provide the particular industry with enough financial opportunities to achieve a technological breakthrough over time i.e., in the case of the PV technology, a technological breakthrough can be a significant increase in the solar cell conversion efficiency or a decrease in manufacturing cost. This would potentially result in a higher deployment of the technology in the future, as it is comparatively more beneficial and less costly to the use the same.

Federal subsidy is the most common form of subsidies provided to the clean technology R&D sector, which increases the investment in the electricity sector. For instance, the U.S. federal Government invested almost $ 4.4 billion and $ 1.2 billion, in the solar and wind technologies, respectively (from 1947 – 1999).[10] In the year 2005 alone, the federal government subsidized the photovoltaic R&D sector by investing $ 76 million.[11] R&D subsidies directly increase the investment in the clean technology sector; however one of the biggest disadvantages of this policy tool is the very high uncertainty involved in the payback on investment.

Technology Learning Curves

The Learning Curve is one of the issues that need to be considered while implementing policy frameworks, especially when Developing technologies are involved. Learning curves represent the reduction in the production costs of a technology, as more and more of the technology is produced over time. For instance, the historical learning curve effect of PV technology has been 80%, i.e., for every doubling of photovoltaic cumulative production, production costs are reduced by 20%.

Let us look at its influence on the allowance trading markets, for example. With time there will be a decrease in the production cost of PV technology, consequently increasing the usage of the technology. A direct implication of such an increased usage of the technology is that it becomes cheaper to abate CO_2 emissions (and other air pollutant emissions) now, i.e., the pollutant allowance price decreases for a constant regulated cap on emissions. Hence if our objective is to increase the usage of cleaner technologies, the Government must respond to the learning curve effect by setting more stringent caps with time, to maintain constant allowance prices. This is one of many implications of the Learning Curve effect on policy frameworks. The regulatory agency needs to be dynamic to achieve any objective over a long period of time. It must constantly respond to the myriad of changes that happen in the technology market over time.

Summary and Conclusions

Technological innovation, social change and policies/regulations are three of the most important drivers that would steer our society towards sustainability. In this article we discussed different policy frameworks that have the potential for promoting investment in the renewable electricity sector. Even though, all of the policies presented above have a common underlying objective, i.e., promoting the usage of renewable sources, they still provide different incentives and provoke different responses. Emissions Tax and Allowance Trading Markets directly influence a reduction in the total amount of CO_2 and pollutant emissions, thus facilitating an increased use of renewable sources (to meet a fixed demand). Energy Tax is different in the fact that it does not penalize emissions, but the total amount of fossil energy generated. It does not require the fossil electricity sector to distinguish between coal and natural gas, but still facilitates the usage of renewable sources, nevertheless. These policy frameworks encourage using renewable sources by imposing a penalty on the electricity generated from fossil based sources. There are more direct ways to achieve the same objective, however. For instance, the renewable production subsidy and RPS both encourage using cleaner technologies to generate electricity more directly. The U.S would be better served if RPS is adopted on a national scale at some point in the future. Last but not the least, the R&D technology subsidies emphasize the Government's long term commitment to the development of cleaner, more sustainable technologies. Policies designed to increase the usage of cleaner, renewable

sources are one of the strongest drivers to encourage increased investment in the clean technology sector.

In the United States some of these policies are well developed and already implemented, while others are still in their nascent stages. Implementing one or a combination of these policies will undoubtedly increase investment in the renewable sector, at the same time providing energy and environmental sustainability to the electricity sector.

Footnotes

[1] CO_2 Emission Factor (g / kWh): The multi-crystalline PV module is 60 g / kWh, the U.S. average national grid is 700 g / kWh. Source: Alsema, E.A. Nieuwlaar, E. 2000. Energy viability of photovoltaic systems. Energy Policy (28) 999 – 1010

[2] The regional environmental center for central and eastern Europe. Carbon Taxes. November 2007

[3] The unit price of electricity in the market is a weighted average of the price of electricity generated from different resources

[4] DSIRE: Database of State Incentives for Renewables and Efficiency. Link: http://www.dsireusa.org/

[5] Speck, S. 2003. Liberalization of electricity market and environmental policy issues: synergy or controversy. Energy Research Center of the Netherlands

[6] Marginal Abatement Cost (MAC): The additional amount of cost spent to abate one extra unit of the pollutant ($ / ton)

[7] Chicago Climate Exchange. Link: http://www.chicagoclimatex.com/

[8] Energy Efficiency and Renewable Energy (EERE). States with Renewable Portfolio Standards. Link: http://www.eere.energy.gov/states/maps/renewable_portfolio_states.cfm

[9] Energy Efficiency and Renewable Energy (EERE). Renewable Energy Certificates (REC). Link: http://www.eere.energy.gov/greenpower/markets/certificates.shtml?page=0

[10] Renewable Energy Policy Project. 2001. Marshall Goldberg. Federal Energy Subsidies

[11] Budgets for Photovoltaics R&D. Link: http://www.iea-pvps.org/isr/

USAEE Student Activities

The USAEE, the United States chapter of the IAEE, has the goal of gaining participation and support for the students and young professionals that will lead the field of energy economics in the coming years. The USAEE supports and promotes several efforts relating to the annual conference which will be held in New Orleans this coming December: a best student paper awards with monetary prizes for up to 10 students, scholarship support for conference attendance, a resume service for conference attendees, and student events at the conference. We also have a working paper series which allows free access to the latest energy publications and submissions from members.

We have recently launched a Facebook group for networking among energy professionals. Our hope is that members that already use Facebook will find a convenient way to reconnect with other professionals and to offer feedback directly to the USAEE council on services and programs.

Kathleen Spees

First Latin American Meeting on Energy Economics – Salvador, Bahia, Brazil.

AB3E – the Brazilian IAEE affiliate – organized its first international seminar on May 27 and 28, in the historic city of Salvador, in Bahia, Brazil. The objectives of this seminar were both to discuss the current status of energy policies in South American countries and to promote a regional network of energy economists.

