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INTERNATIONAL ASSOCIATION for ENERGY ECONOMICS

IAEE Energy Forum

Fourth Quarter 2008 International Association for Energy Economics

President's Message

A turbulent year, 2008, is about to end. Nonetheless, IAEE can be proud of its achievements this year. We have registered the highest success with our Conference Program throughout the world. We still have in front of us an Asian Conference in Perth, Western Australia, November 6-7 and a Northern American Conference in New Orleans, December 3-5. To these, I would like to add the extremely gratifying achievement at ASSA Meeting: we were able to organize, for the first time, a joint session AEA/IAEE at the upcoming Annual Meeting on January 3-5, 2009, in San Francisco. The topic is oil prices and the macro-economy and I would like to acknowledge the efforts of all Council members and HQ involved in the organization: among the panellists there is Professor Blanchard, just nominated last month Chief Economist at IMF.

I started a previous Message early this year with the following question: Are we facing a spreading of crises, one after another, in the international market arena or are we at the final showdown, when the entire world market is risking to collapse under the excess weight of globalization?

Right now, when I am writing, an exceptional G7 Meeting has clearly stated that no bank will be allowed to fail. This language seems severe enough to justify the idea that, yes, we are at the verge of the final showdown. A domino effect can spread worldwide in the entire financial system. Not dissimilar from an electricity black-out, when line tripping aggravates power flows control capability and accelerates overload and other lines tripping, alternating automatic load shedding and frequency degradation, until frequency cannot be maintained any longer, a bank crisis triggers another bank illiquidity, banks start to pull credit lines to industrial customer or to other banks, eventually the strain on the financial system spreads until a bank defaults and then enterprises default and massive job losses occur and vast economic activity recession is remembered for years.

Is there a way to avoid all this? Again, using the electricity analogy, if load shedding restores equilibrium quickly enough, gradient of frequency turns positive and the system can be stabilized; in the same way, if Monetary Authorities can provide enough liquidity to stop the cascading effect, the crisis can be resolved. However, unlike electrons which obey only physical laws, markets are full of expectations, prophecies and feelings and so the injection of liquidity must be perceived and accepted by markets, in order to be effective.

I would like to dwell on the issue of distinguishing illiquidity from insolvency. A Central Bank performs its duty of lender of last resort providing liquidity when there is an illiquidity problem, but abstaining from intervention when it is clear that there an insolvent situation.

However, the distinction is not easy: we know that insolvency occurs when the balance sheet is not strong enough to fund operations, but we also know that a mortgage lender is always at the mercy of its own bank. So if the bank pulls the credit line, there is a liquidity crisis that can become bankruptcy, even if is not due to insolvency.

This problem is now more severe because the plummeting of asset values erodes the balance sheet of the banks endogenously: the more the market value of its assets goes down, the more the bank needs to pull credit to its industrial customers. The ghost of a new '29 was around the corner, until the Paulson Plan was approved by Congress in the U.S.

The promise that the Government will buy out toxic assets from banks, in order to

(continued on page 2)

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CONTENTS

Editor: David L. Williams

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

restore the value of their balance sheets is a measure to be clearly understood as an injection of liquidity in the system, not a bail out from a clear situation of insolvency. So it is a valuable policy action.

Notice, however, that after the news of U.S. plan the financial storm continued to hit more severely the European markets. In one day, Wall Street was at a stand still while all major European Stock Markets plunged 8-9%. Why did this happened? A possible answer is that markets were not fully convinced of the willingness of European Authorities to really provide liquidity to stop the crisis, like their American colleagues.

An ambiguous signal was, unfortunately, provided by the European Central bank. In the midst of the most dramatic development of the crisis on the European economy, while four Big Leaders were meeting to try to find a solution and some subtle discrepancies were anyhow emerging, the President of the ECB declared that, yes, liquidity was to be provided, but he was still keen on fighting inflation and future inflationary effects.

Now, even a child has by now understood that the entire trick of providing liquidity in massive amounts to the world markets is a necessary remedy to fight the crisis, but it may have some (mild) inflationary consequences in the medium run. It is like aspirin: aimed at remedying headache, it may have a (mild) side effect like stomach ache.

My view is that being worried about inflation when a worldwide financial crisis is on, would be like that lady, in front of her house on fire, who is worried that firemen boots can stain her precious carpets. Clearly, it is an inappropriate reaction. And markets felt that way.

A more decisive action was needed: fortunately, immediately afterwards, European leaders issued another statement explicitly referring to the fact that EU rules which impose limits on national deficits also allowed for exceptional circumstances to be taken into account in their application, and that such circumstances now existed.

In other words, Europe is recognising in theory that any government which runs up a larger deficit because of money ploughed into bank rescues, or maybe just because of economic recession due to the financial crisis, could plead for a waiver from the EU deficit limits.

If European markets will recognise, in the weeks and months to come, the importance of this coordinated action by European leaders, it is possible that the sharpness of crisis will subside.

Nonetheless, real effects, like the decline of the oil price from 150 to 77 dollars, will occur. For instance, there can materialize in 2009-10 a slow down of GDP to zero growth in the West and to 5-6% in emerging countries (those with 10-12% growth rate until very recently!), with increasing unemployment.

In conclusion, as we know that history never repeats itself, this year 2008 shall not be remembered as another 1929, but it shall have its own place in economic history. It shall be the year, when Governments have returned to do with some success what they are supposed to do: govern.

Carlo Andrea Bollino

IAEE Mission Statement

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

We facilitate:

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

We accomplish this through:

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

Editor's Note

Once again we are privleged to have a condensed version of the *BP Statistical Review*. This year Christof Ruehl discusses the key isues that have characterized the energy markets in the recent period. He explains why prices have climbed so high in recent years.

The next series of articles focuses on the Nigerian energy situation looked at primarily through the eyes of several Nigerian nationals. Due to the popularity of the topic we will continue our focus on Nigeria in the next issue of the *Energy Forum.*

It is tragic that after 47 years of independence, Nigeria remains a nation of exporters of primary commodities with negligible value added to its economy. Chief Asiodu provides in a preliminary manner, a context for renewing the nation's stride to stability and sustained economic growth and development; and for achieving the set targets for all the primary sectors and aspects that are essential to giving meaning to Vision 2020.

Akin Iwayemi discusses the nature of the Nigerian energy crisis, the causal factors in the crisis and how to overcome them and establish a sustainable domestic energy future.

Wumi Iledare reviews the report of the reconstituted Nigerian Oil and Gas Sector Reform Implementation Committee (OGIC) released on August 3, 2008.The committee report, under the leadership of Riwlanu Lukman, addresses the ineffectiveness of the oil and gas sector over the years and proffers solutions to the problems affecting the industry. He offers an appraisal of the new institutional structures proposed by the OGIC.

Adeola Adenikinju focusses on the electric power sector of the Nigerian economy noting that there has only been marginal improvement in the electricity infrastructure over the last 20 years or so. He notes that only about 40% of Nigerians have access to electricity and that the power sector incurs a cash loss of around US$2billion per month. Finally he notes that Nigerian electric efficiency is worse than that of most other African countries. He concludes with a list of four steps that need to be taken to improve the situation.

A. S. Sambo discusses the Nigerian collaboration with the International Atomic Energy Agency to project Nigerian electric energy supply and demand out to 2030, noting that four scenarios were used. He goes on to report on the available resources for electricity generation in Nigeria.

Clean cooking fuels and technologies were the subject of a workshop at the International Meeting in Istanbul. We carry a report on the workshop in this issue, outlining the extent of the problem and suggesting some potential solutions as well as giving some recommendations and future agendas.

DLW

2nd Annual NAEE/IAEE International Conference

April 23-24, 2009

Sheraton Hotel, Abuja, Nigeria

Energy Industry Restructuring: Interactions Between Business, Economics, and Policy

Topics to be covered include:

Oil and Gas Industry Reforms
Electric Power Industry Restructuring
Petroleum Products Deregulation Challenges
Energy, Environment and the Economy
Energy Security Fundamentals
Regulatory Processes in Electricity and Gas Markets
Human Capital Resource Challenges and Prospects

Contact Adeola Adenikinju at adeolaadenikinju@yahoo.com

Conference Objectives

Recent developments in energy markets suggest that we may be entering a new phase, with demand increasing more rapidly than supply, putting continued upward pressure on prices. Although technological advances continue to extend our capabilities, additional constraints – most notably global climate challenge – are complicating the picture and adding to uncertainties. And while low-carbon approaches including renewable energy technologies, biofuels, nuclear energy and carbon capture and sequestration offer significant promise, they also pose new challenges for policymakers.

The 32nd Annual IAEE conference will assemble prominent scholars and experts from around the world to explore, discuss and debate the challenges facing the global energy sector and offer solutions. The conference aims to bring into focus a host of topics that are of interest both to energy consumers and producers, be it oil, natural gas, transportation fuels, or electricity.

This timely and topical conference, to be held in **San Francisco 21-24 June 2009**, is designed to bring together energy practitioners, industry professionals, regulators, policymakers, researchers and scholars engaged in all aspects of the energy sector to exchange views, network and collaborate. This conference promises to be as big as its theme, "***Energy, Economy, Environment: The Global View.***"

Abstract Format

Abstracts must be submitted online at http://www.usaee.org/usaee2009/submissions.aspx using the template provided. The abstract is limited to ***two pages*** covering (1) a brief overview, (2) method, (3) results, (4) conclusions and (5) references.

NOTE: All abstracts must conform to the standard template. At least one author for each accepted paper must pay the registration fees and attend the conference to present the paper. The lead author must provide complete contact details—mailing address, phone, fax, e-mail, etc. Authors will be notified by **March 4, 2009** and will have until **May 6, 2009** to submit their papers for publication in the conference proceedings. While multiple submissions by individuals or groups of authors are welcome, the abstract selection process will seek to ensure that participation is as broad as possible. No author should submit more than one abstract as a single author. If multiple submissions are accepted, a different co-author is required to pay the reduced registration fee and present each paper.

Call for Papers

We are pleased to announce the **Call for Papers** for the 32nd International Conference of the IAEE to be held **21-24 June 2009** in the beautiful city of **San Francisco**. You are cordially invited to submit proposals for presentations at the concurrent sessions on a range of topics including, but not limited to, those highlighted below. **Deadline for receipt of abstracts is January 28, 2009.** Those interested in organizing sessions should propose topic and possible speakers to: Wumi Iledare, Concurrent Session Chair (p) 225-578-4552, (e) wumi@lsu.edu

Conference Themes and Topics

The following is a list of suggested topics that are of interest, but suggestions outside these areas are encouraged and will be considered.

- **Energy issues in the Pacific Basin**
  - Energy security, fuel diversity
  - Energy poverty and affordability
  - Rise of China, India & the developing world
- **Global climate challenge & environmental sustainability**
  - Carbon limits including cap & trade and alternative emission control approaches
  - Local, regional, national & global context
  - Post-Kyoto proposals
- **Primary energy supply & demand**
  - Oil, gas, LNG, unconventional resources
  - Future of coal, Clean coal technology, CSS
  - Economics & politics of nuclear energy & renaissance of nuclear power
- **Geopolitics of Energy and Energy Security**
  - Western hemisphere & Africa
  - OPEC and the Middle East
  - Russian Oil and Gas
- **Renewable energy & biofuels**
  - How soon, how much & at what cost?
  - Technologies & schemes to promote renewable energy
  - Renewable energy integration
  - Biomass, ethanol, methanol, biodisel
- **Smart energy**
  - Energy conservation, demand side management & demand response
  - Smart pricing
- **Transportation fuels & technology**
  - Carbon content of fuels & fuel additives
  - Hybrids & alternative vehicles
- **Electricity issues**
  - Resource adequacy & infrastructure investment in infrastructure
  - Carbon emissions and technologies to achieve reductions
  - Market reform experience & emergence of integrated markets

HOSTED BY:

USAEE United States Association for Energy Economics

Questions/ Comments? Please contact:

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Visit our conference website at:
http://www.usaee.org/usaee2009/

Student Participation

Students are encouraged to submit papers for consideration of the USAEE Student Paper Awards, which include cash prizes plus waiver of conference registration fee. Students may also inquire about scholarships for conference attendance. Visit http://www.usaee.org/usaee2009/paperawards.html for full details.

Travel Documents

International delegates are urged to contact their respective consulate, embassy or travel agent regarding the necessity of obtaining a visa for entry into the U.S. If you need a letter of invitation to attend the conference, contact USAEE with an email request to usaee@usaee.org. We recommend ample time for processing documents.

About San Francisco

If you have not been there already, you don't know what you've been missing. For those who have already been to San Francisco, it looks more beautiful than you remember it. With world-class shopping, dining, historical and cultural sights and within easy reach to many top sightseeing spots in California, San Francisco is consistently ranked among the most popular destinations in the US – and the world.

Conference Venue and Accommodations

The conference venue is the **Grand Hyatt** on Union Square, conveniently located at the heart of the city within short walking distance to wonderful shopping, eating, entertainment and cultural sights. We encourage early reservations as the hotel venue is likely to sell out.

How to Get to San Francisco

San Francisco is primarily served by San Francisco International Airport (SFO) offering frequent direct flights to the rest of the US as well as many Asian and European cities. The Oakland (OAK) and San Jose (SJC) Airports also serve the city. San Francisco is served by BART, a mass transit system connecting the SFO airport to downtown and other points of interest.

Technical Tours

A number of technical tours will be organized and available to conference participants.

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What San Francisco Has to Offer

The beautiful San Francisco Bay, Golden Gate Bridge, the world-renowned wineries of Napa and Sonoma and quaint Monterey Bay are within a short drive. To visit Yosemite National Park, Lake Tahoe and much more, you should allow extra time before and after the conference for a memorable experience.

A number of half-day, full-day and multi-day sightseeing and cultural options are recommended, including the following:

- Full or half day cultural city tour
- Full day tour of Napa/Sonoma Wine country
- Full day tour of Monterey Bay and Carmel-by-the-Sea
- Full day tour of Yosemite National Park
- Full day bay cruise plus lunch and sightseeing in Sausalito
- Half day San Francisco Bay Cruise & Alcatraz Island
- Tour of Hearst Castle, Santa Barbara, Lake Tahoe & regions beyond San Francisco

Program Committee

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

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/

High Prices for How Long? The 2008 BP Statistical Review of World Energy

By Christof Ruehl and Neelesh Nerurkar*

Introduction

Every Spring, after we collect data for the latest BP Annual Statistical Review of World Energy – 55,000 data points in all by now – we discuss what key issues characterized a given year. This time there was little debate; the central question was why had prices climbed so high in recent years. Using the data from the Statistical Review, this article aims to answer that question, focusing on 2007 and into 2008. The short answer is that it was fundamentals driving the price up – the same set of good old supply and demand forces which have shifted prices lower in recent months.

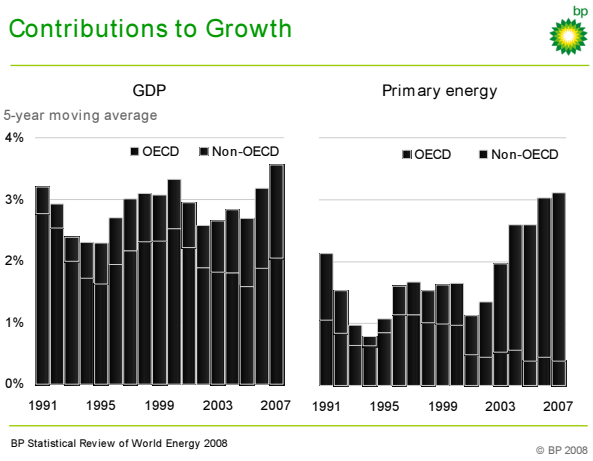
High Energy Prices

Prices for all major fuels continued to rise in 2007 and into 2008. Oil has seen the steepest and the longest increase – it rose for six consecutive years, the longest stretch ever since 1861, where our price data begins. Between January 2003 and the summer of 2008, the world has seen cumulative price growth of 300% for oil, 200% for traded coal, and 100% for U.S. gas.

To see something comparable, one has to go back more than 30 years: The last big, synchronized commodity price cycle occurred in the early 1970s. Price increases then and now are of a comparable order of magnitude. And in the 1970s, of course the cycle faltered in text-book fashion, with supply rising, demand declining, and prices falling back for many years to come – which raises the simple but important question of whether we will see a replay? Or is there reason to suppose that a structural shift has occurred, perhaps with cyclical froth on top, but unlikely to lead prices back to where they came from?

Economic Growth and Energy Demand

The key similarity in the two episodes is the role of economic growth, the ultimate driver of energy demand, in the run-up to higher prices. The global economy grew by an annual average of 5.3% (at PPP) in the ten years preceding 1973 – the highest for any ten year period on record. And it grew by 4.6% per year over the last five years – the highest for any five year period on record, except for that very period, leading into the 1970s.



The key difference lies in the changing composition of this underlying global economic growth, and the rising importance of the "developing" world, and what this means for energy demand growth. Since the 1990s, the contribution of non-OECD economies to global economic growth has almost doubled, to well over 40% today. But their impact on energy demand growth has been disproportionate: The contribution of the developing world to primary energy consumption growth rose to approximately 90% in the same period, much faster than its contribution to economic growth. Economic growth in non-OECD economies is more energy intensive: In 2007, developing countries used 4.4 barrels of oil equivalent to produce $1,000 worth of GDP, OECD economies used 1.4 barrels of oil equivalent.

Why then does growth in poorer countries require more energy? Or, to phrase it differently, why do they seem less sensitive to the recent price spikes? The general answer lies with the different characteristics of economic growth in both country groupings.

To make this statement more precise requires an analysis fuel by fuel. We start with the market for oil, the largest and most traded fuel, where prices have increased the most, and consumption the least.

