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INTERNATIONAL ASSOCIATION for ENERGY ECONOMICS

IAEE Energy Forum

Third Quarter 2011 International Association for Energy Economics

President's Message

I am writing you from beautiful Stockholm, at the completion of the 34th International IAEE conference. The conference was a huge success. The organizers did an outstanding job; I congratulate and thank Lars Bergman, Thomas Tangeras and Joana Padoan for putting together an exceptional event. The Stockholm conference attracted nearly 500 delegates and received 499 abstracts, the most abstracts of any IAEE conference to date.

The IAEE has been very active in the first half of 2011. As the world economy hobbles along, the IAEE has weathered the global downturn and tepid recovery quite well. Our membership is up, our finances are in good shape, we are holding successful conferences around the world and our new journal is near publication.

The association is in a very sound financial position. Our net income is up 13 percent from a year ago. IAEE membership was 3764 in May, up by 188 members from a year earlier. This includes 680 student members, 137 more than a year ago. We are forging ahead into new countries and continents, with new affiliates in Russia and Argentina. We are developing new affiliates in Poland, Benelux and Qatar.

We have also established a new regional affiliate structure: The LAAEE, the Latin American Association for Energy Economics, is an umbrella organization for all Latin American countries without enough members to support an affiliate by themselves. Argentina, Brazil, Chile, Colombia, and Uruguay are part of the LAAEE. Even though Argentina and Brazil are affiliates, they are also members of this new organization. The LAAEE held its inaugural meeting in April in Buenos Aires, and Gerardo Rabinovich of Argentina was elected president. The LAAEE's fourth meeting will occur April 2013 in Montevideo, Uruguay.

We lost affiliates in Greece and China, but are pushing ahead with leads in India. We are also encouraging more Thematic Workshops, to be planned by affiliates. These events are designed as either half- or full-day to foster cooperation and communication between affiliate members and local professionals on topics of mutual interest.

The "Member-Get-A-Member Campaign" has been a great success. We've added 193 members since it began in May 2009. Direct members get three free months for a referral and if the referring member is an affiliate member, the affiliate receives discounted annual IAEE annual dues.

We also have several new developments on the publications front. Energy Journal articles now carry DOI numbers, which should make it easier for researchers to track articles. The Energy Forum is also going strong. The second-quarter issue was on Asia and Russia; the third-quarter issue will be on the effects of Fukushima.

Our blog, International Energy, edited by Joe Marroquin, seeks associate editors. Our aim is to post timely and relevant articles on a consistent basis. If you're interested in writing for the blog or finding authors to post, please contact Dave Williams or Joe Marroquin. We welcome your contributions.

Economics of Energy and Environmental Policy (EEEP) will debut January 2012. Editor-in-Chief Jean-Michel Glachant, Managing Editor Sophia Ruester, editors Paul Joskow and Michel Pollit and IAEE headquarters have worked diligently on the first issue. You can see the list of inaugural-issue articles at http://www.iaee.org/en/publications/eeepnextissue.aspx. EEEP will target a wide audience. It will be scholarly, yet easily accessible, with short pieces on energy and environmental policy issues. I invite you to submit your short policy articles to our new journal.

(continued on page 2)

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CONTENTS

Editor: David L. Williams

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

IAEE conference activity is robust. We've already had successful meetings in Buenos Aires, Abuja and Stockholm. The Stockholm gathering featured two innovations—variants on our concurrent sessions, Collaborative Conversations and Discussant Sessions. Collaborative Conversations were papers on the same topic by academics and business people, forming the basis for interactive discussion. Discussant Sessions featured longer papers with discussants. Both new formats were extremely successful and drew enthusiastic reviews.

There are many conferences to look forward to—the first is the 30th USAEE North American Conference, "Changing Roles of Government, Industry and Research," in Washington, Oct. 9-12 (http://www.usaee.org/usaee2011/). Next up is the third IAEE Asian conference, "Growing Energy Demand, Energy Security and the Environment in Asia," in Kyoto, Japan, Feb. 20-22, 2012. The 35th IAEE International Conference will be in Perth, June 24-27, and the 12th European Conference will be in Venice, Sept. 9-12, 2012.

Have a great summer and a productive rest-of-year. I look forward to seeing you at the conferences!

Mine Yücel

With you phone, visit IAEE at:

International Association for Energy Economics

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 Notes

With this issue we concluded our focus on the South American energy situation. However, before that we're fortunate to have Christof Rühl and Joseph Giljum's report on BP's examination of the energy outlook to 2030, in particular the oil, gas, coal and the power sectors. They conclude that (1) energy consumption growth will need to continue to fuel industrialization in the developing world, (2) the global fuel mix will continue to diversify and non-fossil fuels will be major sources of supply growth, (3) the resulting slow-down in CO_2 emissions growth will fail to put the world on a safe carbon trajectory and (4) energy policies, driven by security and well as climate change concerns, will have diverse outcomes across fuels and regions.

Carlos Rossi writes that Venezuela is a country rich in oil resources that is suffering from what is known as a "resource curse" or the Dutch Disease. This presents itself as an economic malaise with wasteful spending, a non-productive society, unjust income distribution and abject poverty and fosters populism policies that exacerbates all these problems.

Philip Andrews-Speed looks at China's energy situation in 2009-10 and relates it to its five year plan for 2011-2015. He concludes that the path to a low carbon economy will be a long, gradual and tortuous one.

Karl Kolmsee writes that energy in South America is often synonymous with large hydro power systems. While hydropower remains the source with the largest potential, there are valid arguments for using other sources as well. He posits that decentralized electricity production based on organic residuals and micro hydro power plants are real options.

Rural electrification programs have a long history of failure, mostly associated with the lack of long-term support and sustainability of the projects. Dietrick et al propose a new framework for rural electrification programs which tries to address the major shortcomings of the existing ones. They illustrate with a proposed application for Guatemala.

Luiz A. Barroso and Carlos Batlle review the experiences implemented to date in South American to promote renewable energy sources (RES). They briefly describe first the particular characteristics of the territory which make it so appealing for the RES deployment. Then, examine the current situation of RES regulation in the largest countries in the region. They conclude by pointing out what should be expected in the years to come.

Marc Petz analyses the dynamics of industrial consolidation and focuses on the merger & acquisition activities in the Argentinean electricity and gas sector. The study covers 278 transactions with a total deal volume of EUR 18.8 bn. within the period from 1992 to 2008.

Carlos Bellorin reviews the fiscal and contractual measures taken by Venezuela in recent years in order to attract fresh foreign investments in Orinoco Oil Belt projects.

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Get Your IAEE Logo Merchandise!

Want to show you are a member of IAEE? IAEE has several merchandise items that carry our logo. You'll find polo shirts and button down no-iron shirts for both men and women featuring the IAEE logo. The logo is also available on a baseball style cap, bumper sticker, ties, computer mouse pad, window cling and key chain. Visit http://www.iaee.org/en/inside/merch.aspx and view our new online store!