The theme of the conference was "Energy Policies in Latin America: Energy Integration or Energy Nationalism?". There has been a long-held belief that a successful energy integration in South America – albeit involving a few countries – would eventually lead to a broader economic integration, as happened in the European Union.

Energy experts from Argentina, Brazil, Bolivia, Chile, Peru and Colombia attended the seminar as invited speakers, and discussed the main theme in their respective countries perspectives. IAEE representatives – Andrea Bollino (current president), Georg Erdmann (president-elect) and David Williams (executive-director) – came to Salvador to help AB3E in the organization of sessions and meetings.

This seminar provided a great opportunity for an open dialogue on the complex economic and political settings of energy policy in the region. Energy policies in Latin America have experienced significant changes in the last five years, reflecting the underlying process of economic, social and political transformation in the region. During the 1990s, energy policy in the region had converged to market-oriented practices, characterized by the reduction of the role of the governments and state companies in energy markets, including decentralized energy production decisions, less control of prices and incentives to promote competition and trade in the region. However, in the last five years, liberal energy policies have been put in check by some South-American countries. Energy policies in the region started to diverge as some countries have adopted energy-nationalism practices, involving binding price controls, restrictions on private investments and redistribution of energy rents as basis for social policies.

The lack of private investment in part of the countries in the region, particularly in Argentina, Bolivia and Venezuela, has led to a situation of energy scarcity. Insufficient energy supply has impacted tremendously regional energy integration. It has not been possible for countries such as Bolivia and Argentina to honor previously-arranged agreements on energy exports. Venezuela, a major oil and gas producer in the region, is importing natural gas from Colombia, instead of exporting it to other Andean countries, as was planned ten years ago. This situation represents an important challenge for energy economists in the region seeking to maintain a productive dialogue to mesh energy policies with economic rationality. Of course, energy integration will not be possible under continued energy scarcity. South America has a huge potential for producing energy. Adopting economic-sound energy polices would contribute to greater regional social and economic development.

Andre Ghiradi, from Federal University of Bahia and Petrobras, explained clearly how the current period of political and social struggle in Bolivia and Argentina has contributed to a deterioration in the energy business environment. The inability of governments to compensate for shrinking private investments resulted in insufficient energy supply. This process contributed to a deterioration of energy integration possibilities. A clear sign of this is the decision of Chile, Brazil and, more recently, Colombia to import LNG from outside the region, while Peru will become a net LNG exporter to non-South American countries. Ghirardi suggested an agenda to seek new energy policy convergence in the region. This agenda should consider the new role of state-owned energy companies in the region and tackle concrete energy problems in a more pragmatic way.

Amilcar Guerreiro, from the Brazilian Energy Research Agency (EPE), Ministry of Energy, pointed out that the Brazilian energy sector is going through important changes. Energy policy was redesigned, allowing for more energy planning by government. However, this augmented government presence in Brazilian energy market has not lead to the crowding-out of private investments. For instance, significant investments in the oil industry resulted in the recent discovery of massive oil and gas reserves. These findings will change radically the energy sector in Brazil, allowing the country to become a net oil ex-

porter. The natural gas market will also undergo important transformations. Although Brazil currently represents the most important market for Bolivian energy, the need for imports of natural gas from Bolivia will tend to decrease, as Brazil develops its own domestic production. These trends in the Brazilian oil and gas market will impact the prospects for regional energy integration.

The presentation of German Corredor, from National University of Colombia, indicated that Colombia has not departed from the liberal energy policies it adopted in the 1990s. Colombia has preserved the main characteristics of its energy sector, except for a stronger government role in energy planning. The country has created an "indicative planning" agency and has recently reorganized its oil and gas sector, by creating an independent agency to promote private investment in the Colombian oil and gas industry.

Humberto Campodonico, from University of San Marcos, Peru, also showed that Peruvian energy policy has kept its market-oriented approach. In general, the main role of the state in the Peruvian energy sector has been to promote private investment and to provide adequate economic regulation. The country has been successful in attracting private investment and is about to become an important natural gas exporter. Nevertheless, political issues remain an obstacle for Peruvian natural gas exports to Chile, which is the main potential market for Peruvian pipeline and LNG gas exports.

Gerardo Ravinovich, from University of Belgrano, Argentina, explained in detail the difficult energy situation in Argentina. The country was the main natural gas hub in South America, exporting gas to Chile, Brazil and Uruguay. For a long time, Argentina has served as a benchmark for energy liberalism in the region. Since the 2001 economic crisis, however, energy policy in Argentina has drastically changed. It now involves strong government intervention in the control of energy prices. A new national energy company (Enarsa) was created. This policy has produced generalized energy shortages in the country, in particular in the natural gas market. The complicated economic environment of Argentina has precluded private investments in the natural gas sector. Demand soared as the result of very low gas prices, at the same time supply was constrained by the lack of investment. Since natural gas represents 50% of the energy demand in Argentina, gas supply shortages are at the core of Argentinean energy crisis.

Ricardo Raineri, from Santiago Catholic University, Chile, mentioned that Chile has not changed its liberal energy policies. The country is poor in energy resources and highly dependent on natural gas imports from Argentina. However, since 2004 Argentina has increasingly cut its natural gas supply to Chile. As a result, Chile is now facing a very difficult energy situation. The country is now considering new sources of energy supply – basically LNG and coal – from outside the region. Chilean reorientation of its energy policy towards reduction of its regional energy dependence represents a major barrier to regional energy integration.

Edmilson dos Santos, from Sao Paulo University, analyzed the possible impacts of the recent trends of energy policies in the region on energy integration. He believes that energy integration in the region has been seriously jeopardized. The lack of consensus, as indicated by the diversity of energy policies, has contributed to the practice of energy nationalism in South America. In his view, energy conflicts will tend to dominate the regional energy scene for a long time.