The Oil Market

As an annual average, dated Brent rose by 11% to $72/bbl last year, the lowest percentage increase since 2003, although it also had the highest intra-year rate of increase since 1999. This is also

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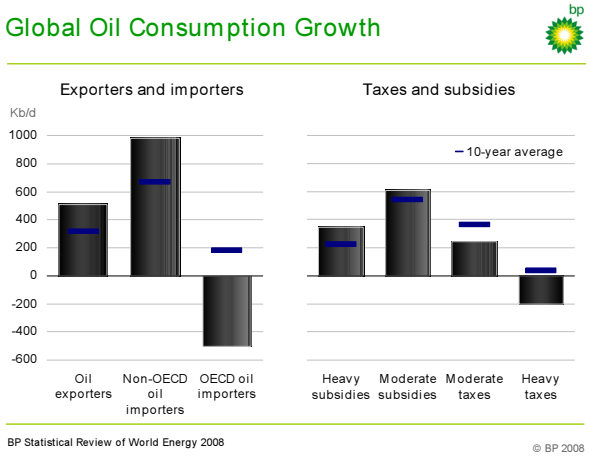
the highest annual average price ever, in nominal terms and after adjusting for inflation. With these price dynamics, one would expect demand to respond.

Oil Consumption Growth

However, global oil consumption grew by 1 Mb/d, or 1.1%, in 2007 – relatively close to its ten year average (1.4%). Two sources of rising consumption muted a stronger demand response: Oil exporting countries and fast growing non-OECD importers. Both groupings have in common that most of their member countries subsidize oil products. In contrast, consumers in countries where prices are liberalized and oil products taxed were first to be squeezed out of the global market place.



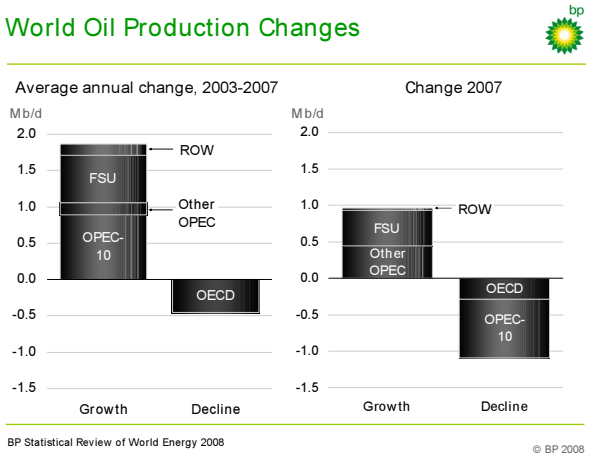
OECD consumption suffered its biggest decline since 1983. It fell for the second year, by 390 Kb/d or 0.9%. Consumption growth in importing non-OECD economies, in contrast, accelerated for the second year running to 1.4 Mb/d. This consumption growth in fast growing developing economies was led by non-OECD Asia, with an increase of 700 Kb/d, nearly half of which was in China and one quarter in India.

In addition, consumption of oil exporters increased by 510 Kb/d or 3% in 2007. For the first time, this surpassed the growth in all importing countries combined, despite the fact that consumption in the main Former Soviet Union (FSU) exporters declined because of an exceptionally warm winter.

All told, one quarter of global consumption thus was consumed at subsidized retail prices last year. In the subsidizing economies, consumption growth exceeded the 10 year average by 190 Kb/d; in taxing economies, it fell short by 360 Kb/d. By early 2008, the fiscal burden of subsidies has put strain on public finances in many emerging market economies, and a range of consuming nations has had to adjust –India, Indonesia, Thailand, and Egypt among them. Others, such as China, adjusted for political or economic reasons.

Crude Oil Production Growth

If there was a defining moment in oil markets in 2007, it was the re-emergence of OPEC in successfully managing its production. Prices fell rapidly in late 2006 and early 2007, the OPEC price basket breached $50/bbl, and OPEC responded with two production cuts implemented in November 2006 and then in February 2007.



This decline in production started to drain OECD inventories from the second half of the year. By September 2007, inventories had fallen from eight year highs to below their long term average. Prices continued to climb – until a production increase over the Spring and Summer 2008 (in conjunction with weakening demand and a worsening macroeconomic outlook).

In contrast to oil demand, global crude oil production last year fell by 130 Kb/d to 81.5 Mb/d. OPEC output fell by 360 Kb/d in aggregate, because growth in Angola, Iraq, and NGLs (not subject to quotas) partially offset the decline of 900 Kb/d in the crude output of those countries which participated in production cuts. OECD production fell by about 290 Kb/d. Combined these declines offset an increase of 520 Kb/d in the rest of the world, almost all of it in the FSU.

Why have six years of rising prices not triggered a much larger supply response elsewhere?

OECD production continued to fall, although at a moderating pace. Declines were halted in the UK and U.S. for the first time in many years, but large decreases in Mexico and Norway kept the overall trend downward.

FSU production continued to increase, but a major shift is taking place here as well. Russia's production, up 210 Kb/d last year, has been in year on year decline since January 2008 (mostly because of an

unattractive tax system and lack of investment in new fields).

This is an example of how limited access for private companies which has become a major issue for the global industry. While oil reserves have increased 170 billion barrels over the last decade, they often remain in countries that restrict upstream access.

Refining

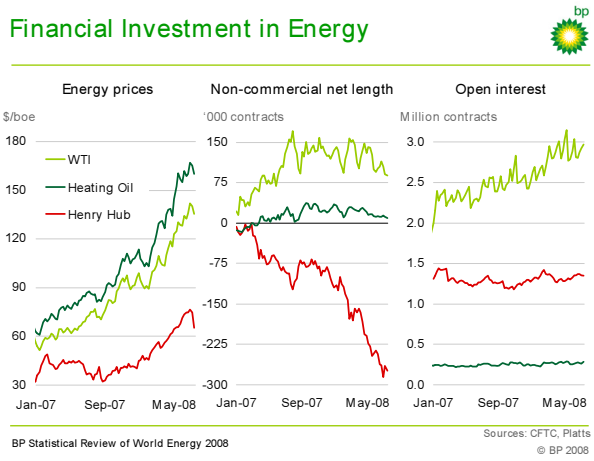
Global refining margins established another record last year. Light-heavy spreads remained wide and widened again into 2008, when fuel oil values could not keep pace with the escalating price of crude. Declining product stocks last summer, as the OPEC cuts worked their way through the system, protected refining margins for a limited time even as demand started to weaken.

Nevertheless, ethanol supply is growing and gasoline exports from Europe are plentiful. As a result, gasoline cracks hit record seasonal lows in Rotterdam – while pump prices went to record highs on both sides of the Atlantic. Consistent with dieselisation in Europe and the global expansion of commercial transport, middle distillate demand in 2008 is rising further, and gasoline demand is reeling.

Meanwhile, global refining capacity is being added about twice as fast as earlier this decade. Capacity additions in 2007 totalled 1.2 Mb/d and exceeded crude run growth by more than 400 Kb/d. Most of the new capacity was installed in Asia, 60% of which (480 Kb/d) was accounted for by China, and in the Middle East (250 Kb/d). Global utilisation rates slipped to their lowest since 2003.

Financial Investment

Financial investment in energy and other commodities has increased sharply. The available data is incomplete, but NYMEX indicators provide perspective on the hotly debated question of whether they have caused crude price increases or merely amplified the underlying trends of demand and supply.



The comparison of investment profiles across fuels shows an ambiguous connection between financial investment flows ("open interest"), their positioning ("net length") and fuel prices. In crude oil, non-commercial net length has remained fairly stable over the past year, although total open interest continued to increase, along with prices. Heating oil open interest and non-commercial net length has changed little, but heating oil prices have increased more rapidly than crude oil. Similarly, natural gas open interest was flat in 2007 and so far this year, even while natural gas prices surged. In sharp contrast to crude oil, non-commercial traders have increasingly become net sellers of gas.

In summary, it is difficult to establish a causal relationship. The data indicate that financial markets don't create underlying fundamentals or the changing perceptions about risk or future trends. They reflect them.

Oil: Summing Up

Oil prices rose in a constrained market. First, the supply response was muted because of OPEC's success in controlling production; a muted supply response over the longer term has also been facilitated by above ground problems in member states such as Iran, Iraq or Nigeria.

Second, the supply response is affected by an increase in state control and limits to access for private investment in other large provinces, of which several countries in Latin America and Russia are good examples.

Third, natural decline in OECD provinces, exacerbated by the limited scalability of biofuels and heavy oil, has accentuated restrictions in provinces still open to private investment.

Constrained industrial capacity and cost inflation have furthered hampered project implementation.

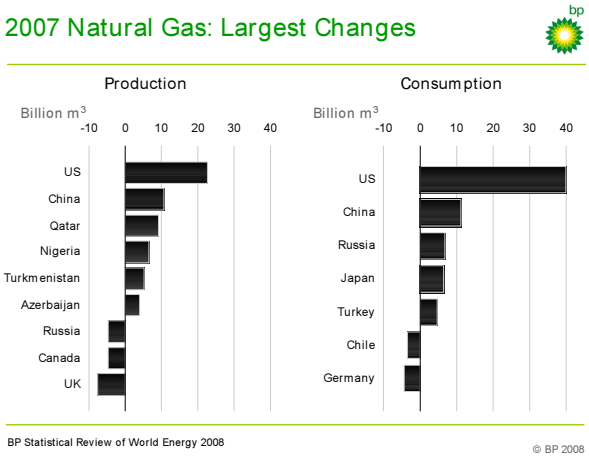
Global demand has been dominated by the effect of high income growth more than by price effects, partially because the share of consumers with subsidised retail prices has risen to new heights.

As a result, fundamentals and long term expectations have been changing. Financial markets are not able to trigger these developments, but they are capable of following them – and, of course, are perfectly capable of accelerating movements up or down.

Did other fuels experience similar constraints?

Other Fuels

Natural Gas



Natural gas is in transition between being a regional fuel, where consumers and producers are connected via pipeline systems, to an increasingly internationalized system connected by LNG.

Gas consumption grew by 3.1% in 2007, the only fossil fuel where growth accelerated. The largest increment worldwide came from the U.S., where domestic production – increasingly of unconventional gas – surged by 23 Bcm in a lagged response to high prices. The U.S. also saw the largest increment in consumption (40 Bcm, or 6.5%), driven by cold weather and the continued discount to residual fuel oil. Europe was at the other extreme – a warm winter led to a decline in consumption of 8 Bcm in the EU, just balanced by a lower than usual increase of 8 Bcm in the FSU.

The second largest increase in production (18 Bcm) and in consumption (27 Bcm) was in Asia Pacific. 60% of the increase in production and 41% of the increase in consumption came from China – which, nevertheless, retained a very low share of only 3.3% of natural gas in total energy consumption.

International Trade

A decline in European consumption kept pipeline trade flat last year despite growth elsewhere. LNG trade grew 7.3%. While slower than the last few years, this was enough to raise its share in total gas production to 8% and in total gas trade to 29%.

Global LNG trade is becoming more integrated. The most diversified suppliers are in the Atlantic Basin, from where they export globally. Asian suppliers typically serve a smaller number of customers; none of them exports to the Atlantic basin. The ability of Atlantic basin suppliers to switch was demonstrated in 2007, when supplies to Asia Pacific doubled, in response to higher prices. After nuclear outages caused a sudden increase in the demand for power generation fuels in Japan, LNG imports increased by 8.5% or 7 Bcm, the largest increment in 2007.

Substitution

Greater flexibility in LNG trade is adding a new dimension to traditional fuel-switching, as relative fuel prices change. Japan provided one example in 2007, Europe provided another.

When European spot prices were particularly weak in the first half of the year, gas substituted for coal and oil in power generation. This was most evident in the UK power sector, where gas consumption increased by 25% in the first half of 2007 at the expense of coal, which fell 22%.

In addition to local fuel-switching, low European spot prices created an incentive to switch flexible LNG supplies to the U.S. market. The resulting flow helped to keep Henry Hub gas prices low relative to oil prices, and so encouraged fuel switching out of oil in the U.S.

Overall, global gas markets continued to integrate if at a more measured pace, partially caused by project delays and the huge needs for LNG infrastructure investment. Correspondingly, natural gas prices increased, but less so than oil or coal prices.

Coal

Coal was once again the fastest growing fuel in 2007, with consumption increasing by 4.5%. More than 50% of the increment in global primary energy consumption is from coal, and more than 70% of this increase is growth in China – almost 40% of global primary energy growth, therefore, originates from one fuel in one country.

Like GDP and primary energy growth, coal consumption growth slowed in 2007. A strong spurt in US growth (1.4%) was neutralized by decline in the EU, the FSU and the Middle East. Global consumption decelerated because China grew at 7.9% – its lowest growth in percentage, and in volume terms, since 2002.

International Trade

Coal markets are both highly concentrated by size, and very local. China accounts for 41% of global

consumption and 41% of production, the U.S. for 18% of consumption and 19% of production. Three of the next four largest producers are among three of the next four largest consumers. Correspondingly, global trade in coal is small, equivalent to only 15% of global consumption. But this simple market structure is changing.

Over the last ten years, four countries (Australia, China, India and Indonesia) accounted for 95% of the increase in global coal production (1,557 million tonnes). However, this happened for very different reasons: In China (1,164 mt) and India (159 mt), growth was driven by domestic demand; in Australia (114 mt) and Indonesia (120 mt), it was led by exports.

A sample of the five biggest coal exporters outside China (Australia, Indonesia, South Africa, Colombia and Russia) shows that fully 88% of the growth in production since 1997 has been produced for export.

But transport and infrastructure facilities have not kept pace with this expansion. Worldwide infrastructure bottlenecks became apparent in 2007, exacerbated by bad weather conditions. Exports suffered from congested transport facilities or mine closures in Indonesia, Australia and South Africa. As a result, prices for traded coal outpaced domestic prices, and shipping and freight rates reached record levels.

Deregulation in Coal Markets

The aggregate numbers continue to be dominated by China. But China also provides an illustration for the prerequisites that make market adjustment happen.

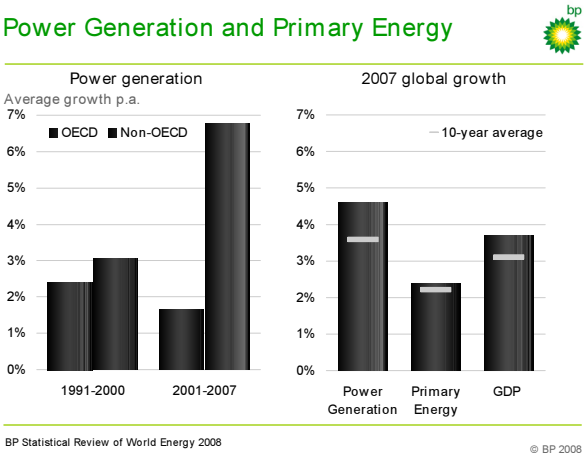
China ended the dual pricing system for coal in January of 2007, and liberalized domestic prices, which duly rose over the course of the year. The price changes were part of a drive toward greater efficiency improvement in the coal sector. They were flanked by measures to limit net exports. Generally, the drive to raise efficiency meant continued investment in new mining and rail capacity, as well as continued attempts to take smaller, less efficient mines off line.

However, coal price liberalization was not accompanied by freeing up consumer prices for electricity. Money-losing power generators responded by running down inventories, leaving the system vulnerable. In the aftermath of cold weather and ice storms this January, the government mobilised a massive effort to increase domestic coal for power generation, sometimes contradicting efficiency targets.

In 2007, economic growth in China was 11.9%, and power generation grew by 15.6%, but coal growth, at 7.9%, was much slower. The official data suggest a mix of successful policy efforts to improve energy efficiency, a rise in the share of coal for power generation, and increased use of oil and gas to the same effect.

Thus, the global supply of coal continued to respond to increased demand; in 2007, this response was facilitated – and triggered – by the continued rise in the trade of coal, and domestic market liberalization, notably in China. However, both could not display their full potential: The internationalization of coal ran into infrastructure problems; and Chinese market liberalization, while improving efficiency, was marred by an inability of power generators to pass on higher prices.

Non-OECD: Economic Growth and the Need for Power Generation



This leads back to an earlier question – are there structural reasons for high non-OECD energy demand growth? The strong demand for coal in the non-OECD matches the comparatively low increase in relative price over the medium term, and also the local availability of fossil fuels. However, there is a structural reason for the shift into coal as well. For most of the developing world, high economic growth means moving labour from agriculture into industry. Building up an industrial infrastructure requires electrification. Accordingly, power generation in the developing world is surging.

The decade before the Millennium compared with the years thereafter saw OECD power generation growth slow from 2.4% to 1.6% per annum, while non-OECD growth doubled from 3.1% to 6.7%. China supplied the lion's share of this surge, doubling its share in global generation to 16% in 8 years. The right hand chart of 2007 global growth near by has become typical for fast growing non-OECD economies: Power generation growth outpaces GDP growth, and power generation requires fossil fuels.

Hydro and Nuclear

In 2007 global hydroelectricity production increased by just 1.7%, well down from the 4% growth in both 2005 and 2006. Drought conditions in the U.S. reduced hydroelectric production by 14% – partially offsetting strong capacity growth in China, India and Brazil.

Nuclear power generation declined by 2% in 2007, the largest one-year decline since 1965. One-off factors account for more than the entire net decline, including an earthquake in Japan, unexpectedly long maintenance time in Germany and the UK, and unscheduled maintenance in France. In addition, seven European reactors were permanently shut at the end of 2006, in pursuit of opting out of nuclear energy.

Four new reactors were brought on line in 2007, in China, India, Romania and in the U.S. (which restarted a reactor taken out of service in 1985). The high number of construction start-ups is evidence for the renewed interest in nuclear energy. Construction started on seven new units: two each in China, South Korea and Russia, and one in France.

Renewables

For renewable energy, the basic constellation has not changed – it continues to expand rapidly, and with government support, but from a very low base. However, progress over the years means that in some countries, renewables have grown enough to make a significant contribution. Examples are ethanol in Brazil and the U.S., and wind power in various European countries.

At 920 Kb/d in volumetric terms, or 0.7% of total oil consumption, global ethanol supply at the margins has had an impact on U.S. and Brazilian gasoline consumption and refining. However, this obviously was not yet enough to tip the tight balance in global oil markets described earlier.

Available estimates suggest a share of around 1-1.5% of global power generation from wind, solar and geothermal power. Under current fuel shares, this would have but a small contribution to reduced global carbon emissions from energy. However, in Denmark, Portugal, Spain and Germany, wind has become a double-digit contributor to power generation, at least in terms of capacity.

Conclusions

Where does this leave us?

We started out with the question of why energy prices are high. On a basic level, it is not that complicated.