Redefining the Energy Economy:

Changing Roles of Industry, Government and Research

30th USAEE/IAEE NORTH AMERICAN CONFERENCE

OCT. 9-12, 2011

CAPITAL HILTON HOTEL
WASHINGTON, DC

CONFERENCE OVERVIEW

As we recover from the global recession and the disastrous Macondo deep water oil spill and the Fukushima nuclear accident, concerns are once again mounting about energy supply, and especially the environmental and carbon implications of continued heavy reliance upon fossil fuels. Will increasing energy demands once again drive up energy prices? How should governments and firms react in terms of developing or facilitating new supplies and efficiencies? How should resources and alternative energy sources be developed, regulated, financed, traded? The clash of interests resounds starkly here in Washington, at the U.S. government's door, amid new legislation, evolving energy technologies, and continuing price uncertainties. Energy analysts, economists, financiers, developers, regulators, and students—each must revisit some basic assumptions about their roles, methodologies, research and planning focus, and the information they are using.

This conference will bring together in Washington key players in the North American energy sector to address these questions and many others in plenary sessions, concurrent sessions, and a unique student poster session. This conference will also provide networking opportunities through workshops, public outreach and student recruitment.

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U.S. Association for Energy Economics
National Capital Area Chapter

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CAEE

AMEE

Conventional and Unconventional Gas and Oil Supplies

- Exploration and Drilling Cost Concerns
- Changing World Oil Supply/Demand Balance
- Protection of Offshore Resources Versus Oil Supplies

Markets and Drivers of Renewable Energy

- Government's Promotional Role
- Integration of Solar and Wind Generation In Power Dispatch
- Capital Markets – Financing Renewables

Energy Efficiency – Defining and Meeting Realistic Goals

- Building Controls and Cost Allocation
- Update on FNMA Rules
- Tightening Standards
- The Minimal Energy Society – Danish Model
- Sudden Acceleration of U.S. Automobile Efficiency Standards

Economic Analysis Methods and Assumptions

- Energy Data Sources
- EIA Reliability Amid Shale Gas Data Difficulties
- IEA Relevance After China Fiasco
- Private Surveys

Rising Role of Government

- Issues in Energy Regulation and Uncertainties
- Energy Trading under Dodd-Frank
- Exchange Trading Efficiencies
- Over-the-Counter Creativity

Changing Geography of Energy Demand

- Atlantic Energy
- Russian Oil and Gas Investment
- Unconventional Energy Revolution – North America, Europe, China

Offshore in Crisis

- Drilling Expansion vs. Constriction
- Rising U.S. Oil Importation
- Macondo = Canadian Oil Sands Bonanza?

Global Warming Legislation Languishing

Natural Gas – Bridge Fuel to More Natural Gas?

- Shale Gas Revolution and Water Issues
- LNG Trade
- Global Gas Contracts vs. Spot Market Trading
- Role of Gas in Meeting RPS or CO_2 Emission Standards

Global Petroleum Security and Pricing

- OPEC Policies in a Changing World
- Increased U.S. Oil Importation After Macondo
- Oil Supply Crisis Looming?
- Strategic Oil Storage Policies

Electricity

- Coal Power Plant Trade-Offs
- Wind and Solar Market Penetration Issues
- Natural Gas and Wind Generation – Competition or Integration?
- Market Efficiency and Design
- Electricity pricing, fuel pricing and policy

Energy Capital Investment and Allocation

- Wind
- Solar
- Nuclear
- Infrastructure

Global Economic Meltdown and Energy Demand

- Energy Demand Expansion in New Industrial Asia and South America
- China's Energy Policy

Energy Infrastructure

- Capital Investment Requirements
- Costs of Capital
- Pipeline and Transmission Line Financing, Regulatory and Right-of-Way Issues

Energy Technology and Innovation

- Supply Expansion
- Cost Reduction
- Demand and Efficiency

Issues in Moving Beyond Petroleum in Vehicles

- Jumping the Gun with Short-Range Electric Cars
- Who Will Kill the Electric Car This Time?
- Ethanol and Biodiesel

Energy and Wealth Distribution

Energy and Water Issues

VISIT OUR CONFERENCE WEBSITE AT: WWW.USAEE.ORG/USAEE2011/

30TH USAEE/IAEE NORTH AMERICAN CONFERENCE

PLENARY SESSIONS & SPEAKERS

The 30th USAEE/IAEE North American Conference will attract noteworthy energy professionals that will address a wide variety of energy topics. Plenary sessions include the following:

- Changing U.S. & International Energy Policy Perspectives
- Nuclear Energy Revival: Fact or Fiction?
- Energy Access and Economic Development
- The Changing Tenor of the Climate Policy Debate in the United States and Around the World
- Changing Realities of Energy Supply
- Energy Technologies: From Development to Deployment
- Changing Realities of Energy Demand
- Energy Policy in an Era of Chronic Budget Deficits
- Economics and Geopolitics of Energy Security
- Changing Face of Electricity: Smart Grid, Renewables, Natural Gas and Energy Efficiency

SPEAKERS INCLUDE:

Douglas Arent
Executive Director, Joint Institute for Strategic Energy Analysis, National Renewable Energy Laboratory

Sara Banaszak
Vice President and Chief Economist, America's Natural Gas Alliance (ANGA)

Nazeer Bhore
Senior Technology Advisor, ExxonMobil

Christophe Bonnery
Vice President, Energy Policy, AREVA

Michael E. Canes
Distinguished Fellow, Logistics Management Institute

Charles K. Ebinger
Director, Energy Security Initiative, Brookings

Mark Fulton
Global Head of Climate Change Investment Research, Deutsche Bank

Arnulf Grubler
Senior Research Scholar, International Institute for Applied Systems Analysis

Thomas Helbling
Advisor, Research Department, IMF

Frederick L. Joutz
Professor of Economics, George Washington University

Raymond J. Kopp (invited)
Senior Fellow, Resources for the Future

Vello Kuuskraa
President, Advanced Resources International

Alex Laskey
President and Founder, OPOWER

Michael Lynch
President, SEER, Inc.

Steve Mufson
Energy Correspondent, *Washington Post*

Shirley J. Neff
Energy Information Administration, U.S. Department of Energy

Neelesh Nerurkar
Specialist in Energy Policy, U.S. Congressional Research Service

Adam E. Sieminski
Chief Energy Economist, Deutsche Bank

James L. Sweeney
Director Precourt Institute for Energy Efficiency, Stanford University

Frank A. Verrastro
Senior Vice President and Director, Energy and National Security Program, CSIS

STUDENTS

Students may submit a paper for consideration in the USAEE Best Student Paper Award Competition (cash prizes plus waiver of conference registration fees). The paper submission has different requirements and a different deadline. The deadline for submitting a paper for the Best Student Paper Awards is July 6, 2011.

Visit www.usaee.org/usaee2011/paperawards.html for full details. Students may also inquire about our registration fee scholarships. Visit www.usaee.org/usaee2011/students.html for full details.

TRAVEL DOCUMENTS

All international delegates to the 30th USAEE/IAEE North American Conference are urged to contact their respective consulate, embassy or travel agent regarding the necessity of obtaining a visa for entry into the U.S. If you need a letter of invitation to attend the conference, contact USAEE with an email request to usaee@usaee.org. The Conference strongly suggests that you allow plenty of time for processing these documents.

VISIT OUR CONFERENCE WEBSITE AT: WWW.USAEE.ORG/USAEE2011/

12th IAEE European Energy Conference

Energy challenge and environmental sustainability

Venice, September 9-12, 2012

The 12th IAEE European Energy Conference "**Energy challenge and environmental sustainability**" will be organized in Venice, on September 9-12, 2012 by the A.I.E.E - Italian Association of Energy Economists.

The Conference aims at providing a forum for an analysis of the new developments and a new vision of the future. No better stage can be imagined for this discussion than the magic and fragile environment of Venice, one of the most beautiful cities in the world.