The presentations by Mauricio Medina-Celi, from OLADE, and by Luis Horta, from University of Itajuba, Brazil, explored future opportunities for energy integration in Latin America.

Medina-Celi emphasized that the natural gas market is still in its infancy in most countries of the region. Natural gas may represent a promising opportunity for the convergence of energy policies in the region, acting as a driving force for effective energy integration.

In the final presentation, Horta gave a more optimistic view regarding the future of the energy integration in the region. Prof. Horta analyzed the main changes in the energy policies in the region, pointing out some convergences. In different ways, every country in the region has postulated greater government participation in energy planning activities, given that the lack of appropriate centralized energy planning may reduce government ability to secure energy supply. In addition to that, the processes of reform and counter reform occurring in the last ten years have produced some lessons: (i) a stable regulatory framework is essential to attract sufficient private investments in the energy sector; (ii) economic efficiency may be accomplished by non-private national energy companies. He believes that efficient government-

owned energy companies can be instrumental in the implementation of economically sound energy policies. Horta emphasized that it is important that public and private companies coexist in energy markets. He stressed that there is potential for regional energy integration through the electricity and natural gas markets. Moreover, energy conservation may constitute an important means of technical cooperation among Latin American countries. Finally, Horta mentioned the increasing role of biofuels, which also may represent a major opportunity for energy cooperation and integration.

The lively energy dialogue that characterized the Salvador seminar encouraged the energy professionals who attended the conference to look for further cooperation. In the meeting held the following day, it was agreed that a network of energy economists in the region would be organized, through the creation of IAEE chapters in other South American countries. It was further decided that the next Latin American energy seminar will take place in Santiago, Chile, in 2009, to be hosted by Ricardo Raineri.

Edmar de Almedia, Federal University of Rio de Janeiro

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.

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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

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• **Professional Journal:** *The Energy Journal* is the Association's distinguished quarterly publication published by the Energy Economics Education Foundation, the IAEE's educational affiliate. The journal contains articles on a wide range of energy economic issues, as well as book reviews, notes and special notices to members. Topics regularly addressed include the following:

- Alternative Transportation Fuels
- Conservation of Energy
- Electricity and Coal
- Energy & Economic Development
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- Energy Policy Issues
- Environmental Issues & Concerns
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- International Energy Issues
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8/08News

Searching for Coherence Between the so Called "External Dimension of the European Energy Policy" and Europe's Historical and New Foreign Relations

By Sara Nso*

Last 3rd September, in a letter addressed to the European Neighbourhood Policy Conference, representatives of several non-governmental organisations from the EU and neighbouring countries regretted the "traditional" character of the Union's energy approach towards its neighbours. They complained this approach focuses on ENP countries as an energy supply source to the EU, instead of prioritizing energy poverty and needs –which is the strategy that the Union has adopted with the less developed countries.

The European Neighbourhood Policy was developed in 2004, according to its official web page, "with the objective of avoiding the emergence of new dividing lines between the enlarged EU and its (immediate) neighbours (by land or sea), as well as to strengthen the prosperity, stability and security of the ensemble."

Since among the neighbouring countries to the Union there are energy producers such as Egypt or Algeria, as well as oil and gas transit countries such as Ukraine, energy has become an important element of the Action Plans that constitute the main instrument of the new neighbourhood initiative.

Being at an early stage of development and implementation, the issue of energy linked to Europe's new neighbourhood policy does not escape controversy between the parties involved.

Part of this controversy is derived from the Union's different approach towards other historical oil and gas providers, located far from the first ring of immediate neighbours to the EU. Oil is one of Central African countries' main exports to the Union. But is the Union giving the same treatment to the region as to its closest neighbours? The adjacent table shows the case of several Central African countries.

In fact, the Union's energy strategy when it comes to Africa, Caribbean and Pacific (ACP) countries is very different from its approach to neighbouring countries: the first one being strongly influenced by the character of Europe's traditional development cooperation.

Country	1st export to EU	2nd export to EU	3rd export to EU
Cameroon	Oil = 45.9%	Wood = 16.5%	Bananas = 9.3%
CAR	Diamonds = 59.7%	Wood = 31.0%	Wood = 6.4%
Chad	Oil = 63.1%	Aircraft = 17.1%	Cotton = 9.5%
Congo	Oil = 48.8%	Wood = 21.2%	Wood = 10.4%
DRC	Diamonds = 57.6%	Oil = 10.5%	Cobalt = 8.8%
Equatorial Guinea	Oil = 88.0%	A. Alcohol = 3.1%	Aircraft = 2.9%
Gabon	Oil = 27.4%	Wood = 26.4%	Sheets V. = 11.7%
Sao Tome & Prin.	Calc. Machine = 34.9%	Accessories = 29.8%	Cocoa beans = 28.8%

Source: European Commission, External Trade.

Percentage of Selected Country Exports to the EU Accounted for by Specific Products.

The General Framework of the Union's Development Cooperation Strategy

Until the 29th February 2000, when the Lomé Agreements expired, EU-ACP countries relations were basically based on a system of non reciprocal tariff preferences and on technical and financial assistance. Independently from the degree of success of this type of cooperation – through which the Union became the world first donor to developing countries –, this policy has received wide criticism due to its disregard of WTO rules such as the Most Favoured Nation treatment. In fact, the Lomé system was working thanks to a succession of waivers that the Union demanded from the WTO. However, the time for waivers has come to an end, since the EU – after two other waivers asked for during the negotiations of the Cotonou Agreements – has decided to adapt its trade relations with the ACP countries to the WTO regime by the end of 2007.

The negotiations for the Cotonou agreement began the 30th September 1998 and concluded eighteen months later. Three questions were mainly discussed: (a) the compatibility of the agreements with the WTO rules; (b) the management of the heterogeneity among the countries that constituted the ACP group; and (c) the impulse to the economic reforms. A compromise was achieved in February 2000 and on the 23rd June the agreement was signed in Cotonou (Benin), to be effective the 1st April 2003. But real implementation – due to the already mentioned waivers – is not due until 2008, when the Economic Partnership Agreements (EPA) negotiated with several regional groupings coming from the ACP will begin working. Until that moment, the terms of Lomé IV will still be in place.