The global economy has become more flexible in combining high economic growth with lower energy intensity. However, in the developing world, energy consumption growth is a more important companion of economic growth than in the OECD economies. At least in part, this is for structural reasons, such as the high need for electricity which comes with industrialisation; and it is also the desire for transport fuels which comes with higher income levels.

Of the three major fuel markets, oil is subject to constraints which limit the ability of private investment to go and do what it does best – create adequate supply. Gas and coal are integrating globally. Their supply is responding to rising prices, although this is limited in both cases (with coal markets experiencing most heavy constraints), as infrastructure limitations and regulations have not kept pace.

A lot, therefore, rides on whether we will allow market forces and competition to complete what liberalization of global energy markets has started – or whether additional restrictions will hamper long term supply growth in energy.

Energy Forum to Accept Letters to the Editor

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. The editors reserve the right to condense and edit letters as necessary.

Developing and Supporting Critical Energy Infrastructure for Vision 2020: Challenges, Constraints and Prospects

By Chief P. C. Asiodu, CON*

This is a very timely conference on a critically important subject. I congratulate the Council for arranging it and I thank them very sincerely for inviting me to participate.

Only a few days ago, last Tuesday, His Excellency, the Vice-President of the Federal Republic of Nigeria, Chief Goodluck Jonathan, GCON, inaugurated, on behalf of the President and Commander-in-Chief, Alhaji Umaru Musa Y'Aradua, GCFR, the National Council on Vision 2020 to be chaired by the President and the National Steering Committee on Vision 2020 with the Hon. Minister of National Planning Commission as the Chairman to provide the leadership in articulating the Vision, and mobilizing the nation and all the stakeholders to own the Vision and to drive its focused, consistent implementation.

It is the tragic truth that 47 years after Independence which was proclaimed with such Great Expectations for fast development and growth, given Nigeria's immense resource endowments, human and material, the caliber and high international standing of our First Republic Leaders, and the abundant international goodwill for Nigeria, we still remain a nation of exporters of primary commodities only, now mainly crude petroleum and liquefied natural gas (LNG) with no value added. The economy has not undergone any structural change despite well articulated National Development Plans of 1970-74, 1975-1980, and 1980-85, which would have diversified the economy and transformed Nigeria into a manufacturing country exporting value-added goods. As we know, only the 1970-74 Plan was implemented. Indeed, the inspiration for those abandoned National Plans was the recognition that oil was a wasting asset and that oil revenues must be invested in diversifying the economy and exiting from the export of one primary commodity and creating renewable sources of future income.

It is only right as we now seek to transform a hope for 2020 into a Vision 2020 to briefly recall the past if only to learn from our mistakes. From 1962 to 1966, the economy grew at an average of 7.6% per annum, then the tragic interruption of the first Military Coup of January 1966 and the second Coup of July 1966 and the Civil War. From 1970 to 1975, the economy grew at an average of just over 11.0% per annum. Then the watershed coup of 1975 which was followed by a mass purge of the Civil Service and the Public Services. The growth rate declined steeply. It became negative in 1981, and 0% in 1986. Per capita GDP fell from US $800 in 1980 to US $250 in 1990. Growth from 1990 to 1999 averaged 2.0% per annum while population grew at 3.0% per annum. The growth rate has improved since 2000 averaging over 6% per annum. However, we must emphasize that the better growth rates for this period are largely due to the unprecedented sustained long period of high crude oil prices. Nigeria is yet to embark seriously and consistently on restructuring and diversifying the economy. These figures explain why 70% of Nigerians are living in severe poverty.

Crude oil and gas exports have for three decades now accounted for about 95% of our export earnings. Contribution of manufacturing to GDP declined from 11% in 1991 to 4% in 2001 and is less today. Vision 2010 which mapped out a comprehensive Perspective Plan to achieve a growth rate of 10% per annum from 1998 onwards was completely abandoned with the change of government in 1999. Vision 2010 produced by an all-inclusive group of stakeholders had articulated comprehensive policies, programmes and "road-maps" for achieving the targets set in all sectors of economic activity and infrastructure including education, health, power, transport, agriculture, manufacturing, telecommunications, etc. The only notable omission was the housing sector.

Now again, under President Y'Aradua, the nation is on a threshold of renewing the march to stability and sustained growth and progress. I am pleased that very useful work has been done in the past few months in the National Planning Commission and other sectors of the Government towards, I am quoting from an official document, "clear definition which spells out the goals to be achieved in all the key sectors and aspects of the nation's economic, social and political life which is essential to giving meaning to Vision 2020.

Let me attempt to provide in a preliminary manner a context for embarking on our journey towards Vision 2020. I understand that at present Belgium is the 20th largest economy in the world, the position which we aspire to reach by 2020. The World Bank estimate for Belgium's GDP (PPP) per capita in 2007 is US $33,542. The population is given as 10,364,000 and the GDP (PPP) is US $348 billion. The GDP (PPP) per capita for Nigeria in 2007 is given as US $1611 and the population 128,266,000. On this basis, our GDP (PPP) in 2007 is US $207

* Chief P. C. Asiodu, CON is President of the Nigerian Conservation Foundation and a former economc adviser to the President of the Federal Republic of Nigeria. This talk was delivered at the first international conference of the Nigerain Association for Energy Economics, April 2008 in Abuja, Nigeria.

billion, and if we use our last census figure of 140 million, the GDP (PPP) will be US $225.5 billion. I believe that in size our economy is currently about No. 54. The economies which are larger than ours will not stand still, and some of them are growing quite fast. This is why preliminary projections would indicate that to achieve the position of being 20th largest economy by 2020, the GDP of Nigeria should be at least US $600 billion, perhaps, significantly more. Our principal presenters will no doubt gives us more authoritative projections but that will not alter the stark reality of the immense tasks before us.

How do we grow the economy from US $225 billion to US $600 billion from 2008 to 2020, a period of 12 years? Vastly increased volumes of goods and services must be produced. Agriculture must be modernized, enormous volumes of raw materials in the agro-allied sector, food, sugar, cassava, rubber, cotton, oil seeds, etc. must be processed into value-added products for the international market. In the oil and gas sector, a completely new order of activity must be achieved in converting our crude oil and gas into valuable petroleum and petrochemical products to be distributed internally and to be exported to the world. The country is also endowed with significant reserves of various solid minerals awaiting exploitation and processing to generate wealth. Let us imagine the exponential growth in tonnage of goods and products to be carried by road, rail, water, and air and the necessary transportation infrastructure to make all this possible.

This is where we are confronted by the theme of this conference – "Developing And Supporting Critical Energy Infrastructure For Vision 2020". There is a direct relation between total energy consumption and growth of GDP. The amount of energy used per worker largely determines his productivity in agriculture and manufacturing. There are interesting studies which showed the energy available per worker in USA expressed in horsepower rising from about 0 in 1850 by nearly 10% per year to about 2 horsepower in 1900 and 7 horsepower in 1950. That was the period of industrialization and expansion in the USA. It is also a truism that per capita energy consumption is a fairly accurate indication of the level of economic development and of the quality of life in a country.

As we all know, the energy situation in Nigeria today is disastrous whether we are considering generation and distribution of electricity or the availability of petroleum products or other types of fuel.

Electricity Generation and Consumption

There is perhaps no sector in which our national failure to determine correct policy and to implement and manage agreed programmes and projects is so glaring as in the power sector. It is derisive enough to advertise to the world that the installed capacity of the national power monopoly, PHCN, is a mere 6000 megawatts for a population of 140 million, notwithstanding the fact that expensive privately owned generating sets may about equal the PHCN installed capacity. The lack of access to the power grid for many would-be-users, as only about 40% of the population is connected, and even then the supply is unreliable, constitutes the greatest factor contributing to the unattractive investment climate in Nigeria. Besides, it renders many Nigerian producers internationally uncompetitive and prevents the emergence of a viable sector of small and medium scale industries and enterprises which would accelerate progress in poverty reduction and the achievement of the Millennium Development Goals.

There are these aspects of the challenge in the power sector which the nation must deal with constructively if we are to escape from the failures and frustrations of the past three decades :

- Investment
- The Structure of the Industry and the Regulatory Environment
- Management and Manpower Constraints.

Extrapolating from the figures for annual investment for 20 years in power generation and distribution required by the developing countries which were discussed at the World Energy Congress in Montreal in 1989 for the purpose of drastically reducing poverty, it was estimated that Nigeria would need to invest at least US $2 billion per annum from then for the period of 20 years. Yet, from then to 1999, there was practically no investment in power generation and distribution. To make matters worse, the pricing structure for power did not allow for full cost recovery let alone produce the surpluses required for necessary timely maintenance of existing plants and installations. All this in the context of 3% per annum population growth.

Since 1999, the situation has been one of initial confusion resulting in the mistaken approach of postponing making well considered investments in the power sector because of imminent privatization. Four years later, this approach was reversed and there was a rush into quick-fix sub-optimal investment decisions.

In order to begin in earnest to advance to our desired Vision 2020 what installed capacity should Nigeria have? Let us consider a few comparative figures of electricity consumption per capita measured in

terms of kilowatt hours per person:

- Egypt rose from 683.4 in 1990 to 1,173.1 in 2003;
- China rose from 511.1 in 1990 to 1,378.5 in 2003;
- India rose from 275.8 in 1990 to 434.8 in 2003;
- Indonesia rose from 161.4 in 1990 to 440.1 in 2003;
- Malaysia rose from 1.194.3 in 1990 to 3060.5 in 2003;
- South Africa rose from 4.431.5 in 1990 to 4,756.8 in 2003; and
- Nigeria rose from 91.6 in 1990 to 106.3 in 2003.

Should we go back to 1975, with the sole exception of South Africa, we would find that Nigerian consumption was on the same level as the rest, or even better than one or two. It is this sort stagnation that explains why in terms of ranking of prosperous nations Nigeria has fallen from around No. 55 in 1980 to No. 157 in 2007 – i.e., among the bottom 20. For more poignant comparison - consumption in a developed country like France went from 5,975.3 in 1990 to 7,585.5 in 2003.

To produce adequate power for modernizing, transforming, and improving productivity in our advance towards Vision 2020, some experts estimate that we need as urgently as we can achieve it installed capacity of at least 60,000 megawatts. This would require investment in excess of US $60 billion. More would be required for transmission and distribution. We cannot find this internally. We must have recourse to the international capital market.

I now wish to discuss briefly issues regarding the structure and regulatory environment for the power sector. I am glad that the National Electricity Regulatory Authority is now established under the law. I agree on the need for privatization but I invite the conference to examine critically the policies which have been pursued in privatizing NEPA. The emphasis has been on what is called “unbundling”. In the process, I understand that about 18 distribution companies, several generating companies and one public sector monopoly transmission company are being established. With such an atomized approach and the insistence on a public sector transmission monopoly company whom are we trying to attract? We know how dismally public sector parastatals have performed over the past four decades.

The main attraction of Nigeria to would-be investors–Nigerians in diaspora and foreigners–is the size of the Nigerian market as the economy begins to grow. I believe that as a country of 140 million with our enormous resource endowments we should seek to attract globally significant power companies. If they can see the possibility of selling from 10,000 or more megawatts installed capacity each in the medium term, we may begin to succeed in re-positioning the power sector to meet the challenges of Vision 2020. To this end, should we not examine the North American, Japanese, European, indeed even Asian and Latin American models and divide Nigeria into four or five zones running from the coast to the Northern boundary and invite bidding for franchises for the zones where the successful bidders will be allowed to generate, transmit and select their own distribution dealers. The Regulatory Authority can still monitor the prices, insist on adequate arrangements for inter-connectivity and ensure a level playing field. There will still be room for smaller companies generating and distributing electricity to captive industrial or other clusters. Might we not be able to repeat in this sector the great achievement registered in the introduction of GSM in our Telecommunications sector?

On the question of management and manpower challenges, the failure to anticipate and plan for growth in demand, to operate and maintain efficiently installed plants, and to persuade the Government to make necessary investments, and approve appropriate pricing policies is largely to be explained by the inadequate calibre of the Chief Executives appointed in the power sector. At a time, when the rest of the world, developed and developing, recruited the best people they could find from the world market to help deliver accelerated development we were handicapping ourselves in Nigeria with the constraints of a mechanical approach in the implementation of the principle of “federal character”. Good people are to be found from every part of the country, but they can only realize their potentials if they are challenged to compete on the basis of merit and the pursuit of excellence. The power sector was not alone. Other parastatals suffered the same affliction.

Oil and Gas Sector

Progress in the upstream sector has been fairly satisfactory over the past 15 years. With the signing of the first Production Sharing Contracts with several of the major oil companies for deep offshore exploration and production in 1993 and the encouragement given to indigenous concession owners to enter into similar arrangements with competent oil companies, and the subsequent agreement on an MOU for JVA operations, there has been enough funding, albeit with occasional delays from the Government, to ensure the achievement of a significant increase in total reserves. It is now just over 30 billion barrels. Product-

ibility has also risen to 2.4 million barrels a day. However, there are discussions to which the public is not yet privy about a Revised MOU for JVA operations, and for modalities for meeting the Government portion of cash calls promptly, as and when due.

Personally, I do not believe there is any need to reduce Government and private sector indigenous Nigerian interests in existing JVAs below 51%. It is profitable business and good investment in the public interest. It is only reasonable that the public sector should pay as when due its own portion of operational expenses and commercialize optimally its proportionate share of oil produced. Borrowing from the banks to pay for operational expenses cannot in the final analysis be of net benefit to the nation especially when the cash flow so generated is spent on needlessly bloated recurrent personnel costs and other items.

After our many missed opportunities starting from 1965, the LNG industry has made tremendous progress since the first two trains were commissioned in 1999. The 7th train is now under construction. I also expect that the new OLNG and BLNG will be successfully executed. There is, however, need to continue to maintain competitive conditions, while protecting our national interest, to ensure that all associated gas is harnessed and that non-associated gas deposits will be developed in time as necessary to fuel the power and industrial projects now on the drawing board and not yet assured of gas supplies, and also that gas flaring is ended by 2010.

Niger Delta Situation

There is urgent need to address the situation in the Niger Delta with equity in resource allocation, and rapid progress in implementing infrastructure, agricultural and industrial projects agreed with the communities in order to transform the economic situation in the Region and greatly improve the quality of life of the people of the Delta. This is the route to achieving sustained peace in the Region which is so essential for realizing energy-sufficiency to drive the 2020 Vision.

Downstream Sector

As we are all aware petroleum products currently accounts for 62% of total energy consumption in the country. I shall leave it to one of our principal presenters to delineate what needs to be done to end the disgrace of Nigerians being incapable of operating and maintaining petroleum refineries to end fuel scarcity and achieve a little value added. Surely, we should not continue to mock ourselves with failure in this sub-sector while Ghanaians, Ivoiriens, and Senegalese with less depth in the supply of indigenous highly trained manpower in petroleum and gas technology continue to manage their own refineries respectably.

It is important in this regard to allow the NNPC to continue to grow into a respectable diversified oil company belonging to the Nigerian public much like its counterparts in Malaysia, Brazil, Algeria, Iran, etc. All I said above regarding management and manpower in the power sector applies with equal force to NNPC.

Other Sources of Energy

I have spoken for long given our schedule. However, I should add a sentence that we must now finalize, publicize, and resolutely implement a National Energy Policy which assigns a larger and appropriate role to coal and lignite, as well as solar and wind energy and other renewable energy sources in developing a long term supporting energy infrastructure for the Vision 2020 now being articulated, and for the future milestone Visions to follow in our nation's progress to prosperity and greatness.

Conclusion

In conclusion, I should add that we are witnessing the political will on the part of the national leadership, that is, Mr. President and his close colleagues to move the nation forward. I must urge, in the light of our own history and the histories of many other nations, developed and developing, that for the Government to be able to deliver there is a critical need to resuscitate, restructure, re-motivate, strengthen its leadership and re-challenge the upper echelons of the Civil Service. They must become again competent, professional, honest, fearless, and patriotic facilitators of the process of modernization and national development.

Nigeria's Dual Energy Problems: Policy Issues and Challenges

By Akin Iwayemi*

The Nigerian energy industry is probably one of the most inefficient in meeting the needs of its customers globally. This is most evident in the persistent disequilibrium in the markets for electricity and petroleum products, especially kerosene and diesel. The dismal energy service provision has adversely affected living standards of the population and exacerbated income and energy poverty in an economy where the majority of the people live on less than $2 a day. Yet, energy and income poor Nigeria is energy resource rich and the sixth largest exporter of crude oil in the world. Nigeria's persistent energy crisis has weakened the industrialization process, and significantly undermined the effort to achieve sustained economic growth, increased competitiveness of domestic industries in domestic, regional and global markets and employment generation. Against this background three key issues are discussed in this paper: namely; the nature of the crises, the causal factors in the crises; and how to eliminate the crises and establish a sustainable domestic energy future in the context sub-regional energy sustainable development.