The general programme of the Conference

Sunday 9/9
08.00 – 16.00 IAEE Council Meeting
18.00 Welcome Reception
20.30 – 22.00 IAEE Council Dinner

Monday 10/9
07.30 – 18.00 Registration
09.30 – 10.30 Opening Plenary Session
10.30 – 11.00 Coffee Break
11.00 – 12.30 Dual Plenary Sessions
12.30 – 14.00 Lunch
14.00 – 15.30 Concurrent Sessions (7–8 meeting rooms)
15.30 – 16.00 Coffee Break
16.00 – 17.30 Concurrent Sessions
19.00 – 22.30 Gala Dinner

Tuesday 11/9
07.30 – 18.00 Registration
09.00 – 10.30 Dual Plenary Sessions
10.30 – 11.00 Coffee Break
11.00 – 12.30 Concurrent Sessions
12.30 – 14.00 Lunch
14.00 – 15.30 Dual Plenary Sessions
15.30 – 16.00 Coffee Break
16.00 – 17.30 Concurrent Sessions
20.00 – 22.30 Conference Dinner

Wednesday 12/9
08.30 – 10.00 Concurrent Sessions
10.00 – 10.30 Coffee Break
10.30 – 12.00 Concurrent Sessions
12.00 – 13.00 Closing Session

The plenary sessions may cover the following topics:

Energy supply and security; Economic recovery and the evolution of energy demand; Climate change and the new GHG emission limitation regime; Toward Independent markets for energy commodities?; Environmental threats and opportunities for energy systems; Re-thinking nuclear power; The closing session will try to make sense of the results of the discussions throughout the Conference.

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

- Extending the horizons of energy regulation in Europe
- Learning by doing: cost reductions for RES
- Technological development: the roadmap approach
- Energy storage and its effects on the market
- Changes in the geo-political situation after North Africa
- Smart grids and smart meters
- Unbundling in the gas sector
- Market instruments for energy efficiency
- Non-conventional hydrocarbon supplies
- A sectorial approach to energy efficiency in industry
- The European automotive industry and the challenge of energy for transportation
- The NIMBY syndrome for RES
- The formation of prices in gas and electricity markets
- Energy from biomass and the EU agricultural policy

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

Arrangements will also be made for special rates with hotels of various categories near the conference venue.
In addition to a highly professional program, the conference will be an opportunity for delegates and accompanying persons to enjoy visiting Venice.

For any questions regarding the Conference you can contact
AIEE Conference Secretariat: Phone +39-06-3227367-Fax 39-06-3234921, e-mail: assaiee@aiee.it

BP Energy Outlook 2030

By Christof Rühl and Joseph Giljum*

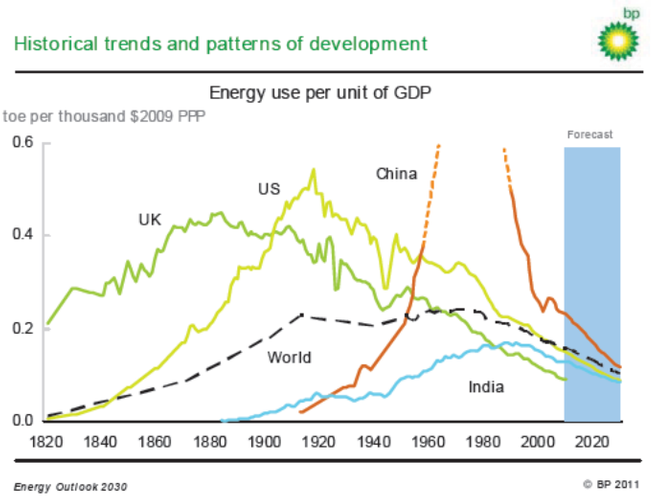
Introduction

The outlook for global energy is not just a matter for energy companies: it is an issue for all of us. As consumers, investors, producers and policy-makers we all face difficult choices regarding the future of energy. Our Energy Outlook[1] seeks to contribute to this debate by assessing future energy trends "to the best of our knowledge" - not as an exercise in trend extrapolation, and not based on anyone's political agenda. The resulting outlook examines three major areas: (1) energy trends that are likely to shape the world for the next 20 years (2) oil, gas, coal, and power markets and (3) variables of uncertainty that could alter the outlook.

Global energy trends

Overall, population and income growth are the two most powerful driving forces behind the demand for energy. The world we live in today is a one where about 80% of the population generates around 35% of global GDP and uses for that 54% of global energy. That share and absolute use of energy is set to increase, prompting the fundamental question – can the world fuel itself? One side argues that human ingenuity and markets will provide the supply necessary to fuel economic growth, while another believes that resource constraints will limit emerging market industrialization. To help address this fundamental question it will be helpful to look at the past to better understand the evolution of energy markets in the future.

Historical trends of energy intensity and industrial development show a common pattern: as countries industrialise, energy intensity tends to rise and then fall, with the peak in intensity usually coinciding with a peak in the share of the industrial sector in GDP. Furthermore, the level of the peak can be explained: first, the peak tends to be lower the later countries industrialise – as better technology makes possible the production of similar GDP levels with lower energy input. Second, resource abundance tends to create higher peaks (for example, the U.S. peaked at a higher level than the UK, although it industrialised later) because abundance leads to lower prices and provides fewer incentives to improve efficiency. Finally, the economic system matters: countries which industrialised under central planning (e.g., China or Russia) tend to exhibit very high energy intensity, as market signals were excluded from resource allocation. The improvement, once markets are allowed to function, is dramatic.



How do these trends assist in answering the fundamental question of whether there will be enough fuel for continued industrialisation and economic development? What the data show is an accelerating process of convergence across countries toward lower and lower levels of energy intensity. At a global level, energy intensity peaked in 1970 and efficiency has risen ever since. However, since the dissolution of central planning in the 1990s, which ushered in the unprecedented pace of industrialisation in the "developing" world, that convergence to lower levels of energy intensity has become more prevalent. This reflects "globalisation": energy traded across borders, common use of the latest technologies, and an equalisation of consumption baskets across nations. In addition to this convergence, history reveals another long term trend: fuel substitution and with it, a greater diversification of the fuel mix. These are two critical trends that we believe are likely to carry forward – energy efficiency will continue to improve at a global level, together with an increasingly diversified fuel mix. This means that economic growth over the next 20 years is likely to continue to be more energy efficient than in the past, but also that the world will be using a growing variety of energy sources, and continue to diversify away from fossil fuels.

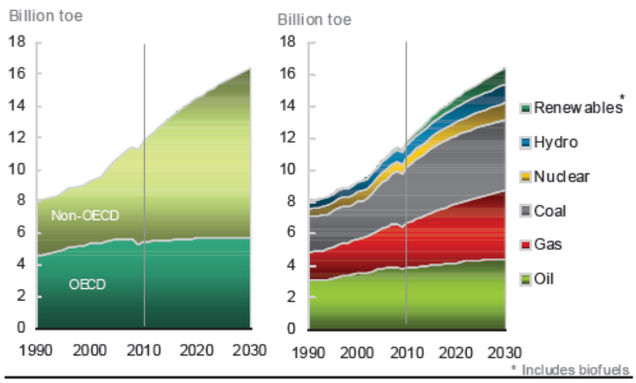
Even though efficiency improves, total energy demand is set to rise as consumption shifts from West to East. As developing nations industrialize, urbanize, build infrastructure, and increase their use of transportation, the rapid growth in

* Christof Rühl is Chief Economist and Vice President of BP plc. Joseph Giljum is an economist with the firm.
See footnote at end of text.

demand witnessed in the non-OECD over the past 20 years is set to continue. World primary energy consumption grew by 45% over the past 20 years, and is likely to grow by another 39% over the next 20 years. Non-OECD energy consumption will be 68% higher by 2030 and accounts for 93% of global energy growth. OECD energy consumption in 2030 is just 6% higher than today.