These EPAs mainly imply the substitution of the former non-reciprocal trade regime for a reciprocal one, since the agreements are supposed to constitute free trade areas (FTAs) between the Union and regions coming from the former ACP group. These new conditions mean getting into the WTO

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liberalisation logic, since the Union will eliminate most of its preferential treatment towards the ACP countries, but they do not necessarily imply the acknowledgement of the superiority of the WTO formula compared to the EU development cooperation model. The decision that drove the change in European policy was mostly imposed by the WTO members who felt at a disadvantage compared with the EU privileged trade partnership with the ACP countries, as for example the United States. In any case, this swerve in the basics of the EU development cooperation policy has already had important consequences in the developing world, starting from the re-activation of the pre-existent regional integration processes in the ACP area.

Coming back to Central Africa, it must be said that most African oil producing countries are located in the Gulf of Guinea: Nigeria, Cameroon, Congo, Gabon, Equatorial Guinea and the Democratic Republic of the Congo – to which we could add Angola, Chad and Sudan, if we refer to Central Africa and not only the Gulf area. With the exception of Nigeria and Sudan, all of them are members of the Economic Community of Central African States (CEEAC, in its French acronym), which is the second regional integration group that has evolved in Central Africa. In 2003, the oil reserves of this group represented 1.6% of world reserves and 17.9% of the African ones (half of them located in Angola). Considering only the territory of the CEMAC, which is a more active organisation at the regional level, we note that oil is in fact common to all its members. This could lead us to think of a security of supply advantage for the EU resulting from its next FTA with Central Africa. But what is the degree of coherence – if any – between the EU new development policy and the Union's strategy on energy supply?

The EU Energy Initiatives and the Poor: Facts and Inconsistencies

In 1996, the Commission published a green book on EU relationships with the ACP countries, which envisaged challenges and options for a new kind of partnership. It opened the door to a debate about the new European development cooperation, since Lomé IV would expired in 2000, and it proposed a reworking of the conventions, the commercial preferences of which had performed in an adverse way – contributing only to the economic success of specific countries that carried out appropriate diversification policies, such as Côte d'Ivoire or Zimbabwe.

But in 2000 many other international organisations made a move towards a new approach to development cooperation: the donor community applied the so called 'comprehensive development framework' – in order to improve the coordination and efficacy of development aids – proposed by the president of the World Bank, J.D. Wolfesohn, in January 1999. The first Summit Africa-Europe of Heads of State and Government took place in Cairo in April. This resulted in the Cairo Action Plan. In September, the UN Millennium Declaration proposed the goal of eliminating poverty by 2015. The in-appropriateness of the development cooperation strategies, mostly directed by Western countries, had finally been accepted by the international community A change in direction was indicated.

Interestingly, at the same time, in November 2000, the Union was publishing another green book, this time on a strategy for the security of energy supply. The European future position was understood as based on four pillars: (1) the control of demand; (2) the diversification of the sources of energy; (3) a better internal energy interconnection; and (4) the search of strategic partners, such as Russia –but also in more distant areas, such as Iran. With regard to this last point, the green paper underlined the need to maintain a "constructive dialogue with the providers to the Union", by putting, as an example, the case of Euro-Mediterranean energy cooperation in the framework of the Barcelona Process. Africa was not even mentioned in the document, apart from its appearance in a graphic – and, even in this case, only Nigeria was represented.

However, during the World Summit for Sustainable Development in Johannesburg, the EU member States and the Commission launched the so called EU Energy Initiative

	2001	2002	2003	2004	2005
Lybia	7'79	7'88	9'16	9'55	9'01
Nigeria	4'84	3'97	4'69	3'09	3'49
Algeria	3'08	3'44	3'77	3'67	3'85
Angola	1'21	1'74	0'91	0'75	1'17
Other African	0'75	1'10	0'97	0'86	0'88
Cameroon	0'63	0'74	0'70	0'78	0'57
Egypt	0'64	0'83	0'51	0'51	0'26
Tunisia	0'23	0'38	0'36	0'34	0'22
Congo	0'29	0'40	0'08	0'07	0'11
Gabon	0'30	-	0'06	0'07	0'11
Zaire	0'04	-	0'02	0'01	0'02
CEMAC	1'22	1'14	0'84	0'92	0'79
Central Africa	7'31	6'85	6'46	4'77	5'47
Whole Africa	19'78	20'49	21'26	19'60	18'81

Source: European Commission, DG TREN.

In 2004, Equatorial Guinea began its oil exploitation, but Guinea's oil boom does not seem represented in such a low increase of supply between 2004 and 2005. Central African Republic reserves have not yet been evaluated. In any case, some data are missing.

Percent of the EU's Oil Supply Provided by Africa and Countries Therein

for Poverty Eradication and Sustainable Development (EUEI), arguing that access to modern and affordable energy services was a prerequisite for achieving the Millennium Development Goals, in particular, poverty eradication. This way, while energy itself did not figure among the six sectoral priorities of the Community's development policy, the document EUEI acknowledged that energy is linked directly or indirectly to every one of them.

The Union was finally receiving the level of interest that the United States, China and India had already achieved. Moreover, the project was initiated as a part of a new European strategy towards development cooperation. But did the EUEI represent the best roadmap possible towards making the abundant African energy resources the key to regional development? Or was it simply surrounding the real issues concerning the transformation of oil revenues in economic growth and development, such as transparency and governance?