Nature and Causal Factors in Nigeria's Energy Crises

Our starting point of analysis is some facts about Nigeria's energy crises. First, is the persistent inadequate quantity, poor quality and low access to energy despite the enormous domestic endowments of non-renewable and renewable primary energy resources. For example, crude oil and natural gas reserves are currently estimated at 35 billion barrels and 185 trillion cubic feet, respectively. These fossil fuel reserves are more than adequate to fuel much of Sub-Saharan Africa energy demand for several decades.[1] Coal reserves are also substantial at 2.75 billion metric tons. Also, a large amount of renewable energy resources including hydro electricity, solar, wind and biomass energy are present. Hydro resources are estimated at 14,750 Megawatts. Solar radiation is estimated at 3.5-7.0 Kilowatthour/m2 per day, wind energy 2.0-4.0 m/s, wind energy at 150,000 Terra Joule per year and biomass at 144 million tons per year.[2] Second, despite being a world ranking exporter of liquefied natural gas (LNG), Nigeria's gas-dominated electric grid experiences frequent system collapse linked often to inadequate gas supply. The oil-linked militancy which has resulted in gas and oil pipeline vandalisation in the oil and gas producing Niger Delta region has exacerbated the petroleum products and electricity supply problems. Largely unrestrained gas flaring has consistently put Nigeria among the world's largest source of carbon emission, a major factor in global warming.[3] Third is the extensive substitution of poor public electricity supply with highly polluting self-generated power. Also the scarcity of kerosene combined with shortage-induced high kerosene prices has induced greater use of fuelwood for the low and middle income classes with adverse environmental consequences. Diesel shortages have crippled industrial production dependent on diesel-generated private electricity supply. Finally, there is the protracted nature of the energy crises. Nigeria's chronic energy infrastructural gaps which have existed since the large scale inflow of oil income in the mid 1970s has worsened in recent times despite huge amounts of public expenditure in this government dominated and controlled industry. The billion dollars of pubic investment into capacity expansion in the energy industry contrast sharply with the extremely poor supply outcomes measured by refinery output, rise in imported fuels and frequent power outages and voltage variation.[4]

The nature of Nigeria's dual energy crises is highlighted by two key developments. The first concerns the recurrent severe petroleum products market shortages of which kerosene and diesel are the most prominent. Nigeria has five domestic refineries owned by the government with capacity to process 450,000 barrels of oil per day, yet imports constitute more than 75% of petroleum products requirements. The state owned refineries have hardly operated above 40% capacity utilization rate for any extended period of time in the past two decades. The gasoline market is much better supplied than kerosene and diesel because of its higher political profile. This factor explains why the government has embarked on large import volumes to remedy domestic shortages of the product. According to the Minister for Energy the subsidy to support the imports of gasoline alone will be in the range of N700 to N800 billion in 2008. The weaker political pressures exerted by consumers of kerosene (the poor and low middle class) and diesel (industrial sector) on the government and the constraints on public financing of large scale imports of these products, as in the case of gasoline, largely explains their more severe and persistent market shortages.

The second dimension of Nigeria's energy crises is exemplified by such indica-

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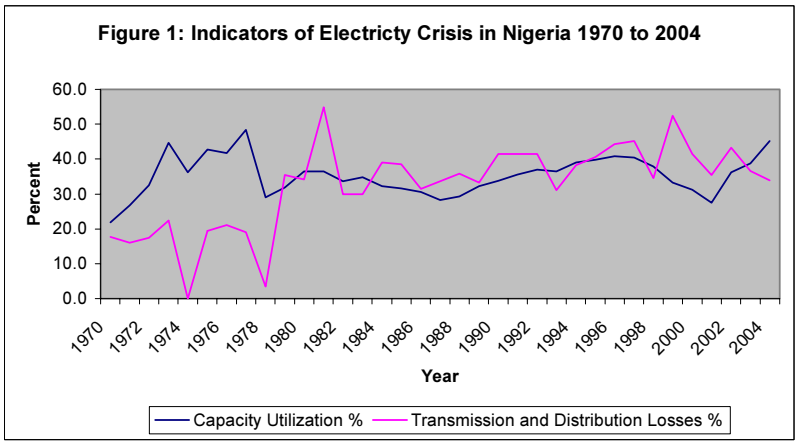
See footnotess at end of text.

tors as electricity black-outs and brown-outs and pervasive reliance on self-generated electricity. This development has occurred despite Nigeria being energy-resource abundant. Nigeria's electricity market, dominated on the supply side by the state-owned Power Holding Company of Nigeria (PHCN) formerly called the National Electric Power Authority (NEPA) has been incapable of providing minimum acceptable international standards of electricity service reliability, accessibility and availability for the past three decades. The nature of the poor record in electricity supply is apparent in the trend in transmission and distribution losses shown in Figure 1. The double digit transmission and distribution losses are extremely large by international standards are among the highest in the world. The system losses are five to six times what obtain in well-run power systems. The high level of power losses and the significant illegal access to public power supply are indicative of the crisis in the industry.



Source: Data from PHCN and NEPA

The trend in capacity utilization provides another perspective on the electricity crisis (Figure 1). The low and unstable capacity utilization, evident in an average capacity utilization of less that 40% for most of the period, shows the large gap between installed and actual operational capacity. It is a reflection of the gross technical inefficiency in the power system. The role of insufficient operational capacity due to ageing facilities that are poorly maintained on poor service provision is indisputable. Remarkably, despite the size of inoperable capacity, no new plant has been added to the grid since 1990. The installed power generating capacity is about 6,000 MW. The operable capacity is less than 3,000 MW. This is made up of hydroelectric and gas-fired power generating plants. The plant mix is dominated by gas-fired plants. The infrastructure facilities are not only old, they are also beset by water flow and gas supply problems. The water flow problems which have seriously undermined the performance of the three hydro stations (Kainji, Jebba and Shiroro) in recent years are linked to reduced water volumes in the River Niger and its tributaries due to climate change. Increased frequency of gas supply disruptions to gas-fuelled generating plants have also reduced electricity generation. Gas pipeline attacks have exacerbated the power supply problem through disruption in gas supplies to the power stations.

Though peak electricity demand has been less than half of installed capacity in the past decade, load shedding occurs regularly. Power outages in the manufacturing sector provide another dimension of the crisis. In 2004, major manufacturing firms experienced 316 outages. This increased by 26% in 2005 followed by an explosive 43% increase between 2006 and 2007. Though no published data exist, near collapse of the generating system to far below 2000 MW for prolonged periods of time suggest that the number of outages in 2008 will also be very high. This poor service delivery has rendered public supply a standby source as many consumers who cannot afford irregular and poor quality service substitute more expensive captive supply alternatives to minimize the negative consequences of power supply interruptions on their production activities and profitability. An estimated 20 percent of the investment in industrial projects is allocated to alternative source of electricity supply.

In concluding the discussion in this section, the causal factors in Nigeria's energy crisis include:

- prevalence of a regime of price control;
- weak concern for cost recovery and lack of adequate economic incentives to induce the state-owned companies (NNPC and PHCN) to engage in efficient production and investment behaviour. This seems apparent in the existence of large input and output subsidies;
- multiplicity of economic and non-economic objectives without proper identification of the trade-offs among these different objectives. This is implicit in its pricing policies in both electricity and petroleum products markets.
- institutional and governance failures which induced gross distortions and inefficiency in production, investment choices and high costs of operation, low return on investment and expensive delays and cost overruns in the state energy enterprises.

The recent reversal of the privatization process evident in government plans to strengthen the two public companies in the energy industry raises some concerns about government intentions in the two

industries. The government is planning to strengthen PHCH and empower it to build more power plants and NNPC to build more refineries notwithstanding the history of poor investment and production outcomes from public energy enterprises.

Transition to Competitive Energy Markets: Policy Issues and Imperatives

It is widely recognized that substantial expansion in quantity, quality and access to energy infrastructure services, are essential to rapid and sustained economic growth, employment generation, poverty reduction and overall well-being of the population in a country where most of the 140 million people are poor. Thus, the persistent suboptimal levels of energy infrastructure capacity and service provision from both growth and welfare maximization perspectives raises the fundamental question: What ought to be done to establish and sustain a robust energy industry characterized by acceptable international standards of service reliability, accessibility and availability and that will support sustainable human development in Nigeria and the West African region. Overcoming the energy crises and ensuring international standards in quantity, access, quality and reliability of energy services in Nigeria is a prerequisite for achieving the desire of the government that Nigeria be one of the top 20 economies in the world by 2020. This defines the scale of policy challenges for energy infrastructure investment and operations. Also, additional factors include three important initial conditions associated with electricity and petroleum products crises. These are the current low level of electricity and energy consumption per capita by global development standards; the depressing state of socio-economic conditions in an economy just recovering from almost two decades of poor performance and deepening poverty; and the low human development indicators. The wide energy gap and poverty in comparative regional terms is apparent in per capita electricity consumption in Nigeria being 140 Kwh in 2004 compared to 1337 Kwh in Egypt and 4560 Kwh in South Africa.[5] The government projects that generating capacity should increase to eliminate current electricity poverty and raise electricity per capita to 1,110kwh in 2015 and 5,000Kwh in 2030. Even then, Nigeria's per capita consumption in 2030 will be about 20% above the level that obtained in South Africa in 2003!

Meeting the challenges of providing adequate, reliable and widely accessible electricity service involves more than summing up numbers (the mega-watts, cubic metres of gas delivery or barrels of domestically refined and distributed oil) and getting other technical things right from the domestic perspective. The domestic solutions to investment, production and delivery problems should be enlarged to factor in the West African region given the two ECOWAS energy initiatives, the West African Power Pool (WAPP) and West African Gas Pipeline (WAGP). Domestic energy supply expansion must be examined in the context and integrated into ECOWAS energy given the current regional WAGP and WAPP as forerunners of the proposed integrated West African energy market. It is obvious that regional energy infrastructure investment and supply policies must be mutually consistent and properly coordinated.

The peculiar nature and initial conditions in the industry may suggest some roles for the government in the production and delivery of electricity. This is particularly so if only one of the 23 Independent Power Producers (IPP) given licences by NERC to add 8237 MW to existing capacity has done anything tangible. There is some reluctance among the licensees to begin observable construction activities. Part of the problem is the attempt by IPP to lock in high tariff into their power purchase agreement (PPA) and its take-or-pay clause for unnecessarily long periods though production could come from more efficient plants in the future. It was partly to prevent the foreign private IPP's from holding the country to ransom because of the power crisis that the Obasanjo Administration as an interim measure close to the end of its tenure decided to embark on a rapid expansion of generating plant capacity with assistance from the Chinese. In all, seven power stations were planned to be constructed in the Niger Delta region to utilize flared gas under the suspended but controversial National Integrated Power Project (NIPP). In addition, a new large 2,600MW hydro project costing US$3.46 billion with assistance from the Chinese government is also underway. Though the NIPP has been suspended, the decision should be revisited given the reluctance of the private sector to set up power plants. After construction, these plants should be privatized or concessioned to guarantee efficient service delivery.

Government intervention through NIPP will moderate the scaling up in the tariff that the sector requires to provide affordable and adequate electricity. Power pricing that guarantees an attractive rate of return to investors adjusted for industry risk and security of investment and input are two important considerations in private sector investment in the industry. The new multi-year tariff scheme which is yet to be fully operational is an important step in bringing new capital to the electricity industry. Effective implementation of the core reforms in the Electricity Power Sector Reform Act would ensure industry operation based on global best practices. From the petroleum products perspective, the plan of the gov-

ernment to phase out the subsidy for gasoline and truly free the products market in 2009 following recent shortages in kerosene and diesel is highly desirable.

While both renewable and non-renewable energy resources will be utilized in meeting future energy demand, the continued dominance of fossil fuels supplemented by hydroelectricity is envisaged in the medium term. Coal, hydro, solar, biomass, wind and nuclear energy technologies are alternative electricity generation options under consideration. Developing and deploying cleaner energy should be part of the investment strategy with the focus however on progressively adopting cleaner fossil fuels based on renewable energy sources to meet rural electricity demand. Notably, the government plans to achieve 10% of electricity supply to be derived from renewable resources by 2025.[6] Coal and nuclear energy also feature on the investment option list. 5000 MWe of nuclear generating capacity is expected by 2026.

The projected amount of investment to meet domestic power system expansion in 2030 is estimated at about $262 billion. This amount is enormous given the antecedent of the industry. Though the financial requirement is daunting, it is achievable. However, success is contingent on the right institutional framework, policy consistency, appropriate incentive structure and security of investment to guarantee the flow of required investment. The successful privatization of the telecommunication industry which brought in more than $12 billion of new investment in the last four years provides support for this position. The dramatic turn around of a moribund public telecommunication utility to a vibrant private sector-led industry with one of the fastest system growth rates in the world has been due to the combination of right institutional framework, policy consistency and appropriate incentive structure.

The mobilization of the financial resources to support a dramatic scaling up of energy infrastructure capacity must factor in the risks associated with investment to strengthen the refining and pipeline and distribution network and power supply system. These risks are in four dimensions: economic, sociopolitical, technological and environmental (methane leaks, climate change compatibility, nuclear accidents spills). Optimal sharing of these risks among the three principal market actors, namely, consumers, investor/producers and the government is essential to efficient resource allocation in the industry for a sustainable energy future in Nigeria and the West African sub-region. Having the appropriate incentive structure anchored on industry restructuring, privatization and sound regulatory framework, and financial support for renewable energy will improve the likelihood of success in achieving a vibrant Nigerian energy industry as the hub of West African energy.

Finally, there is the issue of security of supply of oil and gas pipelines associated with resource control agitation in the Niger Delta. Effort to eliminate tension in the region is more urgent than ever before. Developing and procuring and applying best practices in the industry will impact the volume and quality of investment.

Conclusions

The main conclusions of this paper are that the elimination of the electricity curse and emergence of the required strong investment response are contingent on:

- Radical reform in the sector emboding changes to improve and strengthen the industry governance structure to enhance accountability and minimize corruption;
- Strengthening current reform anchored on restructuring of both the petroleum and power industries to create a more competitive energy market anchored on market-responsive energy pricing.
- Elimination or minimization of concerns about security of supply of gas associated with resource control agitation in the Niger Delta region. Credible and decisive effort to eliminate tension at the core is more urgent than ever before.

However, the current government attempt to slow down and reverse the reform plans embodied in the Electricity Power Sector Reform Act will impede the faster actualization of equilibrium in the energy markets. A new partnership between the public and private sectors would have to be forged to meet these challenges. The scale of disequilibrium in the energy markets and poor quality of supply coupled with the social, economic and environmental costs of large scale substitution of inefficient fuel alternatives, strongly suggest the immense need of new investment and more efficient operation of its energy infrastructure. Ultimately what is important to the consumers and producers in Nigeria and the ECOWAS region is elimination of the disequilibria in the energy markets in Nigeria and more importantly, giving them wide accessibility to affordable and environmentally friendly energy supply in the context of the Millennium Development Goals (MDG).

Footnotes

[1] The share of Nigeria in global reserves of oil and gas are respectively 3% (BP Statistical Review of World

Energy).

[2] See Ibitoye and Adenikinju (2007).

[3] The persistent flaring of oil-associated gas is partly due to the reluctance of multinational oil companies to invest in the gas gathering facilities for domestic use. Another factor has been their willingness to pay the low penalties for flaring gas.

[4] The amount of public spending on electricity infrastructure between 1999 and 2004 far exceeded what was spent between 1981 and 1998 yet the crisis persisted.

[5] This is derived from Energy Information Administration, International Energy Annual 2004. DOE, Washington DC.

[6] See Energy Commission of Nigeria (2005)

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An Appraisal of Oil and Gas Industry Reform and Institutional Restructuring in Nigeria

By Wumi Iledare *

Prologue

A nation or province endowed with petroleum resources such as Nigeria must endeavor to produce its recoverable petroleum reserves optimally. Such a nation must choose whether to allow the current generation to use the entire petroleum wealth derived from current petroleum production for their benefits or give future generations a share of the derived wealth from petroleum resource development. This means that petroleum produced today must be used to develop durable infrastructure and human capital that benefit and advance society for generations to come. The question the oil and gas reformers in Nigeria seek to address is easy to conceptualize: How can the society's economic welfare be maximized over time using the wealth derived from produced and remaining petroleum reserves in Nigeria? Supposedly, the answer to this question lies within a pragmatic petroleum development policy framework with serious emphasis on managing revenue flows and expectations, creating linkages with non-petroleum sectors, expanding local capacity and infrastructure development, human capacity building and development, and advancing technical progress and entrepreneurship and managerial skills.[1]

The immediate past federal administration in Nigeria under President Olusegun Obasanjo had the above pragmatic policy objectives and instruments in mind when they inaugurated the first Oil and Gas Sector Reform Implementation Committee (OGIC) on April 24, 2000. The essence of the National Oil and Gas Policy (NOGP) that emerged from the OGIC efforts is anchored on the need to separate the commercial institutions in the oil and gas sector in Nigeria from the regulatory and policy-making institutions. Unfortunately, Obasanjo's administration did not completely put into operation the recommended OGIC policy instruments to facilitate oil and gas sector institutional restructuring. On September 7, 2007, the federal government administration under President Umaru Musa Yar'Adua appointed Dr. Riwlanu Lukman[2] to chair a reconstituted OGIC with a mandate to transform the broad provisions in the NOGP into functional institutional structures that are legal and practical for the effective management of the oil and gas sector in Nigeria. The mandate basically calls for a restructuring of the petroleum industry in Nigeria that can facilitate the propelling of the national economy to a GDP level comparable to the top 20 largest worldwide economies by 2020.

A Synopsis of the OGIC Report

The Lukman committee submitted its OGIC report on August 3, 2008. The report provides a pragmatic regulatory framework and institutional arrangements that could bring Nigeria oil and gas industry into global prominence.[3] The report addresses the ineffectiveness of the oil and gas sector in Nigeria over the years, which borders on the use of outdated or very archaic regulatory and institutional arrangements to govern the petroleum industry. The Lukman OGIC establishes that such regulatory and institutional structures are incongruous with contemporary global oil business. The report provides insight into the current national petroleum policy framework, objectives and goals and the innovative institutional structures and policy functions to proffer solutions to the problems affecting the oil and gas industry in Nigeria. Further, it highlights operational strategy and action items necessary to drive the national oil company to a global status and suggests solutions to fiscal policy problems and community issues affecting all segments of the petroleum industry in Nigeria. Without mincing words, the Lukman OGIC advocates the need for consultation with energy experts on various regulatory frameworks and institutional structures for clarity and research. The aspects under consideration for further research include funding sources and sustainability, capitalization of the commercial institutions, incorporation of joint venture operations as autonomous commercial entities, and finding progressive policy instruments and terms for existing and new contractual and concessionary fiscal arrangements.

The aspect of the OGIC reform efforts that has inundated public attention is the unbundling of the current National Petroleum Corporation (NNPC). However, the recommended overall institutional framework in the OGIC report is intended to facilitate managing and overseeing all the phases of the oil and gas sector in Nigeria more effectively than before by assigning functional

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See footnotes at end of text.

responsibilities to separate institutional structures. The institutional framework is based on the policy mandate to separate the commercial/operations (private sector culture) of the oil and gas sector from the policy-making and regulatory aspects (public sector administration) in Nigeria. Accordingly, the institutions are revenue generating and some are non-revenue generating or revenue "enhancing" institutions. In any case, for many oil industry observers in Nigeria, the main feature for the entire oil and gas sector reforms is the restructuring of the Nigerian National Petroleum Corporation and its subsidiaries. The success of the restructuring, therefore, will depend on the implementation of these institutions' policy functions. An appraisal of the new institutional structures proposed by the OGIC for effective governance and management of the oil and gas industry in Nigeria follows.