The overall fuel mix changes relatively slowly, due to long asset lifetimes, but gas and non-fossil fuels gain at the expense of oil and gas. Over the coming 20 years the market share of the three main fossil fuels appears set to converge at around 27%, while the three non-fossil fuels reach around 7% each, indicating an important shift away from fossil fuels. For the first time ever, non-fossil fuels are likely to make the single biggest contribution to energy consumption growth, as fossil fuels' share of energy growth drops from 83% in 1990-2010 to 64% in 2010-2030.

Non-OECD economies drive consumption growth



Nevertheless, the implications for climate change policies are sobering. Overall, we expect CO_2 emissions to rise by 27%, with an average annual growth rate of 1.2% (compared to 1.9% for the past two decades). CO_2 emissions in the OECD fall by about 10%, but a 50% rise in the non-OECD more than compensates. There is a silver lining though: from 2010-2020, non-OECD emissions growth averages 5%, but then slows to almost 1% for 2020-2030. Although implying progress, it clearly is not enough to put the world on the path the scientific community considers necessary to limit temperature rises.

Oil

Oil is expected to be the slowest-growing fuel over the next 20 years. Global liquids demand (oil, biofuels, and other liquids) is likely to rise by 16.5 Mb/d, exceeding 102 Mb/d by 2030. Growth comes exclusively from rapidly-growing non-OECD economies, with non-OECD Asia accounting for more than three-quarters of the net global increase. OECD demand in our view peaked in 2005, and consumption is expected to decline over the next 20 years. Overall, OECD consumption is predicted to fall back to its 1990 level, while non-OECD consumption is projected to more than double from its 1990 levels, overtaking the OECD by 2015.

By sector, liquids demand growth is driven by non-OECD transport, with a smaller role for non-OECD industry (largely petrochemicals). Expected OECD declines are concentrated outside the transport sector, in sectors where oil can be displaced by gas and renewables, but OECD transport demand is expected to fall post 2015, as technology and policy lead to improved engine efficiency.

75% of supply growth will need to come from OPEC. An increase of 13 Mb/d over the coming 20 years (mostly accounted for by NGLs and conventional crude in Iraq and Saudi Arabia) would put OPEC's share of global oil production back to levels last reached in the early 1970s. Non-OPEC supply will also rise, driven by a large increase in biofuels and smaller increments from Canadian oil sands, deepwater Brazil, and the FSU which should offset declining conventional production in mature provinces.

Gas

Natural gas is projected to be the fastest growing fossil fuel to 2030. Non-OECD countries account for 80% of the rise in gas consumption, with growth averaging 3% to 2030. Demand grows fastest in non-OECD Asia (4.6% p.a.) and the Middle East (3.9% p.a.).

By sector, growth is fastest in power and in industry – consistent with historic patterns. And while trebling from today's level, compressed natural gas use in transport is confined to 2% of global transport fuel demand in 2030. In the OECD, with its more modest consumption growth, gas plays an increasingly important role in displacing coal in power generation, lead by Europe where the share of gas in power generation rises from 42% today to 65% in 2030. This is driven by policy to curb emissions via carbon prices, mandates, and low carbon technologies. In the non-OECD, the industrial and power sectors drive demand growth, but there is scope for substituting coal in power generation as well.

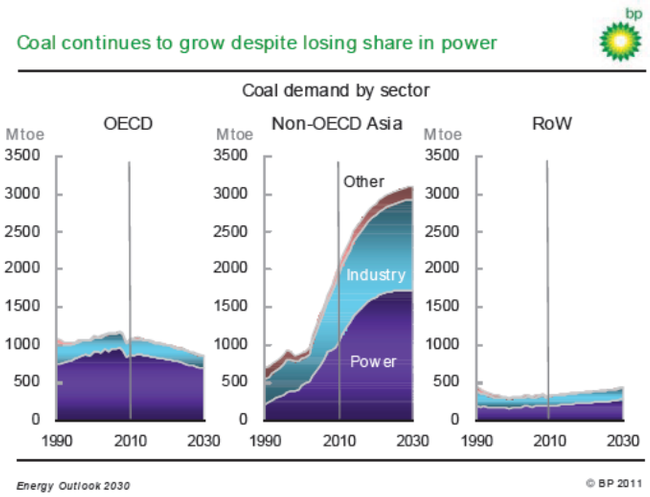
As for supply, unconventional gas (shale gas and CBM) will play an important role over the coming decades. Unconventionals are likely to account for 57% of North American production in 2030 and

could make LNG exports economically viable. Outside North America, the ability to overcome technical and regulatory hurdles will determine their pace of development. We expect significant unconventional production in Europe only after 2020. In China, where natural gas currently accounts for only 4% of the fuel mix but is expected to rise to 9% by 2030, unconventionals are likely to contribute 41% to this rapid growth of supply.

LNG is projected to grow 4.4% per year to 2030, more than twice as fast as gas production. Its share in gas supply increases from 9% in 2010 to 15% in 2030. The expansion is assured by three waves of new projects - currently from the Middle East, then primarily from Australia starting in 2015, and later from Africa.

Coal

Declining OECD coal consumption (-1.2% p.a.) is more than offset by growth in the non-OECD (2% p.a.). In China and India the phase of rapid consumption growth ends around 2020, but elsewhere in the non-OECD coal continues to grow steadily. Coal has been central to the development of China, which accounted for 80% of the growth of world coal demand from 1990 to 2010 and is still expected to account for 77% of the growth to 2030. However, there is a clear recognition within China that it needs to move away from its heavy dependence on coal. Environmental constraints (local air pollution as much as climate change concerns) and the rising cost of domestic coal resources are expected to curb Chinese coal growth.



Power

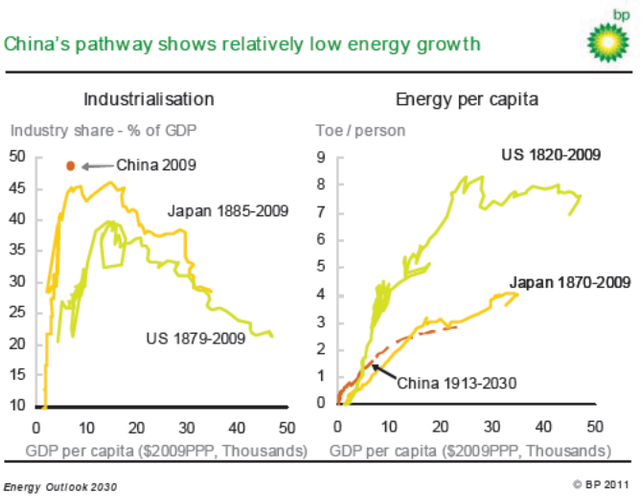
Historically there has been a strong correlation between income and electricity demand. We expect that relationship to persist but to be modified by efforts to promote end-use efficiency. The ratio of global electricity growth to GDP growth should fall to 0.7 in 2010-2030 from 0.9 in 1990-2010. This implies that the industrialising non-OECD economies move onto a less electricity-intensive path. Power generation in the non-OECD is set to overtake the OECD by 2012, and will continue to grow at more than three times the OECD rate. Despite this, non-OECD electricity consumption per capita remains well below OECD levels. As a percentage of the OECD level, non-OECD per capita consumption increases from 20% today to 30% in 2030. We assume that policy will support the continued rapid growth of non-fossil power generation – especially renewables, which attain a global share of 10% by 2030.