Still in exploratory phase, the EUEI counts on a 220 million euros budget (plus private contributions) and it has already launched several programmes, such as:

- An Energy Facility for the ACP countries. This facility co-finances projects that bring energy to the poor living in rural areas. It works through calls for proposals (up until now 75 proposals have been received. One-third of these is co-financed with private sector contributions).
- A Dialogue and Partnership Facility. This encourages the use of national and regional policies for the eradication of poverty. The organisation of a workshop for the Ministers of the CEMAC on the need to get the energy to the poor rural areas is a case in point.
- The COPENER. This is an external program of the DG TREN of the European Commission. It has a 17 million euros budget and offers 50% of the financial aid to selected projects. It has been functioning since 2005 and has 24 projects in Africa. All of the projects funded are focused on the alleviation of the most urgent needs of poor rural populations (access to water, etc.)
- The Africa-Europe Partnership on Infrastructure. This has a 5.6 million euros budget (10th EDF, 2008-2013). Its priorities are: land transport, energy, water, information technology and telecommunications. The partnership is supported by a new fund from the European Bank of Investments (260 million euros for loans).

Even though the logical link between energy and development – which seems fairly appropriate, since less developed countries are more fragile because of the price volatilities of primary resources, and since access to energy in these countries is normally limited to urban areas –, the Union is really using energy for the alleviation of the living conditions of the poor, and not – as it is claimed through the initiative's name– for the eradication of poverty. If that was the case, the EITI project on transparency of the extractive industries' revenues would prove more effective to the Union's goals. In fact, in the Council's conclusions of May 2007 the "transparency discourse" has been finally integrated in Europe's energy strategy.

In addition to the confusion between the goals claimed and the strategies applied, the Union's approach towards Central African countries –considering its growing energy dependency– reveals a serious lack of coherence, defined here as "a logical and consequent attitude with regard to a previous position".

The lack of coherence with the Union's previous position, where the need for oil and its historical link with the Central African region –where some European oil companies have worked for a long time in a situation of monopoly–, is reflected in:

- The absence of a specific mention of its Central African partners in the green book on energy security and its latest developments.
- [Paying attention to the World Bank's statement on how Central African oil will represent a risk for the development of the region as long as "oil management" – implying, among others, the appropriate economic absorption of oil revenues, or the application of the reforms on competition to the oil and mining sectors– will not change its current direction to avoid the evolution of the region into an area containing countries with two speeds when it comes to economic growth (the oil-economies and the non-oil-economies)] The focus on poverty alleviation strategies, instead of on a more transparency linked strategy.
- The fact that the Economic Partnership Agreement (EPA) between the Union and the CEMAC requires the creation of a free trade area, where competition rules compatible with European Law would be established. These rules could have an influence on the participation of European companies in the share of the Gulf's oil. This is incompatible with the Union's development goals.
- The liberalisation of the services sector, also imposed by the free trade area, could thwart future development of basic local industry involved in oil production and distribution. Again, this would

go against the Union's proclaimed development objectives.

All in all, the EU's approach towards Central Africa seems to be contradictory when we consider, on the one hand, its energy needs and historical presence in the region and, on the other hand, its proclaimed development goals.

Conclusion

While the Union launches initiatives to integrate energy in the development strategies of its Southern partners, it seems fair to wonder if that is the best approach to the issue of growth in regions as rich in oil as Central Africa. It is far from clear that programs such as the EUEI attack the real problem of transforming oil wealth into economic growth and linked human development.

The simple push given to the CEMAC integration process could lead to the much needed "new oil governance in the developing world". The institutionalisation of regional political exchanges that includes a dialogue on development cooperation between the EU and those in the South could be the first step towards an authentic harmonisation of the oil management systems that nowadays differ so much from one country to another.

This could be – even if indirect – the way the EU will influence in the near future the economic transformation of a region whose geo-strategic interest has already been acknowledged by the United States. If there is any certainty when it comes to the Central African development equation, it is that it will continue to be linked to its historical inter-regional relations with the EU.

In any case, the failures in Europe's intent to have a comprehensive approach when it comes to its energy needs and its external relations, should push us to be more cautious when we use the expression "external dimension of the European energy policy".

Given that, at this early stage of the development of the Union's energy and international relations strategies, its partners (further and closer neighbours) are not even able to agree on what is the best approach (traditional and more strategic one or modern approach, linked to poverty alleviation), we could bet that the coming debate will be long and arduous.

SPECIAL IAEE SUPPORT FUND FOR STUDENTS FROM DEVELOPING COUNTRIES

IAEE is pleased to announce the continuation of a special program which offers support to students from developing countries to participate in three of the Association's conferences in 2008. The support will consist of a cash stipend of up to $1750.00 plus waiver of conference registration fees for a limited number of eligible students, who are citizens of developing countries (who can be registered as full-time students in programs of study anywhere in the world), to attend either the 31st IAEE International Conference in Istanbul, Turkey, June 17-20, 2008; the 2nd IAEE Asian Conference in Perth, Australia, November 5-7, 2008, or the 28th USAEE/IAEE North American Conference, New Orleans, Louisiana, December 3-5, 2008.

Application deadlines for each of the conferences is as follows: Istanbul Conference – application material cut-off date, April 29, 2008; Perth Conference – application cut-off date, September 17, 2008; New Orleans Conference – application cut-off date, October 8, 2008.

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

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

Please note that students may apply for this support at only one of the above conferences. Multiple requests will not be considered.

Applicants will be notified whether their application has been approved approximately 15 days past the application cut-off date above. After the applicant has received IAEE approval, it will be their responsibility to make their own travel (air/ground, etc.) and hotel accommodations, etc. to participate in the conference. Reimbursement up to $1750.00 will be made upon receipt of itemized expenses (receipts).