National Petroleum Directorate (NPD)

The National Petroleum Directorate (NPD) is designated as the primary institution to initiate, create, and implement the petroleum policy governing the oil and gas sector in Nigeria. The predecessor, the Ministry of Petroleum Resources (MPR), has not been up to these tasks of oil and gas policy initiation, formulation, and implementation. It is my opinion, that the ineffectiveness of MPR in its functions as a policy-making institution, however, has never been because of its location in the ministry environment or a lack of competent and highly skilled manpower, but is due to a lack of institutional empowerment and the putting of a "round peg in a square hole" by the central government. Thus, the oil and gas industry policy initiation and implementation functions ended up being assumed by NNPC to the detriment of its commercial and operational responsibilities over the years.

Accomplishing the thirteen stated objectives for NPD by OGIC would depend significantly on institutional empowerment, funding, and finding and putting highly skilled personnel in the key management positions as envisioned by the OGIC. Surprisingly either by error of commission or omission or because we have had several versions of the final report, the OGIC is silent on the terms of employment for the Director General (DG) of NPD. Neither were there any guidelines on whether NPD management positions shall be political appointees or be hired through open resource recruitment. The government, as a matter of obligation, must avoid invoking or applying the spirit of federal character or "geopolitical zoning" to justify "putting a square peg in a round hole" during recruitment or selection exercise for the filing top management positions in NPD. These principles must be used in a pragmatic manner without sacrificing efficiency and effectiveness for equity. Regarding funding for NPD, a surcharge or fees on per fiscal barrel of oil equivalent basis paid to NPD is a constitutionally taxing. A constitutional amendment may be required to do this. A line-item budgeting approach should be evaluated for consideration.

Nigerian Petroleum Inspectorate (NPI)

The National Petroleum Inspectorate (NPI) is the regulatory institution for the upstream segment of the oil and gas industry in Nigeria. NPI will assume the functions of the Department of Petroleum Resources (DPR) and it will be the upstream industry operation and technical regulator. It will have operational autonomy from the NPD unlike its predecessor the DPR, which traditionally derives its operational directives from the Minister of Petroleum Resources. The extent of NPI's strategic autonomy from the NPD, which serves as the secretariat of the Minister of Petroleum Resources is not clear. The terms of employment for the management positions in the NPI and the optimal approach to filling these positions either as political appointees or professionally recruited management staff are very important if the ongoing restructuring efforts are to be successful. Over the years, we have had as many former DPR Directors and GMDs as the number of Presidents or Heads of State. The undeveloped nature of the oil and gas industry regulatory framework in Nigeria is, therefore, not surprising to many industry observers. Thus, a confirmation process by the National Assembly for a fixed term appointment for the Director General of the upstream regulatory institution will enhance its service deliveries; but I would recommend against making Deputy Director General's (DDG) position a political appointee.

Petroleum Products Regulatory Authority (PPRA)

The Petroleum Product Regulatory Authority (PPRA), which has been designated to regulate the downstream sector of the oil and gas, is a stand-alone institution with no functional relationship with NPI. Alternatively, it could have been a division of the NPI. PPRA should be directed by a technically competent Deputy Director General (DDG) and not a political appointee. This arrangement would optimize the distribution of the limited skilled labor force available at this time both locally and in the Diaspora. This revised arrangement is also not expected to affect the already defined functions and funding of PPRA. The terms of employment for the management positions in the PPRA and the optimal

approach to filling these positions either as political appointees or professionally recruited management staff are very important if the ongoing restructuring efforts are to be successful. Thus, a confirmation process by the National Assembly for a fixed term appointment for the DG would enhance the institutional performance of PPRA.

Nigerian National Petroleum Company (NNPC Ltd.)

There is no doubt that restructuring the Nigerian National Petroleum Corporation (NNPC) is the focal point of the ongoing oil and gas sector reforms in Nigeria. The general observation by the public that NNPC has failed woefully to fulfill its charge is perhaps justifiable. It must be recognized, however, that its failure to attain the prospect to drive the national economy has not entirely been the corporation's error of judgment.[4] For example, there has been as many NNPC CEOs as were Heads of State or Presidents in Nigeria from 1976 to 2007. Thus, the degree of operational and strategic autonomy of the old NNPC from the national government in comparison to successful global NOCs is appalling. Ironically, most of these successful NOCs companies are as old as NNPC, which was created in 1976.

Therefore, the new goal is to reposition the new Nigerian National Petroleum Company, NNPC Ltd., on a level comparable to the status of successful National Oil Corporations (NOCs) worldwide, such as the Malaysia NOC (Petronas), Venezuela NOC (PdVSA), Norway Statoil, Algeria NOC (Sonatraco), Mexico NOC (PEMEX), Brazilian (NOC) and Saudi Aramco. The desired goal is to get the new corporation to a level in which the degree of operational and strategic autonomy from the government is similar to the Norway Statoil. The separation of commercial and business operations from regulatory and policy-making functions in the oil and gas sector in Nigeria will help NNPC Ltd. to be more focused, more so because the regulatory and operational functions of the oil and gas sector will henceforth be undertaken by separate and autonomous institutions, ceteris paribus.

The identity and corporate culture, NNPC Ltd., is expected to operate along the entire petroleum supply chain. This will make NNPC Ltd. a fully integrated oil and gas company. The envisioned ownership structure will enhance its ability to function as a purely commercial and capitalized business. The exclusion of NNPC current profitable assets from the take-off assets for the new National Petroleum Company, NNPC Ltd., however, may perhaps make the capitalization process of the national company difficult. The functionality of the board of directors in the governance structure of NNPC Ltd. is vague. There is also uncertainty as to the extent of the operational and strategic autonomy of the NNPC Ltd. from the influence and dictate of the Minister of Petroleum Resources.

National Petroleum Assets Management Agency (NAPAMA)

The National Petroleum Assets Management Agency (NAPAMA), like NNPC Ltd., is a commercial and operational institution empowered to undertake cost/commercial regulation of the oil and gas industry. It is conceived to manage all national assets and investments in exploration and production ventures to ensure maximum government returns and take statistics. It is paradoxical, however, for NAPAMA to regulate and control costs within the Incorporated Joint Venture (IJV) framework. The IJV concepts seek to convert all of the existing JV arrangements into autonomous commercial entities. Thus, how can NAPAMA regulate and control costs for the IJV companies who have autonomous boards of directors? An outright rejection of the IJV idea as currently proposed seems more likely than not in the national Assembly. Further, the idea is most likely dead on arrival at the door steps of the International Oil Companies operating in Nigeria, not because of its illegality, but the expediency of the concept. The biggest concern of all, of course, borders on international business ethics. The IJV concepts will be thwarted if the international community perceives the process as a form of petroleum assets nationalization.

National Petroleum Research Center (NPRC)

The National Petroleum Research Center (NPRC) is to be responsible for research and development in the petroleum industry in Nigeria. It is expected to pay a great deal of attention to upstream exploration and development issues and problems. As with NAPAMA, NPI, and PPRA, the nucleus of NPRC will be formed by the old NNPC R&D assets. This is going to be another drain on the NNPC Ltd. human resource capacity. The idea of a separate national oil and gas research center is redundant. All the NPRC policy functions could easily be handled by existing federal institutions. This is the rationale for the establishment of the existing Petroleum Technology Development Fund (PTDF) and the many departments of petroleum engineering and geosciences in Federal Universities and the Center for Petroleum Studies in Nigeria?

Concluding Remarks

The rationale for restructuring the oil and gas sector in a petroleum dependent economy like Nigeria should be to enhance the sustainability of petroleum wealth and its impact on all stakeholders. Undergoing such reforms presupposes that the current state of the industry is inefficient in service deliveries and ineffective at promoting society's welfare objectives. This notwithstanding, such reforms or restructuring must not only focus on enhancing industry effectiveness and efficiency, it must be mindful of equity issues with respect to wealth distribution among all stakeholders—governments, communities, and operators.

For an average citizen of Nigeria, the final question on OGIC reform is simple: Can the recommended oil and gas institutional structures and regulatory framework maximize the economic benefits of produced and remaining petroleum reserves in Nigeria for current and future generations? Yes it can! The regulatory framework and institutional structures espoused in the OGIC report could facilitate economic prosperity for an average citizen in Nigeria. However, the caveat or critical issue to keep in mind is recognition of the fact that petroleum is an exhaustible resource and a barrel of oil and gas produced and consumed in one generation is no longer available for the next generation. Yet, there is an opportunity loss if a barrel of oil equivalent of hydrocarbons being produced in this generation is not produced efficiently, effectively and equitably. Thus, hydrocarbons produced today must be used to develop durable infrastructures and human capital that benefit and advance society for generations to come. This is the way to render ineffective the "Dutch Disease," that has traditionally infected most natural resource dominated economies.

Footnotes

[1] Iledare O.O. (2008): Petroleum and the Future of Nigeria: Challenges, Constraints and Strategies for Growth and Development. IPS Monograph Series No.5, pp30. University of Port Harcourt's Institute of Petroleum Studies. Nigeria.

[2] Dr. Lukman, former OPEC administrator for many years, chaired the original OGIC inaugurated by President Obasanj in April 2000. Let me also add that Dr. Lukman has also been a major player in the Nigeria oil and gas policy development and implementation since the 1980s. Perhaps, public perceptions on the OGIC as a sort of "new wine in an old wine cloth" are legitimate.

[3] Oil and Gas Sector Reforms Implementation Committee Draft Final Report,pp79, May 2008.

[4] Nwokeji, G. U. (200): The Nigerian National Petroleum Corporation and the Development of Oil and Gas Industry: History, Strategies and Current Directions. Report Prepared in Conjunction with the energy Study Sponsored by Japan Petroleum Energy Center and the James A. Baker III Institute for Public Policy at Rice University.

Efficiency of the Energy Sector and its Impact on the Competitiveness of the Nigerian Economy

By Adeola Adenikinju*

Introduction

The oil sector has dictated the pace and structure of growth of the Nigerian economy since 1970. Oil contributed over US$391.6 billion to government revenue between 1970 and 2005. This accounted for 77.1 per cent of total government revenue over the period. Out of this amount, US$118.4 billion or 30.2 per cent was earned between 1999 and 2005. Similarly, the Nigerian economy has earned over US$593.6 billion from oil exports, representing 96.3 per cent of total foreign exchange earned between 1970 and 2005. Out of this amount, US$153.1 billion or 25.8 per cent was earned between 1999 and 2005.

The country is currently experiencing its longest boom ever. Oil booms have increased the consumption levels of both the government and the ordinary citizens, albeit, these levels have not been sustained nor translated into a permanent increase in the standard of living of Nigerians. The history of oil in Nigeria has been characterized by almost an equal measure of progress and retardation, blessings and curse, hope and hopelessness, wealth and poverty and inability to translate the good luck of oil to build an efficient modern society. Nigeria has experienced all the phases of oil – the good, the bad and the ugly.

Apart from its direct fiscal effects, the energy sector is strategic for increasing the competitiveness of the Nigerian economy, be it as a way of reducing overall energy costs or as a way to further modernize the technology used by economic agents and businesses. Countries have, therefore, taken significant efforts to ensure the efficiency of their energy sector. The focus of this presentation is on the efficiency of the energy sector, in particular, the power sub-sector and the extent to which this has impacted on the competitiveness of the Nigerian economy.

The Nigerian Energy Sector

Nigeria is fortunate to have huge energy resources, which potentially give the country ample opportunity to transform her economy and the lives of her citizens. Nigeria sits astride of over 35 billion barrels of oil, 187 trillion cubic feet of gas, 4 billion metric tones of coal and lignite, as well as huge reserves of tar sands, hydropower and solar radiation, among others.

For understandable reasons, Nigeria has not devoted equal attention to her abundant energy resources. Her efforts have been concentrated on the development, exploitation and utilization of crude oil and gas for fiscal objectives and the electric power to generate electricity to power the economy. Table 1 shows the profile of the Nigerian electricity industry infrastructure.

Generation	Pre-1999	Post-1999
- Thermal	4,058 MW	5,010 MW
- Hydro	1,900 MW	1,900 MW
Installed capacity	5,996 MW	6,910 MW
Available Capacity	1,500 MW	4,451 MW
Transmission.		
- 330kv line	4,800 km	4,889.2 km
- 132kv lines	6,100 km	6,284.06 km
Transformer capacity		
330/132KV	5,618 MVA	6,098 MVA
132/33KV	6,230 MVA	7,805 MVA
Distribution.		
- 33kv lines	37,173 km	48,409.62 km
- 11kv lines	29,055 km	32,581.49 km
- 415v lines	70,799 km	126,032.79 km
Transformer capacity	8,342.56 MVA	12,219 MVA

Source: Maigida (2008)

Table 1: Profile of the Electricity Industry Infrastructure

A key point that emerges from the table is that there has been very marginal improvement in electricity infrastructure over the years. Between 1985 and 2000, electricity generation capacity grew by a mere 10 per cent in Nigeria compared to 332 per cent in Vietnam, 142 per cent in Iran, 237 per cent in Indonesia, 243 per cent in Malaysia and 205 per cent in South Korea (Maigida, 2008). Electricity generation capacity is also far below comparator countries. Nigeria, with a population of over 150 million people, has an installed generation capacity of 6000MW compared to UAE 4740MW to a population of 4 million or South Africa that has 46000MW to 44million people.

Efficiency of the Nigerian Energy Sector

Energy efficiency is a concept expressed by a set of measures or the effects of those measures whose objective is a reduction of energy consumption such that consumer satisfaction is maintained. Energy efficiency is not simply confined to the manage-

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ment of demand, but can also be applied to production, transport and distribution of energy.

A common indicator of energy efficiency is the index of energy intensity which measures the quantity of energy required to generate one dollar unit of aggregate output. The lower the value of energy intensity, the more efficient an economy. Figure 1 shows the trend in energy intensities for selected countries – Nigeria, South Africa, Algeria, Brazil and China. Brazil has the most efficient energy sector, follow by Algeria and Nigeria, while South Africa and China have the least energy efficiencies. However, beyond this aggregate picture, is a more relevant picture of the trend in efficiency over time in each of the countries. From the trend in the graph, China recorded the highest improvement in energy efficiency over time. Algeria also recorded some improvements. Energy efficiency, however, remained fairly stable in South Africa, and Nigeria, while efficiency declined in Brazil.

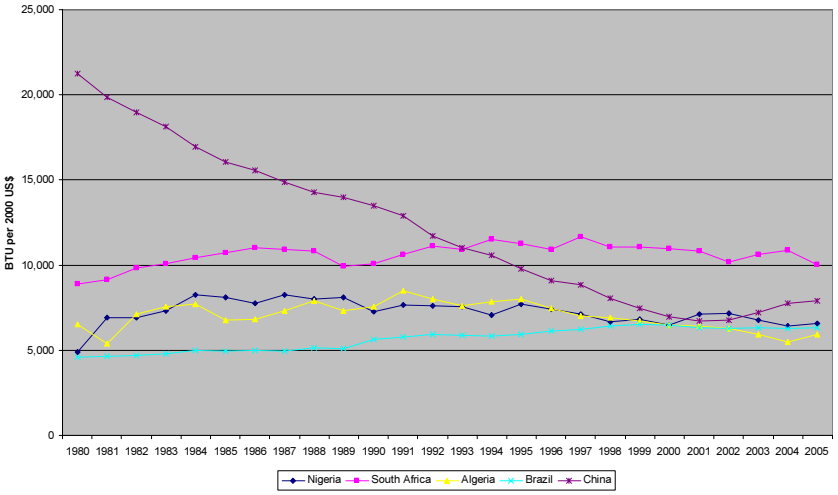


Figure 1: Trend in Aaggregate Energy Intensities for Selected Countries

Efficiency of the Power Subsector

The statistics on the power sector have been appalling. Only about 40 per cent of Nigerians have access to electricity. In terms of efficiency and performance, the Nigerian electric power sector has been rated by the UNDP/World Bank Report 1993 as having one of the highest rate of losses (33%), the lowest generating capacity factor (20%), the lowest revenue at 1.56c/kWh, the lowest rate of return (-8%) and the longest average account receivable period (15 months), among a group of 20 low income and upper income countries.

However, over a decade after the conclusion of the UNDP/World Bank Report, the story has not radically changed. Electricity tariffs are below the cost of service and there is poor revenue collection. According to Tallapragada and Adebusuyi, (2008), about 30-40 per cent of power supplied is never billed. The power sector incurs a cash loss of around US$2billion per month. Over US$400 million annually is spent by the Federal Government of Nigeria as an annual subsidy to cover losses and investment, an amount that is higher than the Federal budget for health.