What can bend the trend?

There are, of course, numerous uncertainties that may alter this outlook. Global economic growth remains the key to energy demand growth: a change in the GDP growth rate (up or down) of about 1% would lead to a cumulative impact on energy demand in an order of magnitude of around 13%, depending on the fuel.

Climate policies are another. The carbon emissions implied by our Outlook are a far cry from the trajectory to 450 parts per million by 2100 which, according to scientists, would open the prospect of limiting temperature increases to two degrees. We did calculate an alternative Policy Case by strengthening our assumptions about climate change policies to the extent (we felt) realistically possible; but still global emissions, though declining after about 2020, end up higher in 2030 than in 2010. Clearly this is a wake-up call to us all.

The final uncertainty leads us back to the starting point, namely whether energy supply will be sufficient to support the continued high economic growth which is needed to



lift developing countries out of poverty. In our outlook, China's growth will become significantly less energy intensive after 2020, reflecting the path of economic development discussed earlier, as China currently has a very high share of industry in GDP relative to other countries. However, the scale of China's energy requirements is such that any change will have an impact on global energy markets. Energy prices (or supplies) could indeed become a temporary constraint on growth and in this regard, China is merely the most visible representative of a large group of rapidly industrialising economies.

Conclusions

Overall, this Energy Outlook illustrates four key topics. (1) Global energy consumption growth will need to continue, to fuel industrialisation in the developing world and, we conclude, it can do so as efficiency improvements are likely to accelerate. (2) The global fuel mix will continue to diversify and for the first time, non-fossil fuels will be major sources of supply growth. (3) The resulting slow-down in CO_2 emission growth, supported by energy policies and new technologies, nevertheless fails to put the world on a safe carbon trajectory. (4) Energy policies are driven by security as well as by climate change concerns – with diverse outcomes across fuels and regions.

Footnote

[1] http://economics.bpweb.bp.com/en/local_assets/documents/Oil_briefs_and_pres/BP_energy_outlook_2030_jan_2011.pdf

Oil Wealth and the Resource Curse in Venezuela

By Carlos A. Rossi*

"The overwhelming presence of oil did act, indirectly, to deform the economy and national life. Privilege sectors of the population began to acquire the mining mentality of newly rich spendthrifts. The uninterrupted flow of dollars encouraged imports and expanded commerce to such a degree that the nation became primarily a consumer of foreign products. We began to appear too much like that chaotic California—the paradise of adventurers and thieves—during the days of the gold rush."

Romulo Betancourt, Former President of Venezuela 1945-1948, 1959-1964.

The objective of this paper is to argue that regardless how well endowed a country may be in natural resources and how long it has been in the business of producing and exporting this natural wealth, that without the right economic policies implemented by strong and courageous policy makers, the monetized revenues of this oil wealth will not render prosperity for the majority of the people in the country.

Furthermore, it is also argued that there are well defined economic elements that interplay with the prevailing historical and socio-cultural country specific factors that render the monetization of the oil wealth into undesired results, commonly referred in the economic literature as "Dutch Disease" or more appropriately "Resource Curse". Further, that given the extensive study that has been done in this area this disease or curse can be dealt with appropriately with political and economic measures that do provide favorable results in productivity and general prosperity. Last, it is also argued that in the case of Venezuela the economic policies applied since the nationalization of its oil wealth and exacerbated in this century have aggravated the resource curse problem to the point that it is fair to conclude that oil wealth has crippled Venezuela and made it into an unproductive and rent seeking society.

Venezuela's Oil Wealth

Although at the end of the 19th century Venezuela had already experimented timidly with asphalt residuals in the northeast and even exploited a small oil field in its Andean region, it was not until the early part of the 20th Century that Venezuela burst onto the international scene with its oil production. The most salient features were:

- The Geological study conducted between 1911 and 1916 by the oil company General Asphalt-Caribbean, soon a subsidiary of Shell, that covered 25 million hectares of Venezuelan territory from east to west discovering, among others, the large Menegrande field in 1914 in the western state of Zulia. This led to more and more discoveries in this extremely fertile state.
- The explosion of the Barrozo 2 field in late 1922 (100,000 bpd in the first 10 days). This gave a green light to more exploration and bigger discoveries in the Zulian fields of Lagunillas (1926); Tia Juana (1928) and Bachaquero (1930).

The historical summary can be summarized as: It was thanks to the multinational corporations that oil was discovered in the oil basin of Lake of Maracaibo. In 1917 the first refinery of the country was built; five years later, in December of 1922, the Barroco 2 oil well "exploded" with 100,000 bpd; in 1926 Lagunillas was discovered, also in the Maracaibo Lake, the biggest oil field in the world at the time. In that same year petroleum became the country's first export item and in 1929 Venezuela became the leading oil exporter of the world, a position they would hold for no less than four decades up to 1970 when Saudi Arabia passed it.

The oil wells found and exploited in Zulia are still producing but are all in steep decline. These are mostly light and medium oil with an API grade over 25. To compensate for this shortfall, Venezuela plans to develop another huge reservoir, the largest remaining in the world, called The Oronoco Oil Belt. Given its importance it is prudent to describe its properties briefly.

The Orinoco Belt was discovered by the middle of the 1930's, but given its extra-heavy and high sulfur and metals content, it was not given any importance and abandoned as the companies preferred other cheaper and cleaner fields.

It is vast. 53,314 KM^2; 700 kilometers long and with width that goes from 32 to 100 kilometers. For reference, if we added the total area of Belgium and Israel it would come out short by more than 2,000 KM^2 of filling the Orinoco Belt. It has been estimated to contain over 1.3 trillion barrels of oil in place, more than what humanity has consumed so far. It is geographically plane and virtually uninhabited leaning on small cities and neighboring towns such as Ciudad Bolívar, El Tigre, Anaco and Maturín. It has a warm climate, shallow depths, high porosity sands and access to pipelines,

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See footnotes at end of text.

terminals, refineries and ports of the Caribbean. But it is extra heavy, viscous oil with API grades that average between 8 and 9. Because of this high viscosity, the recovery factor is very low, ranging between 7 and 9%. However, there is ample room for improvement as an in depth study conducted by the USGS and released in 2009 reveals.[1]

> *"The US Geological Survey estimated a mean volume of 513 billion barrels of technically recoverable heavy oil in the Orinoco Oil Belt Assessment Unit of the East Venezuela Basin Province; the range is 380 to 652 billion barrels. The Orinoco Oil Belt Assessment Unit thus contains one of the worlds largest recoverable oil accumulations".*[2]

Professor Barbierii describes it:

> *"Geologically is in the south part of the Maturín basin to its west, and geographically it has been given the name Orinoco because its southern limits are along and close to the river…very characteristic of the mechanics and behavior of the production of the fields of heavy crude is that its initial removable volume is between 3 and 10%. However even in this case, in the phenomenon of the Belt, given the immense figure of petroleum in place, the primary extraction runs between 30 billion and 100 billion barrels. Moreover if through the application of enhanced oil recovery methods (for example the injection of vapor) are possible to duplicate the primary extraction, then the volume producible would be between 60 billions and 200 billion barrels. This figure will be appreciated better when it is compared with the 46,4 billions of barrels of all type of crude oil that has taken place in Venezuela during seventy seven years (1917-1994)"*[3]

The Orinoco Belt has been divided into four large regions, all of which have names of the most famous battles fought in the independence wars in the Andean region. It is important to keep in mind that the four projects that exist today in the Orinoco Belt are the product of the Apertura Program enacted in the 1990's which produced at its height a combined 630,000 bpd.