For further information regarding the IAEE support fund for students from developing countries to participate in our conferences in 2008, please do not hesitate to contact David Williams at 216-464-5365 or via e-mail at: iaee@iaee.org

DENNIS J. O'BRIEN USAEE/IAEE BEST STUDENT PAPER AWARD GUIDELINES

USAEE is pleased to continue our Dennis J. O'Brien USAEE Student Paper Award program for student papers on energy economics. This year, the usual USAEE awards are being cosponsored by the IAEE and will consist of a cash prize of $500 to each winner plus a waiver of conference registration fees (a value of $355) for the 28th USAEE/IAEE North American Conference, December 3-5, 2008. Up to 10 awards may be given. In addition, four of the award winners will be invited to present their papers in a special session the first day of the conference, and each will receive an additional $250 cash award. The judges for the session will determine which paper is to be recognized as the *Best* Student Paper, an honor that is accompanied by an additional $500 cash prize. An award ceremony will recognize all of the students later in the conference. Please note that all travel (ground/air, etc.) and hotel accommodations, meal costs in addition to conference-provided meals, etc., will be the responsibility of the award recipients.

In order to receive the award and the cash prize, the student must attend the conference and present the paper. To be eligible for consideration for the USAEE/IAEE Student Paper Award competition, follow the guidelines below:

- Student must be a member of USAEE or IAEE in good standing. Membership information may be found at https://www.iaee.org/en/membership/application.aspx
- Electronically submit COMPLETED paper by **September 3, 2008** to USAEE Headquarters. The submitted paper should be double-spaced on an 8.5 by 11 inch page format and not exceed 30 pages in length. *Any paper that exceeds the page limitation will be subject to disqualification*.
- Paper MUST be original work completed by the student as part of an academic program and may not be co-authored by a faculty member.
- Submit a letter stating that you are a full-time student or have completed your degree within the past 12 months.
- Submit a letter from your faculty member, preferably your faculty supervisor, confirming the work is your own and recommending the paper for consideration.

Complete applications should be submitted to the USAEE Headquarters office no later than September 3, 2008 for consideration. Please submit all above materials electronically to usaee@usaee.org

For further questions regarding the USAEE/IAEE Student Paper Award, please contact David Williams at 216-464-2785 or via e-mail at: usaee@usaee.org

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28th USAEE/IAEE NORTH AMERICAN CONFERENCE STUDENT SCHOLARSHIPS AVAILABLE

USAEE is offering a limited number of student scholarships to the 28th USAEE/IAEE North American Conference. Any student applying to receive scholarship funds should:

1) Submit a letter stating that you are a full-time student and are not employed full-time. The letter should briefly describe your energy interests and tell what you hope to accomplish by attending the conference. The letter should also provide the name and contact information for your main faculty supervisor or your department chair, and should include a copy of your student identification card.
2) Submit a recommendation letter from a faculty member, preferably your main faculty supervisor, indicating your research interests, the nature of your academic program, and your academic progress. The faculty member should state whether he or she recommends that you be awarded the scholarship funds.

USAEE scholarship funds will be used only to cover conference registration fees for the 28th USAEE/IAEE North American Conference. All travel (air/ground, etc.) and hotel accommodations, meal costs in addition to conference-provided meals, etc. will be the responsibility of each individual recipient of scholarship funds.

Completed applications should be submitted electronically to USAEE Headquarters office no later than November 3, 2008. Email to usaee@usaee.org

Students who do not wish to apply for scholarship funds may also attend the conference at the reduced student registration fee. Please respond to item #1 above to qualify for this special reduced registration rate. Please note that USAEE reserves the right to verify student status in accepting reduced registration fees.

If you have any further questions regarding USAEE's scholarship program, please do not hesitate to contact David Williams, USAEE Executive Director at 216-464-2785 or via e-mail at: usaee@usaee.org

Scenes from the 31st IAEE International Conference

18–20 June, 2008, Istanbul, Turkey

Welcome New Members!

The following individuals joined IAEE from 4/1/08 to 6/30/08

Abdul Kareem Abdul Gaffak
Gas to Power Project
Nigeria

Sabbhabs B Abdullahi
Nigerian Petroleum Dev Company
Nigeria

Abebayo O Adedeji
ELF Petroleum Nigeria Ltd
Nigeria

Oga Adejo-Ogiri
Vintage Capital
Nigeria

Adeyanju Adetimi
Gas to Power Integrated Project
Nigeria

Beat Affolter
University of Zurich
Switzerland

Abefe M Afolalayan
Nigerian Petroleum Dev Company
Nigeria

Adesola A Agbede
University of Ibadam Oyo State
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ENERGY SECURITY, INTEGRATION AND DEVELOPMENT IN LATIN AMERICA

Santiago, Chile
Sheraton Santiago Hotel and Convention Center
March 22-24, 2009

www.elaee.org info@elaee.org

First Program Announcement and Call for Papers
Deadline for Submitting Abstracts: October 31, 2008

Dear Colleagues in the energy field

Latin America is a region rich in natural resources, with large reserves of oil, gas, coal, hydropower resources, with privileged conditions for the implementation of renewable energies like wind, tidal, solar and biomass as well as excellent conditions for biofuel production. However despite the abundance of its resources, the continent faces big challenges in the energy field.

The standard model of energy is undergoing profound revisions as a matter of rising prices for fossil fuels and the abatement of climate change. There is an increasing effort in developing mechanisms for producing clean and renewable energy along with a renewed interest for the efficient use of energy, as well in the need to define new institutional arrangements and work on relationships and agreements among the countries in the region.

In this conference we will discuss these issues in respect of the energy markets and technologies such as renewables and nuclear energy. You are cordially invited to be with us in March 22-24, 2009 to participate in an exciting forum that seeks to enhance the development of public policies and linkages within the region.

We invite you to visit our web page www.elaee.org and to reserve March 22-24, 2009 in your agenda to be with us in this exciting forum.

We look forward to have you in Santiago!