Indicators	**Nigeria**	**Average Africa**	
		Low income Countries	**Middle Income Countries**
1.Technical efficiency:			
(i) Ingeneration capacity (MW)	598	918	13651
(ii) MW per million pop.	42	32	404
(iii) MW in operation condition as % of installed capacity	61	84	97
(iv) Per capita (kWh/cap)	173	141	1912
(v) Self-generated as % of electricity generated	42	10	0.7
2. Effective residential tariff (cents/kWh)	4.1	12	32
3.Quality			
Number of unplanned outages per year	1059	3082	39
4.Efficiency			
(i) Labour efficiency (ann. labour costs as % of operational expenses)	48	29	11
(ii) Average revenue (cents/kWh)			
5. Efficiency ratios (%)			
(i) T & D losses)	30	25	13
(ii) Cost recovery (based on effective tariff)	36	64	56
(iii) Implicit collection (based on effective tariff)	52	83	95
6. Total hidden costs of inefficiencies			
(i) as % of GDP	1.4	2.0	0.6
(ii) as % of utility revenue	229	125	13

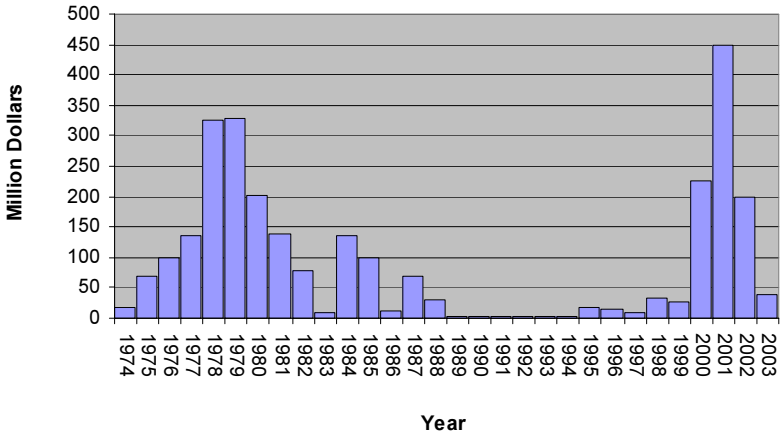
Source: Derived from Eberhard, A., V. Foster, C. Briceno-Garmendia, F. Ouedraogo, D. Camos and M. Scharatan (2008)

Table 2: Selected Power Sector Indicators of Performance for Nigeria and Africa, (2004-05)

Table 2 provides an interesting comparison of selected power sector indicators of technical and financial efficiencies between Nigerian and the average for a group of African countries. Nigeria efficiency performance on all counts is much worse than for a set of middle income African countries. In 2004/05, installed generation capacity in Nigeria was a mere 42MW per million people compared to 404MW for middle income African countries. The share of self electricity generated in total electricity generated in Nigeria was 52 per cent compared to less than 1 per cent for Middle income African countries. The number of unplanned outages in Nigeria was also 30 times more than what obtained in the former group of countries. Labor efficiency is also poorer in Nigeria. Labor costs account for 48 per cent of operational costs compared to 29 and 11 per cent for low middle and middle income African countries respectively.

A bane of the power sector remains the low funding of the sector as well as the inability of revenue to cover costs. Cost as a percentage of tariff declined from 83.3 per cent in 2001 to 42.6 per cent in 2003 before rising to 66.5 per cent in 2004. In view of other demands on its revenues, the government has shown itself unable to continue to shoulder past energy financing responsibilities. Figure 2 shows the historical funding levels by government for PHCN operations since 1974.

The problem of inadequate gas supply has also been an important challenge faced by the power sector. Gas currently accounts for 75 per cent and 67 per cent of installed and available electricity capacities in the country respectively. However, as the current experiences with the new power plants built by the government have shown, gas security will continue to pose a major challenge for the power plants now and in the near future.



Source: Makoju (2007) cited in Adegbulugbe and Adenikinju (2008)

Figure 2: The Low Growth Rate in the 80s and 90s was Due to Poor Funding & Neglect of the Nigerian Power Sector

Impact of Energy Sector Efficiency on the Competitiveness of the Economy

An evidence of the impact of the poor quality, unreliability and limited availability of power supply on Nigeria's economic development is its debilitating effects on the industrialization process. Nigerian manufacturers have consistently identified poor power supply as the most important constraint to their businesses. The majority of them have to supplement publicly supplied electricity with very expensive auto-generation. Removing the constraint of unreliable power generation will ,therefore, enhance the microeconomic response of the real sector to the various government incentives. Table 4 shows that respondents rank the two energy input electricity supply (93.2 per cent) and petroleum shortages (50.6 per cent) as either moderate or major obstacles to their businesses in Nigeria. Table 5 further shows the share of total investment devoted by firms to their own provision of electricity facilities. This costs as expecteds varies inversely with the scale of operations of the firms. Small scale firms spend on the average between 10 to 20 percent of initial investment on self generation compared to large scale firms that spend less than 10 percent. However, across all the firms, the additional investment costs borne by these firms to mitigate the unreliability of NEPA is an avoidable cost that simply increases the costs of business operations in Nigeria.

Station	Initial Capacity (MW)	Capacity Available (MW)	Capacity Operational (MW)	Comments
1. Gereku	414	414	140	Insufficient gas supply. Additional 434MW planned
2. Omotosho	335	300	75	Insufficient gas supply. Additional 700MW planned
3. Olorunsogo formerly Papanlato	335	300	75	Insufficient gas supply. Additional 700MW planned
4. Alaoji	515	0	0	Under construction. Additional 1000MW planned
Total	1599	1014	290	

Source: Oke (2008)

Table 3: Status of Government Owned Power Plants and Availability

Way Forward: Lessons for the Future

In spite of recent reforms, the challenges ahead are tremendous. A growing economy requires massive energy to power it. Recent estimates have shown that to achieve the Vision 2020 goal of making Nigeria one of the twenty largest economies in the world, electricity generation will have to increase from the present level of 3650MW to about 45000MW. The achievement of this projected generation capacity in the country will ensure that by 2020, per capita electricity consumption in Nigeria exceeds the critical minimum prescribed by the

Infrastructure	No	Moderate	Major
	-------Obstacle-------		
Land	8.1	4.9	4.3
Electricity	1.9	10.5	82.7
Water	19.8	13.6	4.3
Telecommunication	1.2	14.8	34.0
Road	13.6	6.8	1.2
Petroleum shortages	22.2	48.1	2.5

Source: Adenikinju (2003)

Table 4: Ranking of severity of Infrastructure Problem in Nigeria

United Nations but will still be below the 2003 figure for South Africa.

However, the current efforts to delivering the massive investment required to meet the national aspirations with respect to the energy sector have not been encouraging. Past reforms, because of the way they have been managed have not delivered on their promises. Actual electricity expansion continues to fall short of government projections. For instance, while government planned to deliver over 7000MW of electricity by 2007, actual delivery was under 3000MW.

However, there are several ongoing efforts to boost power supply in the future. These efforts involve both the government and private sector initiatives. The successful completion of these projects will no doubt contribute to enhancing the competitiveness of the economy.

Proportion	Small	Medium	Large
	-------Scale-------		
0 to 10 percent	28.8	35.5	56.0
10 to 20 percent	35.6	29.0	20.0
20 to 30 percent	10.2	25.8	14.0
More than 30 percent	25.4	9.7	10.0

Source: Adenikinju (2003)

Table 5: Proportion of Total Investment at Start Up Devoted to Provision of Own Electricity Facilities by Firm Size

Name	1st Phase Capacity (MW)	2nd Phase Capacity (MW)	Total (MW)
1. Installed hydro	1,900	0	1,900
2. Future Hydro	2,639	3,610	6,249
3. Installed thermal	5,976	1,922	7,898
4. Ongoing Thermal	4,793	2,400	7,193
5. Private IPPs	6,591	8,174	14,765
Total	21,899	16,106	38,005

Source: Oke (2008)

Table 6: Summary of Total Proposed Installed and Future Potential Capacities

What Do We Need To Do?

(1) Develop competitive energy markets: Competitive energy markets will play a major role in developing and deploying new technologies. Strong competition in the electricity markets has a positive effect on the efficiency of power generation, because market players want to minimize their costs and invest in efficient technologies. We need to enhance the efficiencies of end-use technology.

(2) Provide the environment conducive for private sector investments in the energy sector. Energy sector investments, whether for exploration and exploitation of energy minerals or for the establishment of downstream energy infrastructure such as power plants, transmission and distribution networks, are characterized by huge capital demands, a long term investment horizon and advanced technology. In addition, due to the low level of development of the domestic technological and industrial base, the demands for investment funds in foreign currency far outweigh that for local currency.

First is the issue of an appropriate electricity pricing framework that will enable investors not only recoup their investment but also allow the sector to generate funds for new investments for expansion as presently obtains in the telecommunication sector. Second, there is a need for an established policy related to the liquidity support that government is willing to provide to developers of gas to power infrastructure. Presently, each investor that arrives in Nigeria with a project concept negotiates its own support package, which is an undesirable outcome from at least two perspectives: (a) it constitutes an opaque, non-transparent process and takes up a great deal of time; and (b) it becomes difficult for government to periodically monitor, evaluate and manage its exposure to the various non-uniform support packages that are approved.

Third, development of alternative energy sources are important both to diversify our supply mix, and to provide access to Nigerians living in rural areas. Current statistics show that over 65 per cent of Nigerians live in the rural areas. These Nigerians, if deliberate efforts are not made, may be neglected by the current reforms as grid expansion may take a long time to get to them. Hence, there is an urgent need to consider non-grid supply options. Recent surveys by UNIDO and other agencies in Nigeria have shown huge potentials for small hydro plants, wind, solar, cogenerations and within the gate power supply options.

Fourth, urgently address the issue of gas supply security. Gas fired power plants currently dominate the power generation mix. The dominance of gas over other types of fuels for power generation is due to its relative abundance and the lower cost of gas fired power plants. However, in recent times the weakness of the structure of the power generation mix has become very glaring. First, gas supply is geographically localized in the Niger Delta region; and second, the incidence of disruption of gas supply pipelines, has increased, reducing power supply and causing significant social and economic losses. The unreliability of gas supply has rendered the power supply system unstable and unpredictable.

Conclusion

The energy sector has played a significant role in the economic development process, in particular through the provision of revenue to finance socio-development projects of all the tiers of government.

However, while the sector has largely fulfilled its fiscal objective, the inefficiency of the power subsector has constrained the competitiveness of the productive sectors of the economy and has imposed significant costs and distortions on the economy.

While the challenges of reforming the energy sector to make it deliver reliable and affordable energy inputs to the economy are huge, there are reasons to be hopeful. The Multi Year Tariff Order (MYTO) has been approved by the government, some institutional structure to ensure the competitiveness of the sector like the Nigerian Electricity Regulatory Commission (NERC) is in place. The government has approved the Gas Master Plan as well as New Gas Pricing and Allocation Policy. Nigeria now also has a National Electricity Master Plan, and the Electricity Reform Act has been enacted.

However, there is a need to address other issues that we have raised in this paper: appropriate funding, gas supply security, small power producers, maintenance of existing energy supply infrastructure, adequate coordination of activities among various stakeholders in the energy sector, expansion of transmission and distribution networks, and enlightenment of the public on issues of energy use efficiency. The government should also faithfully implement the recommendations of the Power Sector Reform Committee as well as the Oil and Gas Reform Committee.

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Matching Electricity Supply with Demand in Nigeria

By A. S. Sambo*

Introduction

Electricity plays a very important role in the socio-economic and technological development of every nation. The electricity demand in Nigeria far outstrips the supply and the supply is epileptic in nature. The country is faced with acute electricity problems, which is hindering its development notwithstanding the availability of vast natural resources in the country. It is widely accepted that there is a strong correlation between socio-economic development and the availability of electricity.

The history of electricity in Nigeria dates back to 1896 when electricity was first produced in Lagos, fifteen years after its introduction in England. Despite the fact that its existence in the country is over a century, its development has been at a slow rate. In 1950, a central body was established by the legislative council, which transferred electricity supply and development to the care of the central body known as the Electricity Corporation of Nigeria, now defunct. Other bodies like Native Authorities and Nigeria Electricity Supply Company (NESCO) have licenses to produce electricity in some locations in Nigeria. There was another body known as Niger Dams Authority (NDA) established by an act of parliament. The Authority was responsible for the construction and maintenance of dams and other works on the River Niger and elsewhere generating electricity by means of water power, improving and promoting fish brines and irrigation. The energy produced by NDA was sold to the Electricity Corporation of Nigeria for distribution and sales at utility voltages.

For over twenty years prior to 1999, the power sector did not witness substantial investment in infrastructural development. During that period, new plants were not constructed and the existing ones were not properly maintained, bringing the power sector to a deplorable state. In 2001, generation went down from the installed capacity of about 5,600MW to an average of about 1,750MW, as compared to a load demand of 6,000MW. Also, only nineteen out of the seventy-nine installed generating units were in operation.

The Energy Commission of Nigeria (ECN) was established by Act No. 62 of 1979, as amended by Act No. 32 of 1988 and Act No. 19 of 1989, with the statutory mandate for the strategic planning and co-ordination of national policies in the field of energy in all its ramifications. By this mandate, the ECN is the government organ empowered to carry out overall energy sector planning and policy co-ordination. As part of its contribution to the resolution of the problems of the electricity sector along the line of its mandate, the ECN has been collaborating with the International Atomic Energy Agency (IAEA) under an IAEA regional project titled "Sustainable Energy Development for Sub-Saharan Africa (RAF/0/016)".

The project entails capacity building for energy planning and the determination of the actual energy demand and the strategies for supply for each participating country over a 30-year time horizon. The implementation of the project requires the establishment of a Working Team (WT) and a Country Study Team (CST) both of which include the major public and private stakeholders in the energy sector of the country. The working team consists of technical experts that directly implement the project and reports to the CST, which serves as the steering committee for the project on a regular basis. Members of the WT were trained on the use of the IAEA models and have computed the Nigeria energy demand and supply projections covering the 2005-2030. The project involves the use of the following IAEA Energy Modelling tools:

- Model for the Analysis of Energy Demand (MAED)
- Model for the Energy Supply Strategy Alternatives and their General Environmental Impact (MESSAGE).

Energy Demand Projection

The energy demand projections were computed using MAED with the key drivers of energy demand, namely demography, socio-economy and technology. The application of MAED requires detailed information on demography, economy, energy intensities and energy efficiencies. This information is first assembled for a base year which is used as the reference year for perceiving the evolution of the energy system in the future. Selection of the base year is made on the basis of availability of data, assessment that the data are representative of the economic and energy situation of the country.

MAED allows the breakdown of the country's final

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energy consumption into various sectors and within a sector into individual categories of end-uses in a consistent manner.

The breakdown helps in the identification of the social, economic and technical factors influencing each category of final energy demand. In modelling the Nigeria's energy case, four economic scenarios were developed and used as follows:

- Reference Scenario - 7% GDP Growth;
- High Growth Scenario - 10% GDP Growth;
- Optimistic Scenario I – 11.5% GDP Growth; and
- Optimistic Scenario II – 13% GDP Growth (based on Presidential Pronouncement for the desire to be among the first 20 economies by 2020).

Economic growth and structure of the economy are the major driving parameters in the four scenarios. Projected electricity demand has been translated into demand for grid electricity and peak demand on the bases of assumptions made for T&D losses, auxiliary consumption, load factor and declining non-grid generation. Table 1 shows the electricity demand projections for the scenarios. It must be emphasized that the demand indicated for 2005 represents suppressed demand, due to inadequate generation, transmission, distribution and retail facilities. Suppressed demand is expected to be non-existent by 2010.

Scenario	2005	2010	2015	2020	2025	2030
Reference (7%)	5,746	15,730	28,360	50,820	77,450	119,200
High Growth (10%)	5,746	15,920	30,210	58,180	107,220	192,000
Optimistic I (11.5%)	5,746	16,000	31,240	70,760	137,370	250,000
Optimistic II (13%) Presidential Pronouncement	5,746	33,250	64,200	107,600	172,900	297,900

Table 1 Electricity Demand Projections Per Scenario, MW

For the 13% GDP growth rate, the demand projections rose from 5,746MW in the base year of 2005 to 297,900MW in the year 2030 which translates to construction of 11,686MW every year to meet the demand. The corresponding cumulative investment (investment & operations) cost for the 25-year period is US$ 484.62 billion, which means investing US$ 80.77 billion every five years within the period. In conducting the studies, all the available energy resources in the country were considered in order to broaden the nation's energy supply mix and enhance its energy security.

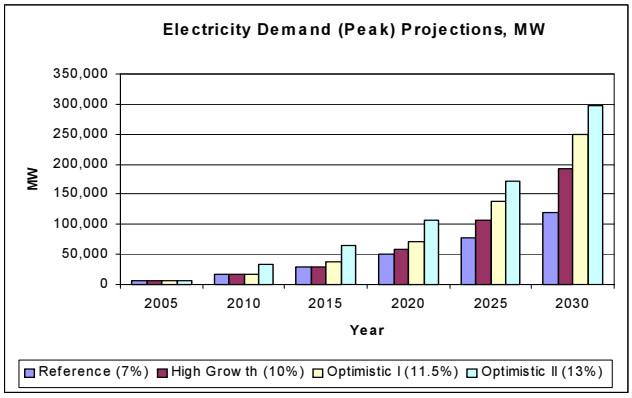

Figure 1: Electricity Demand Projection

Energy Supply Projection

The total energy supply were computed using MESSAGE and utilizes the projected energy demand as an input to produce a supply strategy. MESSAGE is an energy supply model, representing energy conversion and utilization processes of the energy system (or it's part) and their environmental impacts for an exogenously given demand of final energy. It is used for development of medium-term strategies, the planning horizon being in the order of 30 years. The time scope is limited due to uncertainties associated with future technological development. The energy system dynamics are modelled by a multi -period approach. It is an optimisation model which from the set of existing and possible new technologies selects the optimal in terms of selected criterion mix of technologies able to cover a country's demand for various energy forms during the whole study period.

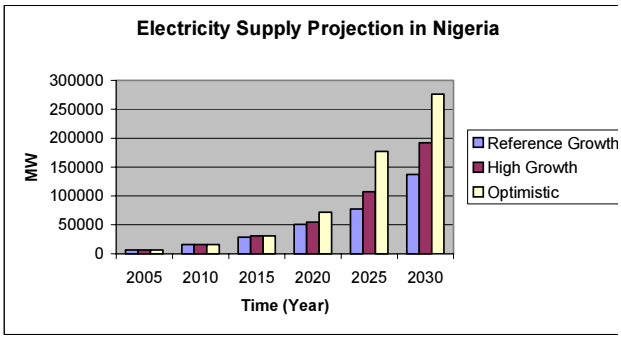

Figure 2: Electricity Supply Projection, MW

MESSAGE takes into account demand variations of various final energy forms during the day, week and year, as well as different technological and political constrains of energy supply. It is an energy and environmental impact model, enabling the user to carry out integrated analysis of the energy sector development and its environmental impacts. The application of the MESSAGE model results in a least-cost inter-temporal mix of primary energy, energy conversion and emission control technologies for each scenario. For the computation of Nigeria's Energy Supply

Scenario	2005	2010	2015	2020	2025	2030
Reference (7%)	6440	15668	28356	50817	77450	136879
High Growth (10%)	6440	15861	30531	54275	107217	192079
Optimistic I (11.5%)	6440	15998	31235	71964	177371	276229

Table 2

the same scenarios that was used in MAED are used. The result for the electricity supply projections is shown in table 2.