The Belt originates in the eastern basin of Maturín, an extremely rich area in hydrocarbons and supplier of most of the production of Venezuela at present and, through the centuries of formation, it migrated towards the south and upwards until colliding with a gigantic trap in the skirts of the biggest river in the country. In its long and winding road this oil found a lot of geologic garbage, especially sulfur and metals that mixed with the molecules of the crude oil and changes and thickens its composition to a heavy crude oil thus worsening its quality and fluency. The further south you go, the worse the quality (5-6 API) gets but the north area is lighter (12-16 API). Towards the 1970's when PDVSA began to detect depletion in the traditional fields of Maracaibo it ordered some exploratory drillings in the Belt. But it was not until the end of the last century that interest in the Belt truly began as oil companies, faced with depletion all over the planet, decided to take another look at the Belt. Helped with the technological advances in production, upgrading and distribution, the companies agreed to form strategic associations with the Venezuelan Government in the Apertura Oil Opening. This was when we first begin to see huge investments and later production flow in the Belt fields. With around 2000 perforated wells so far and with certification in process, the Orinoco Belt now places Venezuela at the center of the energy focus.

The long term target recovery factor is in the order of 20%. At the moment this factor is between 6% and 11.8% with an average of 8.4%, and it is projected that soon this will increase to 12% when hot production techniques (SAGD) are implemented. The majority of the wells have used horizontal drilling techniques that will help in increasing the recovery factor to the desired targets. Production costs, however, are deemed steep in the initial stages, given the expensive upgrading facilities that need to be built to process the synthetic oil, plus the refineries, pipelines and port facilities. Material costs in drill bids and rising prices in steel and other inputs are also projected to escalate, especially since new competitors are on the rise (Brazil, Colombia, Gulf of Mexico, Gulf of Guinea, Caspian Sea, Canada, Iraq and Russia). However, large cost reductions through economies of scale are also projected beyond the initial investments.

Venezuela's oil development was well managed by the international oil companies (IOCs) for 6 decades up to the 1975 nationalization. The Venezuelan petroleum historian Efraín Barberii recognizes this:

> *"Petroleos de Venezuela (PDVSA) received from the concessionaires a mature industry, worldwide recognized for its involvement, progress, development and for their large contributions in production, handling and commercialization of the hydrocarbons"*[4]

Table 1, next page, summarizes the involvement of IOCs in Venezuela.

Venezuela today has 297 billion of certified proven reserves of which about 77 billion belong to the light and medium crude category and the rest to the heavy and extra heavy variety, most of which are located along the Orinoco Belt formation. It is estimated that Venezuela also harbors about 185 TCF of natural gas (over 90% of which is associated with petroleum). This certification is done on a field by field basis by a team that involves Venezuelan, IOC and international specialists with experience within

the Orinoco Belt. The final number is at best an estimate that involves, besides crude reserves availability, current recoverable technology as well as economic profitability. If any of those variables change, so does the reserves figure. As was noted, there is ample improvement room in the recoverable factor in the Orinoco Belt.

It is also worth pointing out that the technology exists and is in use today to upgrade the low API quality of this oil towards medium and light oil acceptable for refining into all its multiple uses, including transport and petrochemicals. As Table 2 shows, the oil industry initially progressed well under the nationalization scheme.

Produced petroleum	31,947.2
Processed petroleum	8,563.2
Exported petroleum	23,310.2
Exported products	6,758.8
Wells Producing of Petroleum	86.6%
Wells Producing of Gas	0.9%
Dry wells.	12.5%

Table 1
Realization of Independent Oil Companies in Venezuela, 1914-1975 (MMBD)

Table 3, released recently by Barclays, analyses Venezuelan actual production from the import figures reported by its clients. This does not include the estimated 600,000 BPD of national consumption. Together they post about 3.0 MBD of total daily production, a figure that is close to the official stated figures which includes crude oil, synthetic oil, NGL's, coker, and condensate. Because of physical and political constraints, e.g., well maintenance and OPEC production quotas, this total production figure is problematic. It is also worth noting that this total production number may fall well short, between two and three million barrels per day, of the planed 2005 goal of 5.8 MBD of 2012 oil production.

Crude Produced,	
Light (>30 API)	6,068
Medium (22-29.9 API)	6,200
Heavy (< 21.9 API)	5,923
Total MMB	18,191
Condensed MMB	2,073
Natural Gas Liquids MMB	885
Crude Processed MMB	8,274
Crude Exported MMB	11,726
Sold Products in Domestic Market MMB	3,204
End 1999: Total Active Wells/Wells	31,593/17,916
Fiscal Participation 1976-1998 MMBs	8,207,180

Table 2
Figures of the National Petroleum Industry, 1976-1999

Dutch Disease

Dutch Disease is a complex economics phenomenon that occurs to mineral rich nations when a sudden burst in the demand for its product is recorded. It has been widely analysed and documented from various sources. Here we will only describe the elements that explain why the oil wealth rent that has accrued to Venezuela has come with a double edge sword that has contributed to moving the country into a renter and unproductive society.

1. It has overvalued the national currency and weakened the competitive edge in the production of other staple goods that used to be made and now are imported.
2. Since oil related activities are much more lucrative, this has caused many entrepreneurs to abandon their traditional areas in the rural sectors in favour of flocking to the urban cities in search of a piece of the "oil pie''. For example, in the 1970's, a government decision was made to cancel all agricultural related debt in the hopes of eliminating this financial burden and increasing agricultural production. The result was the opposite. Most landowners simply sold or closed their latifundios and moved into the construction business or other urbanite ventures.
3. Massive internal migrations and foreign immigrations to the urban core of principal cities were caused, creating the infamous poverty belts, collapsing all social services and resulting in rampant crime. Venezuela's population tripled since the first oil boom in 1973.
4. Lavish spending on huge industrial projects that were ill conceived and badly managed were induced, wasting valuable resources, creating the need for permanent subsidies and international debt. Rampant rent seeking and corruption by both state 'technocrats' and private contractors occurred. In 1949 Venezuela's GDP per-capita income was higher than West Germany, Italy and Japan. Now it ranks number 44 in the world.
5. It made the nation more dependent on one commodity for hard currency earnings to pay for imports, which include both final food and medical goods, as well as in parts and inputs for industrial plants.
6. It made the country totally dependent on the Government for all economic activity, including both public and private production since it is the state that controls foreign currency for imports of spare parts and finished goods.