Ricardo Raineri
President of the Conference
Profesor Departamento de Ingeniería Industrial y de Sistemas
Escuela de Ingenieria
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Calendar

8-10 September 2008, Smart Energy Strategies at Zurich, Switzerland. Contact: Conference Coordinator, Energy Science Center, ETH Zurich, MLK20, Sonneggstrasse 3, Zurich, CH-8092, Switzerland. Phone: 41-44-632-83-88. Fax: 41-44-632-13-30 Email: info@esc.ethz.ch URL: www.esc.ethz.chsms08

15-19 September 2008, Training Course: LNG - Understanding the Strategic, Commercial & Legal Fundamentals at Courtyard by Marriott, Port of Spain, Trinidad & Tobago. Contact: Viviane Walker, Ms, CWC School for Energy Limited, Regent House, Oyster Wharf, 16-18 Lombard Road, London, United Kingdom. Phone: +44 20 7978 0042. Fax: +44 20 7978 0099 Email: vwalker@thecwcgroup.com URL: http://www.thecwcgroup.com/train_detail_home.asp?TID=13

17-18 September 2008, Oil and Gas Exchange Houston 2008 at Crowne Plaza-Reliant Park. Contact: General Enquiry, Marketing Intern, IQPC, 15-19 Britten Street, London, SW3 3QL, United Kingdom. Phone: +44 (0) 207 368 9300. Fax: +44 (0) 207 368 9301 Email: enquire@iqpc.co.uk URL: www.oilandgas2008.com

17-19 September 2008, Geo Inida 2008 at Greater Noida, New Delhi. Contact: Ms. Peggy Pryor, Conference Organiser, AAPG, USA. Phone: 1-918-560-2641. Fax: 1-918-560-2684 Email: ppryor@aapg.org URL: www.aapg.org

22-25 September 2008, Global LNG - the Complete Supply Chain (Training Course) at Cape Town, South Africa. Contact: Ms. Lesley Rigg, The Oxford Princeton Programme, 1st Floor, 59 St. Aldates, Oxford, OX1 1ST, UK. Phone: +44-1865 250521 Email: info@oxfordprinceton.com URL: http://www.oxfordprinceton.com/search/coursedetails.asp?ID=318&PLP=LNG1

24-25 September 2008, 7th BIEE Academic Conference : The New Energy Challenge: Security and Sustainability at St John's College, Oxford, UK. Contact: BIEE Admin Office. Phone: + 44 1296 747916. Fax: + 44 1296 747916 Email: admin@biee.org URL: http://biee.meeting.org.uk/

6-8 October 2008, Hydro 2008 - Progressing World Hydro Development at Ljubljana, Slovenia. Contact: Mrs. Margaret Bourke, Conference Coordinator, Hydro 2008, Aqua Media Intl Ltd, Westmead House, 123 Westmead Rd, Sutton, Surrey, SM1 4JH, United Kingdom. Phone: 44-20-8643-5133. Fax: 44-20-8643-8200 Email: mb@hydropower-dams.com URL: www.hydropower-dams.com

6-17 October 2008, Master of Petroleum Business Engineering 2008, module 1 at Groningen. Contact: Richard Sanders, Study Adviser, Energy Delta Institute, Laan Corpus den Hoorn 300, P.O. Box 11073, Groningen, 9700 CB, Netherlands. Phone: +31 50 524 8332. Fax: +31 50 524 8301 Email: info@energydelta.nl URL: www.energydelta.org

7-10 October 2008, Solar Asia 2008 at Grand Hyatt. Contact: Eileen Hor, Marketing Manager, Terrapinn Pte Ltd, Singapore. Phone: 65 6322 2320. Fax: 65 6226 3264 Email: eileen.hor@terrapinn.com URL: www.terrapinn.com/2008/solar

7-10 October 2008, Ethanol and Biofuels Asia 2008 at Grand Hyatt. Contact: Eileen Hor, Marketing Manager, Terrapinn Pte Ltd, Singapore. Phone: 65 6322 2320. Fax: 65 6226 3264 Email: eileen.hor@terrapinn.com URL: www.terrapinn.com/2008/ethanol

7-9 October 2008, EXPPERTS 2008 - Exploring Power Plant Emissions Reduction: Technology and Strategies at Brussels, Belgium. Contact: Linda Dunkley, Event Manager, Progressive Media Markets Ltd, Maidstone Road, Footscray, Sidcup, Kent, DA14 5HZ, United Kingdom. Phone: +44 (0) 208 269 7812. Fax: +44 (0) 208 269 7804 Email: ldunkley@progressivemediagroup.com URL: http://www.modernpowersystems.com/expperts2008

7-10 October 2008, Carbon Finance Asia 2008 at Grand Hyatt. Contact: Eileen Hor, Marketing Manager, Terrapinn Pte Ltd, Singapore. Phone: 65 6322 2320. Fax: 65 6226 3264 Email: eileen.hor@terrapinn.com URL: www.terrapinn.com/2008/carbon

8-10 October 2008, Northern Arabian Plate Oil & Gas Summit 2008 (NAPOGS 2008) at Antalya / Turkey. Contact: TAPG, Turkish Associaion of Petroleum Geologists, TAPG, Kizilay, Ankara, 06440, Turkey. Phone: 903122072182 Email: info@napogs2008.org

8-10 October 2008, Northern Arabian Plate Oil & Gas Summit 2008 (NAPOGS 2008) at Antalya / Turkey. Contact: TAPG, Turkish Associaion of Petroleum Geologists, TAPG, Kizilay, Ankara, 06440, Turkey. Phone: 903122072182 Email: info@napogs2008.org URL: www.napogs2008.org

13-17 October 2008, Underground Gas Storage Course at Groningen. Contact: Evanya Breuer, Manager Customer Relations, Drs, Energy Delta Institute, P.O. Box 11073, Laan Corpus den Hoorn 300, Groningen, Groningen, 9700 CB, Netherlands. Phone: +31 50 524 83 12. Fax: +31 50 524 83 01 Email: breuer@energydelta.nl URL: www.energydelta.org

19-23 October 2008, International Petroleum Joint Ventures: Strategy, Negotiation and Management at Dubai, UAE. Contact: Viviane Walker, Ms, CWC School for Energy Limited, Regent House, Oyster Wharf, 16-18 Lombard Road, London, United Kingdom. Phone: +44 20 7978 0042. Fax: +44 20 7978 0099 Email: vwalker@thecwcgroup.com URL: http://www.thecwcgroup.com/train_detail_home.asp?TID=21