Available Resources for Electricity Generation in Nigeria

Nigeria is a country that is blessed with a lot of resources that can be used to generate electricity such as coal, natural gas, oil, hydro and other renewable energy sources.

Coal

Coal was first discovered in Nigeria in 1909. Coal mining in Nigeria began in 1916 with a recorded output of 24,500 tons. Production rose to a peak of 905,000 tonnes in the 1958/59 with a contribution of over 70% to commercial energy consumption in the country. Available data show that coal of sub-bituminous grade occurs in about 22 coal fields spread in over 13 States of the Federation. The proven coal reserves so far in the country are about 639 million tonnes while the inferred reserves are about 2.75 billion tonnes. Following the discovery of crude oil in commercial quantities in 1958 and the conversion of railway engines from coal to diesel, production of coal fell from the beginning of the sixties to only 52,700 tonnes in 1983 and contributed about 0.02% to commercial energy consumption in the country in 2001.

Nigeria's coal can be utilized for power generation, steam production, in cement production and for brick making; as a heat source and reducing agent for steel production; as a domestic fuel; and a feedstock for the production of chemicals, liquid fuels, gaseous fuels, batteries, carbon electrodes, etc. These potentials of coal need to be effectively harnessed into the country's energy delivery system and export commodity mix through the development of a vibrant coal industry.

Oil

Oil exploration in Nigeria witnessed steady growth over the past few years. The nation had a proven reserve of 25 billion barrels of predominantly low sulphur light crude in 1999. This substantially increased to 34 billion barrels in 2004 and currently is about 36.5 billion barrels. The growth in reserves is attributable to improved funding of Joint Venture operations, timely payment of cash call arrears, introduction of an alternative funding scheme, the emergence of new production sharing arrangements and the opening up of new frontier and deepwater / offshore blocks. Based on various oil prospects already identified especially in the deepwater terrain and the current (2006) development efforts, it is projected that proven reserves will reach about 40 billion barrels by year 2010 and potentially 68 billion barrels by year 2030. Oil production in the country also increased steadily over the years, however, the rate of increase is dependent on economic and geopolitics in both producing and consuming countries. Nigeria's current producibility is about 2.4 million barrels per day even though actual production is averaging around 2.4 million barrels per day partly due to the problems in the Niger Delta and OPEC production restriction. Average daily production is projected to increase to 4.0 million barrels per day by 2010 and potentially to over 5.0 million per day in year 2030. However, these high potentials will be realized only with the adoption of high exploration strategic development policies and programmes covering the inland basins of Niger Delta, Anambra, Benin (Dahomey), Benue and Chad Basins, the offshore continental shelves and deepwater offshore terrains.

In the downstream oil sub-sector, Nigeria has four refineries with a total installed capacity of 445,000 barrels per day and 5001 km network of pipeline from the refineries to 22 oil depots. The Federal Government also established petrochemical and fertilizer plants. The capacity utilization of these plants and facilities has been considerably low, due to the high level of decay arising from poor maintenance and operating conditions, under -funding, criminal vandalization especially on the pipelines, and the various companies' lack of management autonomy for efficient operation. Consequently, annual domestic demand for petroleum products is not fully met by internal production and has to be supplemented by imports.

Natural Gas

Nigeria's proven natural gas reserves, estimated at about 187.44 trillion standard cubic feet in 2005, are known to be substantially larger than its oil resources in energy terms. Gas discoveries in Nigeria are incidental to oil exploration and production activities. Consequently as high as 75% of the gas produced was being flared in the past. However, gas flaring was reduced to about 36% as a result of strident efforts by the Government to monetize natural gas. Domestic utilization of Natural gas is mainly for power generation which accounted for over 80% while the remaining are in the industrial sector and very neg-

ligible in the household sector. Given the current reserves and rate of exploitation, the expected life-span of Nigerian crude oil is about 44 years, based on about 2mb/d production, while that for natural gas is about 88 years, based on the 2005 production rate of 5.84 bscf/day.

New and Renewable Energy

Nigeria is endowed with abundant renewable energy resources, the significant ones being solar energy, biomass, wind, small and large hydropower with potential for hydrogen fuel, geothermal and ocean energies. The estimated capacity of the main renewable energy resources is given in the Table 3.

ENERGY SOURCE	CAPACITY
Large Hydropower	11,250MW
Small Hydropower	735MW
Solar Radiation	3.5 – 7.0 kWh/m^2-day
Wind	2 – 4 m/s (annual average) at 10m height

Source: Energy Commission of Nigeria; National Energy Masterplan

Table 3 Nigeria's Renewable Resource Estimate

Except for large scale hydropower which serves as a major source of electricity, the current state of exploitation and utilization of the renewable energy resources in the country is very low, limited largely to pilot and demonstration projects.

The main constraints in the rapid development and diffusion of technologies for the exploitation and utilization of renewable energy resources in the country are the absence of market and the lack of appropriate policy, regulatory and institutional framework to stimulate demand and attract investors. The comparative low quality of the systems developed and the high initial upfront cost also constitute barriers to the development of markets. Therefore, if the country is to unleash the enormous potential of its renewable energy resources on its drive to match electricity with demand and achieving the MDG's and Vision 2020, these barriers must be eliminated through significant investment in critical areas of R&D, building of indigenous human and manufacturing capacities and the intensification of the on-going economic reform to create an investor friendly environment.

Electricity Supply Mix

Large hydro accounted for about 31.30% of grid electricity generation by 2005 while natural gas accounted for the balance of 68.30%. One of the objectives of the study done with *MESSAGE* under the auspices of the IAEA was to find the optimal mix of fuels for the diversification of electricity supply in Nigeria. In the study, seven different fuel types were used for the optimization. These are natural gas, large hydro, coal, nuclear, small hydro, solar, and wind. Oil was not considered to be very expensive and was not used in the optimization. The shares of the different power generation technologies in the total installed capacity for the Reference Case are shown in Table 4. It may be noted that the share of hydropower (large and small) in the total installed capacity will decrease from 31.30% in 2005 to about 11% in 2030, while the share of natural gas based power capacity will increase from 68.30% in 2005 to 82.15% in 2010 and thereafter decrease to 62.95% in 2030. Coal and nuclear, which are not used for power generation at all at present, will account for 15.6 and 6.7% by 2030, respectively. Solar and wind are also projected to account for 8.3% and 1.8% respectively by 2030. The High Growth and Optimistic Scenarios follow similar supply patterns.

Fuel Type	**2010**	**2015**	**2020**	**2025**	**2030**
Coal	0.0	9.9	13.8	15.3	15.6
Gas	78.6	48.5	53.5	53.0	59.0
Hydro	21.3	18.9	13.6	10.7	8.6
Nuclear	0.0	9.4	5.3	8.3	6.7
Solar	0.1	13.1	11.0	10.4	8.3
Wind	0.0	0.1	2.9	2.3	1.8

Table 4 Future Installed Electricity Generation Capacity By Fuel (Reference Case), %

Energy Efficiency and Conservation

Although energy conservation and efficiency is not a resource per se, it is acknowledged that its adoption in the country can significantly mitigate the supply challenge. It is in recognition of this that the Federal Government of Nigeria recently approved the establishment of a National Centre for Energy Efficiency and Conservation. The Centre, which will operate under the auspices of the Energy Commission of Nigeria, is situated at the University of Lagos, in the commercial nerve centre of Nigeria. The Centre is charged with the responsibility for organizing and conducting research and development in energy efficiency and conservation. In this regard, the Centre shall carry out the following functions:

(i) develop guidelines for energy efficient end-use products and advise on their implementation;
(ii) develop energy efficiency codes, standards and specifications for domestic, industrial and commercial facilities;
(iii) gather, analyze and manage energy supply and consumption data and information;
(iv) serve as a Centre for training of high level manpower in energy efficiency and conservation;
(v) develop and execute pilot/demonstration project highlighting energy efficiency concepts;

(vi) disseminate information on energy efficiency and conservation concepts through public awareness programmes such as seminars, workshops, publications, etc; and
(vii) perform any other functions, as may be directed by the Federal Government.

Conclusion

Estimated total investments to meet the demand for the Optimistic Growth Scenario is US$ 484.62 billion. The Federal Government alone cannot provide this level of funding.

Indeed, the state governments, private sector and foreign investors must be involved. Moreover, all the country's energy resources need to be deployed in order to achieve matching supply with demand on a continuous basis.

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Clean Cooking Fuels & Technologies

By Wesley Foell, Shonali Pachauri, Daniel Spreng and Hisham Zerriffi*

Introduction

There is an increasing awareness of the crucial role which energy plays in the life of the world's impoverished – particularly, those 3 billion people who still depend on fuelwood, charcoal, agricultural waste and animal dung to satisfy their daily needs for cooking and heating. During the past few years, the energy economics community, and the IAEE in particular, has begun to devote more attention to the issues surrounding this problem. A concurrent session on *Energy and Poverty* was held at the IAEE 2004 European Conference in Zurich, followed by an informal post-conference session on this topic. This led to additional activities in subsequent IAEE conferences, including the Taipei International Conference (2005) and the 1st Asian IAEE Conference (2007). A primary reason for holding these workshops in conjunction with the IAEE international conferences was to sensitize the energy economics community, both at large and represented at these conferences, to this issue, and to increase awareness of the large knowledge and data deficit and the opportunities for business and research in this area.

With the financial support of British Petroleum, a pre-conference workshop on Clean Cooking Fuels and Technologies was organized in conjunction with the 31st IAEE International Conference in Istanbul on the 16th and 17th of June, 2008. The main objectives of the workshop were to bring together a diverse group of experts working on the issue of clean cooking fuels and technologies for the poor, in order to report on and assess the current status of achievements to date and to develop an agenda for future research and action. The Istanbul workshop was attended by more than 30 participants from a diverse set of disciplines, countries and stakeholder groups (Figure 1).

This article summarizes the workshop and its outputs. Details of the workshop, including the list of participants, submitted papers, and session summaries can be found on the Workshop Website: www.saee.ethz.ch/events/cleancooking

Who Were the Participants?

Institutional break-down

- NOC (Pertamina)
- IOC (BP, Shell Foundation)
- Academia/ Research
- Donors (gtz, US EPA)
- UN & WHO
- NGOs
- Industry (Enzen, WLPGA)

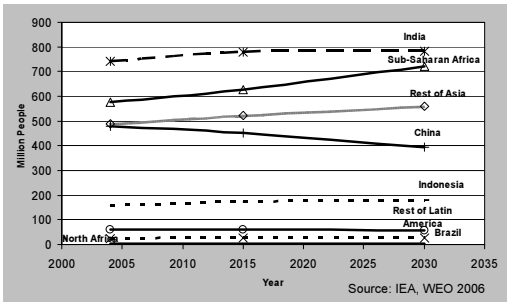
Geographical break-down

- South Africa
- Rwanda
- Tanzania
- Indonesia
- India
- Sri Lanka
- Turkey
- OECD

Background of the Problem

In developing countries, especially in rural areas, over 3 billion people rely on coal and traditional biomass, such as fuelwood, charcoal, agricultural waste and animal dung, to meet their energy needs for cooking. As shown in Figure 2, most of these live in Asia and Sub-Saharan Africa.

People Reliant on Traditional Biomass



In the absence of new policies and because of population growth, the number of people relying on biomass will increase from the current 2.5 billion to over 2.6 billion by 2015 and to 2.7 billion by 2030 (IEA, 2006). This means one-third of the world's population will continue to rely on these fuels. Use of biomass is not in itself a cause for concern. However, when resources are harvested unsustainably and energy conversion technologies are inefficient, there are serious adverse consequences for heath, the environment as well as social and economic development.

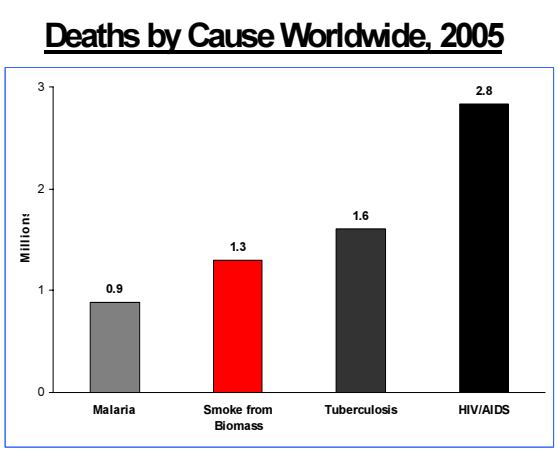
Approximately 1.5 million people – mostly women and children – die prematurely every year because of exposure to indoor air pollution from solid fuels (largely biomass and coal). Indoor air pollution associated with biomass is directly responsible for more deaths than malaria, almost as many as tuberculosis, and approximately half as many as HIV/AIDS (Figure 3, WHO, 2006). In addition, much valuable household time and effort is devoted to fuel collection instead of education or income generation, as indicated in a recent global cost-benefit analysis carried out on a regionally disaggregated basis by the World Health Organization (WHO, 2006). Significant environmental damage can also result, such as land degradation and regional air pollution.

* Wesley Foell is with Resource Management Associates, Madison WI, USA, Shonali Pachauri is with the International Institute for Applied Systems Analysis, Laxenburg, Austria, Daniel Spreng is with the Energy Science Center, Swiss Federal Institute of Technology, Zurich, Switzerland and Hisham Zerriffi is with the Liu Institute for Global Issues, University of British Columbia, Vancouver BC, Canada. This is a report from the Energy & Poverty Workshop at the 31st International IAEE Conference in Istanbul.

Potential Solutions to the Problem

Two complementary approaches can improve this situation:

- promoting more efficient and sustainable use of traditional biomass;
- encouraging people to switch to modern cooking fuels and technologies.



Note: Worldwide deaths from all causes in 2005 totalled 58 million.
Sources: Unpublished WHO analysis and WHO, 2005.

The appropriate mix depends on local circumstances such as per-capita incomes and the availability of a sustainable biomass supply.

Halving the number of households using traditional biomass for cooking by 2015 – a recommendation of the United Nations Millennium Project – would involve 1.3 billion people switching to other fuels. **In other words, to meet this target an additional 500,000 people have to get access to improved cooking energy every day.** Alternative fuels and technologies are already available at reasonable cost. Needed now is vigorous and concerted government and entrepreneurial action, together with increased funding from both public and private sources. Policies to promote cleaner, more efficient fuels and technologies for cooking must address barriers to energy access, affordability and supply, and form a central component of broader development strategies.

Workshop Structure

The stated major themes of the workshop were:

- Analysis of successes/failures of past policies to improve access to cleaner fuels and technologies
- Strategies of suppliers of modern technologies and fuels; substitution, market creation
- Role of the private sector in financial leveraging, venture capital, and business models to scale-up successful initiatives
- The role of the government and public policies, particularly as regards pricing and providing the regulatory framework needed to attract private participation
- Ways of making energy provisioning for the poor a central component of broader development strategies.

Based on these themes and an IAEE *Call for Workshop Papers* in late 2007, thirteen papers/presentations were accepted and posted on the workshop website prior to the workshop. An additional seven presentations were "commissioned" by the workshop organizers, mostly in background areas which laid out the problem, frameworks of analysis, and the status of potential approaches and solutions. The first day of the workshop was devoted to these commissioned presentations and two panels in which the thirteen papers were presented and discussed. On the second day the participants divided into three breakout sessions:

- Public Policy
- Business/Commercial Issues
- Embedding Household Fuels Issues into the Development Process

The deliberations and outputs of the breakout sessions were then discussed in a final plenary session, resulting in conclusions, recommendations, and development of agenda for the future.

Summary of Major Conclusions, Recommendations and Future Agendas

The workshop brought the following clearly to light:

- The challenge is immense. There is no question that the various approaches adopted (improved stoves, new forms of biomass, commercial fuels, e.g., LPG, etc.) are in competition, yet all approaches are needed. The success of any of the approaches depends critically on the local institutional and physical environment.
- Recently, there have been some examples of rather successful programs: a switch from electric cooking to LPG in South Africa; a switch from kerosene to LPG in Indonesia; major use of improved cook stoves in a Uganda; and a pilot project in India with the improved cook stove financed by BP. These programs have been dealing with household numbers in the order of 100,000 per year, not in the thousands as in previous programs, but not yet on the order of 100,000 per day, which would be what is associated with meeting Millennium Development Goals.

- While in the past, most programs have been either government financed or supported by international donor funding, there is now growing recognition of the market opportunities for interventions by large energy corporations. New actors are beginning to enter the field and there are significant opportunities for research and the energy business. Key to this happening in a country is a low risk and stable environment, coupled with transparency and good governance at the national level.

Below is a set of recommendations that came out of the two day workshop. These recommendations are in the form of:

1) A research agenda,
2) An action agenda, and
3) A set of activities that the IAEE and its members can undertake to engage in this issue. Each of these is dealt with separately below.

Research Agenda

A key conclusion of the workshop is that there is a huge data and knowledge deficit on this issue. Significant research is required in order to strengthen evidence-based action/policy if progress is going to be made in changing the trends discussed above. The current and potential market for clean cooking fuels and technologies is not well understood, including the role that different actors, including the business community, could play. While the markets are naturally segmented according to income, there are many distortions in both traditional and modern fuels.

Better understanding and appreciation of household-level decision making factors is important, particularly gender and culture specific power factors, cash versus other drivers of adoption, and willingness to pay. Understanding is also lacking on the use of incentives to switch fuels, the potential role of microfinance operations, how manufacturers can participate in creating markets, and how supply-chain problems might affect these markets. Much could be learned from analysis of the efforts of multi-national corporations in other economic sectors to create markets at the bottom of the income pyramid.
Specific research needs include:

- **Basic economic research:** Application of formal theories, development of new theoretical models and empirical analysis on fundamental economic factors (e.g. demand elasticities for various traditional and modern fuels, price formation, market structure and segmentation) is needed in order to generate new insights into the problem.
- **Technology diffusion studies:** Many of the technologies necessary to alleviate the energy poverty problem exist. However, diffusion of technologies lags behind the need for such technologies. Specific case studies as well as further development of technology diffusion models would aid in understanding and overcoming diffusion barriers.
- **New modeling approaches:** There are a number of energy-economic models in existence. However, their application in rural areas has been limited. Further application of such modeling tools (e.g. Markal) and development of new tools would help provide further understanding of the drivers of change in these areas.
- **Institutional economics studies:** Institutions across a wide range of scales (from the household to international organizations) have an impact on energy choice and usage in rural areas. A better understanding of the institutions at play in the rural energy sector and how they impact decision-making is critical to understanding how these markets are structured and the options for changes in rural energy systems.
- **Welfare impact and evaluation studies:** Creating effective energy poverty alleviation programs requires an understanding of the impacts of such programs on human welfare. Improved data collection and analysis on specific projects, as well as comparative analysis, is necessary.
- **Analysis of the nexus between energy and developmental economics:** Incorporating energy into development economics and vice-versa would hopefully advance our theoretical understanding in both these areas.
- **Study of linkages to the climate change problem:** There are numerous linkages between the clean cooking fuels issue and climate change, both in terms of the impact that the use of biomass resources can have on the climate and the impact that climate change may have on the biomass resources that households depend upon. Understanding how these are linked and how they play into the concepts of burden sharing, adaptation funding and other international debates is critically important as the post-2012 climate change framework is being negotiated and then implemented.