Country/Area	**2007**	**2008**	**2009**	**2010**
USA	1361	1188	1063	998
U.S. Virgin Islands	250	271	247	919
Europe	305	274	243	200
China	22	130	207	244
India	127	130	88	200
Other Asia	37	82	121	90
Brazil	15	19	31	31
Others	97	90	73	70
Exp Market Cond	2214	2183	2073	2052
Cuba	120	115	112	120
Curacao	200	212	190	170
Nicaragua	6	14	28	30
Others	143	115	113	105
Exp Pref Cond	470	456	446	425
Total	2683	2639	2519	2477
Official Exports	2789	2897	2682	

Table 3
Destination of Venezuelan Oil Exports (thousand B/D)

7. It has transformed the political conditions of the country. This last effect is probably the least understood.
   As opposed to virtually all other developing countries, where the means of production (land, capital, companies) is privately held, Venezuela is different for two reasons: 1) Because, by the constitution oil belongs to the state and 2) because it is a full grown democracy. This means that the vote from the poor people count, and since the country has a lot more poor folk that rich, they count a lot. Hugo Chavez champions the poor people because he not only comes from within their ranks but has developed a great rapport with them. He has improved their lot and hastened their hope and dignity but he has done it charitably, not productively nor sustainably.
   The phenomena arises since by Venezuelan law whomever governs the state also governs the fate of the countries lucrative oil reserves. This dramatically hastens rent seeking but in the reverse. It is not the rich who have control of the lucrative means of production and the poor who want access to it, but just the opposite. The real paradox in Venezuela is that it is the rich who want access to what the poor (or some) have; the power over the oil wealth. It is a political-sociological pyramid turned on its head.

Today oil accounts for over 95% of Venezuela's exports, 50% of government revenues and 30% of GDP directly. According to official figures, imports tripled between 2000 and 2008 to the unheard of level of US$ 49.4 billion, before they collapsed 22.3% the following year due to policy instigated recessions[6]. Venezuela's populist president, Hugo Chavez, has presided over untold oil wealth and a recognizable reduction in Venezuela's worst poverty levels (through 'missions' geared towards extreme hunger alleviation by handouts, free education and health care) has also presided over a collapse in the production of all of Venezuela's agriculture and much of the industrial apparatus, including crude oil production and even some energy intensive sectors like steel and aluminium. In contrast to other socialist nations that focus on socialist distribution while leaving production issues to private enterprise, Venezuela has opted for the ill defined "productive socialism'' were the state interferes with basic production decisions of key industries. This socialist production model has exacerbated rent seeking and Dutch disease, and the constant "expropriations'' have scared off would be investors in virtually all economic sectors. It is not that his socialist production model is not working, but that it can't work; it is socially-physically impossible for it to work (100 years of productive capitalism is enough time to teach us how companies must be managed to produce.

A sudden influx of petrodollars are never easy to absorb productively, as Stanford University professor Dr. Terry Lynn Karl, in her landmark book, *The Paradox of Plenty*, found through her extensive research on petro-states like Venezuela:

> *"Petro-states find themselves incapable of absorbing their surplus, even if they quickly generate new public-sector projects. But, facing the impending threat of massive inflation, worried about depletability, accustomed to seeing the state as the leader in development, and eager to put their new wealth to immediate use, oil governments rely on their standard operating procedures: they reach for large-scale, capital-intensive, long gestation projects, or if such projects are already underway, they increase their sale and accelerate their completion dates. These projects epitomize a resource-base industrialization strategy; they emphasize processing and refining, petrochemicals, and steel. Not surprisingly, in the face of a powerful push to absorb petrodollars rapidly and a general relaxation of fiscal discipline, they are often wasteful and poorly conceived.*
>
> *"The boom not only provokes a grander, oil-led economic model but also simultaneously generates new demands for resources from both the state and civil society. Policymakers, once torn between their twin preoccupations with diversification and equity, now think that they can do both. The military demands modernized weapons and improved living conditions; capitalists seek credit and subsidies; the middle class calls for increased social spending, labor for higher wages, and the unemployed for the creation of jobs. As demands rise, unwieldy and ineffective bureaucracies, suddenly thrust into new roles, find themselves incapable of scaling down expansionist public- sector programs or warding off private-sector requests. Thus they ultimately contribute to growing budget and trade deficits and foreign debt."*[7]

One of the crucial phrases of the above paragraphs is Dr. Karl's reference to 'accustomed to seeing the state as the leader in development', which, of course, was not the case in Texas or Norway when they struck oil. Productive development occurs rarely, if at all, under non-competitive conditions, because it is competition that breeds the juices of innovation, inventiveness and creativity. Technological and productivity prowess is and has always been a product of company competition in a fair play and open market environment, and living standards have increased because of it.

Venezuela's current economic framework is founded on political favour (like the never defined "21st Century Socialism'') rather than on well tried and tested economic and productive fundamentals. Its

results have been nothing short of disastrous for the country. In 2010 the government expropriated close to 200 companies, most of which were productive and paid taxes, in key sectors like steel, cement, electricity, communications, food and petroleum. Now their production has collapsed and needs to be subsidized. Economist/Intellectual/Newspaperman and a long time veteran of the Venezuelan political scene, Teodoro Petkoff (also a former Marxist guerrilla, now reformed) wrote the following in his most recent and excellent book.

> *"In the six years prior to 2008, the management of the economy has not been sustained on productive growth but on a formidable expansion of public expenditure, in tune with the exponential growth of oil income. Public expenditure has rounded, year after year, 30% of the GDP, but it has been a highly unproductive expenditure, translated into a widening of demand and consumption and attended by unfettered imports instead of the growth of the internal supply. On the contrary, in manufacture as in agriculture, both have been severely damaged by an exchange control policy and the systematic hostile pressure that the enterprising sector has been subjected to. By anchoring the exchange rate from 2003 to January 2010 (when logically, a maxi-devaluation became inevitable), the (Venezuelan currency) bolívar has been strongly revalued and this has stimulated massive imports and diminished the incentives of internal production and non-oil exports. The result has been a significant contraction of the industrial structure, as well as agriculture and livestock. Moreover, the incendiary anti-capitalistic rhetoric, accompanied by the persistent harassment of the economic sectors, which ideological roots have sunk now to an elemental and primitive Marxism, has contributed to the systematic destruction of some of the material basis of what the government pretends is a change in socialistic orientation. After 11 years of Chavism, the country is ever more dependent on oil exports as ever before (95% of the hard currency earnings come from oil) and it constitutes an archetypical case of the so called "Dutch Disease" and the rent seeking condition of the economy."*[8]

Petkoff then makes the following observation of Venezuela's failed economy.

> *"We can say…that Chavez has tried to forward some alternative projects of social-economic organization, but the failures have been spectacular. From cooperatives, which Chavez later discarded when he 'discovered' that cooperatives, even though they are collective organizations were also 'capitalists', to the phantom 'production enterprises of social property'…going through the picturesque (and failed) promotion of barter as an option to the use of money, Chavez has tried to stimulate, experimentally, this class of initiatives that weight very little within the total of the Venezuela economy. In fact, the so called 'social economy' doesn't even reach a half point of the Venezuelan GDP according to the 2009 official figures from the Venezuelan Central bank. Four other "congestive" experiences also failed, especially for its absolute official misapprehension that left the workers free to their own luck and these "congestive enterprises" ended up as mere broken state owned companies…there hasn't been one sole experience of an economic peasantry of social 'revolutionary' and not even distantly related to the Venezuelan agrarian reforms of the 60's and 70's."*[9]

Table 4, from EDC Economics, illustrates all too clearly the exhaustion of the productive socialist model of development. Not only did the GDP decline for the second year in a row making the country the only petro state and the second in Latin America still mired in recession (other than Haiti), but Venezuela posted by far the highest inflation rate in the Western Hemisphere. Despite all of its oil wealth, its ranking in income per-capita has remained unchanged at number 44 for at least two decades. The link between high oil prices and economic growth through public expenditure increases has been broken, as firms are running at very high capacity but are understandably hesitant to expand for fear of expropriation.