20-31 October 2008, Executive Master of Gas Business Management 2008, module 1 at Groningen. Contact: Richard Sanders, Study Adviser, Energy Delta Institute, Laan Corpus den Hoorn 300, P.O. Box 11073, Groningen, 9700 CB, Netherlands. Phone: +31 50 524 8332. Fax: +31 50 524 8301 Email: info@energydelta.nl URL: www.energydelta.org

3-7 November 2008, Asia Oil & Gas Investment Congress 2008 at Singapore. Contact: Eileen Hor, Marketing Manager, Terrapinn Pte Ltd, Singapore. Phone: 65 6322 2320. Fax: 65 6226 3264 Email: eileen.hor@terrapinn.com URL: www.terrapinn.com/2008/asiaoilgas

4-7 November 2008, Global LNG: Import & Regasification Europe at Zagreb, Croatia. Contact: Ms. Lesley Rigg, The Oxford Princeton Programme, 1st Floor, 59 St. Aldates, Oxford, OX1 1ST, United Kingdom. Phone: +44-1865 250521 Email: info@oxfordprinceton.com URL: http://www.oxfordprinceton.com/search/coursedetails.asp?ID=347&PLP=LNGIM%5CAABW08

4-5 November 2008, Future Power at London UK. Contact: Linda Dunkley, Event Manager, Progressive Media Markets Ltd, Maidstone Road, Footscray, Sidcup, Kent, DA14 5HZ, United Kingdom. Phone: +44 (0) 208 269 7812. Fax: +44 (0) 208 269 7804 Email: ldunkley@progressivemediagroup.com URL: http://www.modernpowersystems.com/futurepower

5-7 November 2008, 2nd IAEE Asian Conference at Perth, Western Australia. Contact: Tony Owen, Professor, Curtin Business School, Curtin University of Technology, GPO Box U1987, Perth, WA, 6845, Australia Email: tony.owen@cbs.curtin.edu.au URL: http://aaee2008cbs.curtin.edu.au

10-13 November 2008, Leadership & Team Dynamics in Oil & Gas Projects at Traders Hotel, Dubai, UAE. Contact: Viviane Walker, Miss, CWC School for Energy, Regent Houst, Oyster Wharf, 16 - 18 Lombard Road, Dubai, United Arab Emirates. Phone: +44 20 7978 0042. Fax: +44 20 7978 0099 Email: vwalker@

thecwcgroup.com URL: http://www.thecwcgroup.com/train_detail_home.asp?TID=55

10-14 November 2008, Negotiating Oil & Gas Contracts at Location: London, UK. Contact: Viviane Walker, Ms, CWC School for Energy Limited, Regent House, Oyster Wharf, 16-18 Lombard Road, London, SW11 3RB, United Kingdom. Phone: +44 20 7978 0042. Fax: +44 20 7978 0099 Email: vwalker@thecwcgroup.com URL: http://www.thecwcgroup.com/train_detail_home.asp?TID=32

24-28 November 2008, Global LNG - the Complete Supply Chain at Oxford, UK. Contact: Ms. Lesley Rigg, The Oxford Princeton Programme, 1st Floor, 59 St. Aldates, Oxford, OX1 1ST, United Kingdom. Phone: +44-1865 250 521 Email: info@oxfordprinceton.com URL: http://www.oxfordprinceton.com/search/coursedetails.asp?ID=318&PLP=LNG1%5CBGBR08

2-2 December 2008, Smart Metering - Gizmo or Revolutionary Technology? at London, UK. Contact: Jennifer Wiffen, TPN Manager, The Institution of Engineering and Technology, United Kingdom. Phone: 01438 465658 Email: jwiffen@theiet.org URL: www.theiet.org/smartmetering

3-5 December 2008, 28th USAEE/IAEE North American Conference: Penetrating Energy Frontiers at New Orleans, LA. Contact: David Williams, Executive Director, USAEE, 28790 Chagrin Blvd Ste 350, Cleveland, OH, 44122, USA. Phone: 216-464-2785. Fax: 216-464-2768 Email: usaee@usaee.org URL: www.usaee.org

20-21 January 2009, 29th Oil & Money Conference at London, UK. Contact: Juanine Stroebel, IHT, 40 Marsh Wall, London, E14 9TP, United Kingdom. Phone: 44-20-7510-5729. Fax: 44-20-7987-3463 Email: jstroebel@iht.com URL: http://ihtinfo.com/events

24-27 January 2009, Nano Petroleum, Gas and Petro-Chemical Industries Conference: "Providing Nano-Powered Solutions" at Cairo, Egypt. Contact: Neveen Samy, Assistant, SabryCorp Ltd. for Science and Development, 4 Al-Sabbagh Str., El Korba, Cairo, Egypt. Phone: +20 2 2414 6493. Fax: +20 2 2415 0992 Email: neveen.samy@sabrycorp.com URL: www.npg.sabrycorp.com

3-5 February 2009, One Live Wire at San Diego, Ca. Contact: Debbi Boyne, CMP, Conference Coordinator, Distributech Conference & Exhibition, 1421 South Sheridan, Tulsa, OK, 74112, USA. Phone: 918-832-9265 Email: dtechconference@pennwell.com URL: www.distributech.com

Announcement

1st Joint IAEE/AEA ASSA Session, San Francisco, California

Oil Prices and the Macroeconomy: A Return to the 1970s?

Presider: Mine Yucel, Federal Reserve Bank of Dallas

Panel:

Olivier Blanchard, Massachusetts Institute of Technology - *The Macroeconomic Effects of Oil Price Shocks: Why are the 2000s So Different from the 1970s?*

James D. Hamilton, University of California, San Diego - *Oil and the Economy in the 21st Century*

Lutz Kilian, University of Michigan - *Energy Price Shocks and the Macroeconomy*

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.

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