Action Agenda

Complementing the above agenda for targeted research is a commensurate urgent need for timely action to move forward the implementation of policy development and specific private/public sector projects. A recurring theme at the workshop was the need for specific approaches to increase public and government understanding of the cooking fuels/technology problem. A general consensus was that this would lead to greatly improved decisions by governments, the private sector and civil society in promoting and implementing the needed energy interventions. "Cross-country" networking and learning mechanisms could be very useful toward this goal.

Specific programs for increased information are a high priority, both for enhancing the above research, but also for increasing the government and public understanding of the magnitude of the problem. This includes increased capacity-building efforts for dealing with the problem at all levels of government.

The identified action areas include:

- **Data and Analysis:** Programs, including protocols, for enhanced data collection, monitoring, evaluation and dissemination
- **Societal Awareness:** Increased broad-based societal awareness programs
- **Policy Tools:** Development and institutional embedding of better policy formulation tools; specific "policy tool kits", similar to those used in other energy sectors are needed to aid policy makers in understanding the needs to be addressed, the options available, and the implications of different policies.
- **Role of Government:** Improved communication, interaction and coordination with and within government agencies
- **Business Models:** Development and promotion of new business models, e.g., micro-financing and public/private partnerships, such as the proposed LPG Investment facility.
- **Philanthropy:** Pursuing the establishment of clean cooking fuels programs with "new philanthropists" in emerging economies.
- **Large Energy Users:** Examination of the potential role for larger energy users (such as schools, clinics, agricultural producers, etc) to act as initial adopters of cleaner technologies.
- **Private Sector Participation:** Exploration of mechanisms to encourage greater private sector participation in the huge emerging market, including providing a stable investment environment, reducing business risks, and creating incentives for R & D

Role for the IAEE

The research and action agenda items above can be undertaken by individual members of the IAEE. This would include academics that may now turn their attention to a market they had not studied before or a member from industry that explores the potential to expand their market into this area. However, given the particular make-up and focus of the International Association for Energy Economics, there is clearly a role for the IAEE to play as an organization. The growing importance of emerging energy markets in global energy use means that these emerging economies are also of growing importance for the IAEE. This can already be seen in the appearance of energy & development on the conference topics list and in various keynote addresses. However, there is much more that can be done:

- More workshops, special sessions, special issues of publications and, of course, research by individual members
- Encouragement for regional affiliates from the South and regional meetings
- Strengthening support for participants from new affiliates
- Exploration of special sponsorship possibilities with industry

Future Steps

The research and action agendas above, as well as the specific potential roles for the IAEE and the broader energy community, suggest a number of potentially significant follow-up activities. In addition, a number of excellent ideas have been put forward individually by various workshop participants. Some of these include projects involving specific participants, outreach to other ongoing projects and networks, potential publication efforts, and targeted research/action activities. There have been suggestions to publish the papers and materials produced for the workshop either in the form of a book or a special journal issue. This would require additional effort to produce some new materials and to edit what has already been submitted. In the meantime, comments, contributions and suggestions from all *IAEE Energy Forum* readers are most welcome.

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References

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World Health Organization, (2006), evaluation of the Costs and benefits of Household Energy and Health Interventions at Global and Regional Levels, Geneva

Website of *IAEE Pre-Conference Workshop on Clean Cooking Fuels and Technologies*, June 1008: www.saee.ethz.ch/events/cleancooking

Participants in the Clean Cooking Fuels and Technologies Workshop at the Istanbul Conference

Announcement

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

January 4, 2009, Hilton Hotel

2:30 pm, Union Square 5 & 6 Room

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. All delegates are invtied to attend the USAEE/IAEE cocktail party held during the ASSA meeting.

Welcome New Members!

The following individuals joined IAEE from 7/1/08 to 9/30/08

Nathan Abercrombie
USA

Tolulope Adegabi
University of Surrey
United Kingdom

Parviz M Adib
APX Inc
USA

Nodir Adilov
IPFW
USA

Julius Nkenchior Aguni
Shell Pet Dev Co Ltd
Nigeria

Olumoye Ajao
Germany

Joseph E Akpokodje
Earthguards Limited
Nigeria

Adel Mohammed Al Gosaibi
Dhahran Global Co for Oil and Gas
Saudi Arabia

David S Anderson
Sonoran Energy Inc
USA

Fritz Andreas
Germany

Chinwe Ruth Anyanwu
United Kingdom

Nicholas Apergis
University of Piraeus
Greece

Kathleen Arano
Fort Hays State University
USA

Mohammed Asharaf el Sayed
Institute of Manufacturing
Egypt

Shahzeen Attari
Carnegie Mellon University
USA

Danny Auerswald
Germany

Belinda Barr
Deloitte
USA

Luiz Augusto Barroso
PSR
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David Baumann
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Andrew Berdy
Constellation Energy
USA

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Ramboll Oil and Gas
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Timothy Considine
University of Wyoming
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Matthew Cumbie
USA

Isyaku Dahiru
PHCN Headquarters
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Leonardo De Lella Ezcurra
Argentina

Haliru Dikko
Nigerian Electricity Reg Comm
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Cheryl Dooley
Simpson and Assoc
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Renato Skaf dos Santos
Lighthouse Business Development
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Aodhagan Downey
Ireland

Alexander B Dunn
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George G Eberling
USA

Matthias Edel
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Guven Eraktas
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Anke Esser
Univ Karlsruhe
Germany

Natalia Evtushenko
Mexico

Harrison Fell
Resources for the Future
USA

Daniel Fipke
International Student Energy Summit
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Francisco Flores-Macias
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Marco Frias
Columbia University
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Janice Tran
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Niamh Troy
University College Dublin
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Bill Tubbs
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Ibrahim Tutar
Turkey

Garen Vartanov
Shell
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The French Student Chapter of IAEE

The French Student Chapter includes 49 PhD student members belonging to 13 different research groups from university or higher educational establishments in Paris and elsewhere in France. These 49 students work in energy economics on various topics (including topics dealing with environmental issues, electricity, gas, fuel and so on). This diversity is a guarantee of profitable exchanges between us. We are supported by many professors in the field of energy economics and by persons working in the French government (ministry for industry and raw materials) and in some companies like EDF, GDF-SUEZ, Total, AREVA, AFD, etc.

Aude LE LANNIER, President of the French Student Chapter

Our main objective is to continue the animation of this network and the extension of it. For this purpose, we organize two meetings a year. These seminars constitute an opportunity for PhD students to present their work (PhD projects, reviews of literature, working papers, articles for publication). Speakers can benefit from a report by academic or professional senior people, and from intense discussions with all participants.

To further increase the richness of the discussions, at the next seminars, we plan to invite researchers from other disciplines like management, sociology or history, working in the field of energy, for an expanded view of economic analysis in the energy sector.

Léa BARUCH-GOURDEN, Vice President of the French Student Chapter

In addition, an innovation of the new board elected in February 2008 is to organize several special seminars relating to a particular research issue, the use of specific theoretical tools or the methodology of the thesis. The next seminar of this type will include all the PhD students working on “the carbon market”.

The website for the French Student Chapter is http://www.aee-france.fr/aeese/se_index.htm and for the National French Chapter, http://www.aee-france.fr

Léa BARUCH-GOURDEN

AAEE
Austrian Association for Energy Economics

The 10th IAEE European Conference

7-10 September 2009
Hofburg Congress Center
Vienna, Austria

at times of high energy prices

Energy, Policies and Technologies for Sustainable Economies

Call For Papers

We are pleased to announce the Call for Papers for the 10th IAEE European Conference entitled *Energy, Policies and Technologies for Sustainable Economies*. The conference, hosted by the Austrian Association for Energy Economics and IAEE, is scheduled for 7-10 September 2009 at the Hofburg Congress Center, Vienna, Austria.

The core objective of this conference is to bring together young and senior scientists, policy makers, energy sector professionals, and representatives of governmental and non-governmental organisations from across Europe (and beyond) to present and discuss economic research, industrial developments, and policy issues in the energy arena, primarily as they relate to Europe.

Papers are invited on a wide variety of topics and not limited to those listed in this flyer. Please submit abstracts of up to two pages in length, comprising: **1. Overview 2. Methods 3. Results 4. Conclusions**

Conference Themes and Topics

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

- Scenarios for global and local paths towards sustainable energy systems
- Efficient exploitation and use of renewable and exhaustible energy sources
- Review of national and international energy and climate policy strategies
- Adaptation technologies for climate change
- Technological learning and innovations
- Strategies towards increased energy supply security
- Demand-side efficiency and demand-side conservation strategies in households, industry, transport and commercial buildings
- Energy markets: Price developments, market power, trading issues, re-regulation of energy markets, ownership structure

Format

- Prepare abstracts in Microsoft Word using the abstract template provided on http://www.aaee.at/2009-IAEE/
- Attach a short CV
- The lead author submitting the abstract must provide complete contact details: affiliation, mailing address, phone, fax and e-mail. At least one author of an accepted paper must pay the registration fee and attend the conference.

TU VIENNA Technische Universität Wien / Vienna University of Technology

IAEE www.iaee.org International Association for Energy Economics

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Energy Economics Group

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Submissions

Abstracts, CVs and contact details should be submitted through the conference website:

http://www.aaee.at/2009-IAEE/abstractupload.php

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: 3 April 2009

Authors will be notified by 8 May 2009 of their paper status. Accepted abstracts will be published in the printed abstract volume. Related documents are available on the conference website:

http://www.aaee.at/2009-IAEE/

Programme Committee

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About Vienna

Vienna is located in the very heart of Europe - this is of benefit to all participants, who will be able to reach Vienna easily either by plane or train. But not only travelling to Vienna is easy - the Viennese public transport offers good connections and easy accessibility within the whole city. With this service our delegates will also be able to explore Vienna. In Vienna, tradition is not only on exhibit in museums but is a pulsing part of every-day life. Delegates to our meeting as well as accompanying persons will not be bored while exploring the city aside the conference.

Conference Venue

Hofburg Congress Center, located in the very centre of Vienna, offers a unique ambience for hosting the 10th IAEE European Conference. The Hofburg Palace complex was built between the 13th - 20th centuries. The different wings of the former imperial residence of the Habsburgs portray the architectural periods of Gothic, Renaissance, and Baroque up to Classicism.

Until 1918 the Hofburg Palace was the seat of the Habsburg dynasty. The conference will be held in the same halls where the Emperors held their audiences, gala dinners and royal balls, or where Empress Maria Theresia was baptised on 15 May 1717.

The Hofburg's historical chambers have maintained their original character, and are furnished with modern technical equipment and offer a stunning backdrop for an exceptional IAEE European Conference.

Accommodation

The organising committee has contacted a few hotels near the Hofburg Congress Center (covering different categories) offering favourable accommodations. A corresponding list for the delegates can be found on the conference website.

We are looking forward to seeing you in Vienna!

Prof. Dr. Reinhard Haas
Programme Committee Chair

Dr. Hans Auer
General Conference Chair

iaeeu2009@eeg.tuwien.ac.at
http://www.aaee.at/2009-IAEE/

THE FUTURE OF ELECTRICITY: PAPERS IN HONOR OF DAVID NEWBERY

Special Editors: Richard J. Green and Michael G. Pollitt

Each of the authors of this Special Issue has made a significant contribution to the theme of The Future of 'Electricity'. Paul Joskow offers a masterly review of the learning from two decades of electricity reform. Stephen Littlechild and Michael Pollitt discuss how regulation of electricity and gas network regulation might develop. Littlechild lays out alternatives to regulation and Pollitt discusses how the UK energy regulator should respond to future challenges, including climate change concerns. Richard Green reflects on the wholesale market design differences between the U.S. and Europe, suggesting that the model used in many U.S. markets has advantages which may become more important as the industry responds to climate change. Catherine Waddams Price demonstrates that there remain serious doubts about how well competition is working for domestic electricity and gas customers, even in the most liberalized of markets, the UK. Ignacio Pérez-Arriaga and Pedro Linares look at the role of indicative planning in the electricity sector and whether it is likely to be effective. Finally, Karsten Neuhoff makes the case for subsidy of strategic roll-out of new electricity technologies in order to exploit economies of learning by doing.

CONTENTS

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Publications

Energy. Joseph M. Dukert (2008). 200 pages. Price: US$55.00. Contact: Greenwood Publishing Group, P.O. Box 6926, Portsmouth, NH 03802-6926, USA. Phone: **1-800-225-5800. URL:** www.greenwood.com

U.S. Energy Independence: A Plan for Energy Independence by 2020. Walter R. May (2008). 168 pages. Price: US$20.00. Contact: SFA International, Inc., 6143 Sienna Arbor Lane, Houston, TX, 77041, USA. URL: www.SFAInternational.com

Calendar

10-13 November 2008, Leadership & Team Dynamics in Oil & Gas Projects at Traders Hotel, Dubai, UAE. Contact: Kim Adams, 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: kadams@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: Kim Adams, 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: kadams@thecwcgroup.com URL: http://www.thecwcgroup.com/train_detail_home.asp?TID=32

13-14 November 2008, Platts The Nodal Trader at Hyatt Regency Jersey City, Jersey City, New Jersey. Contact: James Gillies, Platts. Phone: 781-430-2110 Email: james_gillies@platts.com URL: http://www.platts.com/Events/2008/pc846/

23-24 November 2008, International Transfer Pricing for Oil & Gas at Dubai, UAE. Contact: Conference Administrator, The Conference Connection Inc, Raffles City PO Box 1736, Singapore, 911758, Singapore. Phone: 65-6222-0230. Fax: 65-6222-0121 Email: info@ccgroupevents.org URL: www.cconnection.org/tphome.htm

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@oxford-princeton.com URL: http://www.oxfordprinceton.com/search/coursedetails.asp?ID=318&PLP=LNG1%5CBGBR08

27-29 November 2008, Pan European Institute 20th Anniversary Conference: Energy Challenges in Northern Europe at Turku, Finland. Contact: Hanna Makinen, Project Planning Officer, Pan European Institute, Turku School of Economics, Rehtorinpellonkatu 3, Turku, 20500, Finland. Phone: 358-2-481-4563 URL: www.tse.fi/pei

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

9-11 December 2008, DeepGulf 2008 at New Orleans, LA. Contact: Sandra Gregory, Corp Support Svc Mgr, Quest Offshore, 1600 Hwy 6, Ste 300, Sugar Land, TX, 77478, USA. Phone: 281-491-5900. Fax: 281-491-5902 Email: sandra.gregory@questoffshore.com URL: www.questoffshore.com

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

2-2 February 2009, Executive Master of Petroleum Business Engineering at Groningen. Contact: Andrea Poelstra-Bos, Account Manager, Energy Delta Institute, Laan Corpus den Hoorn 300, PO Box 11073, Groningen, 9700 CB, Netherlands. Phone: 31-0-50-524-8319. Fax: 31-0-50-524-8301 Email: poelstra-bos@energydelta.nl URL: www.energydelta.com

2-2 February 2009, Executive Master of Petroleum Business Engineering at Groningen. Contact: Andrea Poelstra-Bos, Account Manager, Energy Delta Institute, Laan Corpus den Hoorn 300, P.O. Box 11073, Groningen, 9700 CB, Netherlands. Phone: +31 (0)50 524 8319. Fax: +31 (0)50 524 8301 Email: Poelstra-Bos@energydelta.nl

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

9-11 February 2009, Refining – Strategic Operational and Commercial Drivers at Traders Hotel Dubai. Contact: Kim Adams, Miss, CWC School for Energy, London, United Kingdom. Phone: 44 020 7978 0042 Email: kadams@thecwcgroup.com URL: http://www.thecwcgroup.com/train_detail_home.asp?TID=37

20-23 February 2009, NanoBusiness Summit: "Big Capital Meets Small Tech" at Egypt. Contact: Neveen Samy, SabryCorp Ltd. for Science and Development., 4 Al-Sabbagh St., El Korba, Cairo, Egypt. Phone: +20 2 2414 6493. Fax: +20 2 2415 0992 Email: neveen.samy@sabrycorp.com URL: www.nanobus.sabrycorp.com

22-24 March 2009, 2nd Latin American Meeting on Energy Economics: Energy Security, Integration and Development in Latin America at Santiago, Chile. Contact: Conference Coordinator, ELAEE, Vicuña Mackenna 4860, Macul, Santiago, Chile. Phone: 56 2 3541411. Fax: 56 2 5521608 Email: info@elaee.org URL: www.elaee.org

March 29, 2009 - April 2, 2009, Nanotech Insight: "Because Small Matter is no Small Matter" at Spain. Contact: Neveen Samy, SabryCorp Ltd. for Science and Development., 4 Al-Sabbagh St., El Korba, Cairo, Egypt. Phone: +20 2 2414 6493. Fax: +20 2 2415 0992 Email: neveen.samy@sabrycorp.com URL: www.nano-insight.sabrycorp.com

March 31, 2009 - April 2, 2009, MCE Deepwater Development 2009 at Copenhagen, Denmark. Contact: Sandra Gregory, Corp Support Svc Mgr, Quest Offshore, 1600 Hwy 6, Ste 300, Sugar Land, TX, 77478, USA. Phone: 281-491-5900. Fax: 281-491-5902 Email: sandra.gregory@questoffshore.com URL: www.questoffshore.com

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IAEE ENERGY FORUM

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