	04-08 Ave.	2009	2010	2011 est
GDP (% growth, real)	10.2	-3.3	-2.5	1.5
Inflation (% chg. pa ave.)	19.9	27.1	32.0	30.0
Fiscal Balance (% of GDP)	0.3	-6.2	-3.2	-3.9
Exports (% comp. an. growth)	28.4	-39.5	4.7	-9.4
Imports (% comp. an. growth)	36.4	-22.3	-6.7	-1.3
Current Account (% of GDP)	13.1	2.6	6.0	3.7
Reserves (months of curr. debts)	6.7	5.9	3.7	3.2
External Debt (% of GDP)	25.1	15.5	27.3	30.1
Debt Service Ratio (due)	10.8	10.6	15.8	14.8
Exchange Rate (to USD: eoy)	2.1	2.2	4.3	5.5

Source: EIU, EDC Economics

Table 4
Economic Indicators

Fortunately there are countries that have confronted Dutch Disease and defeated it. These lie mostly in Scandinavia where a clear line has been defined between "productive" socialism and "distributive" socialism. It is the last of these that has proven successful. The state lets all productive decisions within the realm of privately owned companies and through taxes manages distributive themes like public education, health care, and infrastructure. Venezuela should take a much closer look at this experience or else risk, once again, wasting another golden opportunity to move the nation towards productive and fair prosperity. It is its last opportunity.

(See footnotes on page 18)

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China's Energy Supply and Demand: 2010 and the Five-year Plan

By Philip Andrews-Speed*

The timing of my drafting this column allows me to reflect on the energy statistics from 2010 as well as on the five-year plan for the period 2011-2015 currently under consideration at the annual session of the National People's Congress in Beijing.

The last five years saw GDP growth rates average about 10% per year, with total primary energy demand growing at about 8% per year. The government not only succeeded in bringing down the rate of economic growth from 14% in 2007, but they managed to protect the economy from the worst impacts of the global financial and economic crisis. At the same time they took drastic steps to reduce the nation's energy intensity. The goal of reducing energy intensity by 20% between 2005 and 2010 was 'basically achieved', according to official pronouncements, falling just one percent short at 19%.

The table ajacent shows some of the preliminary data on energy production, consumption and imports for China in 2010, and a comparison with 2009.

		Unit	2009	2010	2010/ 2009
GDP	Growth rate		9.2%	10.3%	
Energy	Consumption	billion tonnes of coal equivalent	3.07	3.25	+5.9
Coal	Production	million tonnes	2960	3200	+8%
Coal	Imports	million tonnes	126	166	+32%
Coal	Exports	million tonnes	22.4	19.0	-15%
Electricity	Generation	TWh	3.66	4.14	+13%
Electricity	Generation capacity	GW	874	962	+10%
Crude oil	Production	million tonnes	189	203	+7%
Crude oil	Imports	million tonnes	203	239	17.5%
Oil	Refinery throughput	million tonnes	374	423	+12.9%
Natural gas	Production	billion cubic metres	83	94.5	+13.8%
Natural gas	Consumption	billion cubic metres	88.7	104.8	+18.2%
Natural gas	Imports	billion cubic metres	7.6	9.4	+23%

A higher rate of economic growth in 2010 saw the rates of energy consumption rise towards levels not seen since the period 2005-2007. Official preliminary statistics show that total primary energy consumption grew by just 5.9%. But this does not appear to be consistent with data for individual fuels which show much higher rates of growth. The production of China's main source of primary energy, coal, grew by 8% and imports rose by 32%. Some 28% of these coal imports took the forms of coking coal. Electricity generation grew by 13%. Construction of additional power generating plants boosted total capacity by 90 GW to reach 962 GW, a rate of growth not seen for four years. Total wind power capacity grew by 16 GW to 42 GW.

Data for oil and natural gas also show significant rises. Assessing actual oil consumption is always difficult. Apparent oil demand rose by 11.4% to 434 million tonnes, or 8.7 million barrels per day. This rate of increase was double that in 2009, and was the highest annual growth since 2004. Domestic oil production rose by 7% after a slight fall in 2009, and 80% of the increase came from offshore fields. Refinery throughput rose faster than total consumption, showing that the continuing construction of new refineries is allowing the country to progressively reduce its requirement for imported oil products, subject to mismatches in the product mix. To fill the growing gap between demand and domestic production, crude oil imports rose 17.5% to 239 million tonnes (4.8 million barrels per day), and imports now account for about 55% of oil consumption. Imports are certain to continue rising in 2011, possibly by as much as 9% to 260 million tonnes. Only a very small proportion of the imports in 2010 were used to fill the growing strategic stock. Official announcements suggest that some 1.6 million tonnes were added in 2010, bringing the total quantity of oil in the stocks to 24.4 million tonnes, with some 8 million tonnes of storage capacity not yet filled.

The production, consumption and import of natural gas all continued to rise rapidly, and 2010 saw the first full year of imports through the pipeline from Turkmenistan and at the LNG import terminals in Fujian and Shanghai.

The government's success at almost achieving its energy intensity target for the period 2006-2010 was due mainly to actions in the energy-intensive industries such as petrochemicals, chemicals, ferrous and non-ferrous metals, electricity and heat production through the closure of old plants, the upgrading of existing plants and the construction of high quality new plants. Over this period, the industries showing the most rapid increase in total energy consumption were construction and transportation.

Preliminary information on the five-year plan for 2011-2015 shows that the

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government wishes to keep trying to change the balance of the economy: to encourage household spending, to upgrade the manufacturing sector, to constrain the construction boom and to promote development and urbanisation in the central and western parts of the country. The target for the average rate of annual GDP growth is 7%, but history tells us that real growth is almost invariably higher than the target.

Seven strategic industries have been identified, of which four relate directly or indirectly to energy: energy saving and environmental technology, new forms of energy, new energy vehicles, and new materials. The question remains as to whether the greatest impact of these industries will be felt in the international markets for these products or in the nature and performance of China's own energy sector.

The government has also highlighted the need to further reform the pricing systems for coal, oil, gas and electricity, and to collect dividends from state-owned enterprises at higher rates than before.

Looking ahead to 2015 within the energy sector itself, the draft plans state that total annual energy consumption should be constrained to 4.2 billion tonnes of coal equivalent, reflecting annual increases of energy demand of just 6%. Energy intensity is to be reduced by a further 16-17%. Coal's share in primary energy consumption is to fall from 75% to 63% and a ceiling on coal annual consumption will be set at 3.8 billion tonnes, just 19% more than current annual production. This reflects an aim to increase the share of non-fossil fuels from 8.3% in 2010 to 11.4% in 2015.

The electricity sector will continue to grow. Total power generation capacity is to rise by a further 270 GW to 1230 GW by the year 2015. Within this total, nuclear capacity is to increase from 11 GW today to 40 GW, hydro power to 310 GW, wind power to 90 GW, and solar power to 5 GW. Oil refinery capacity will be boosted by 100 million tonnes, allowing annual throughput to reach 310 million tonnes. Domestic gas production is set to reach 170 billion cubic metres, with annual imports of some 90 billion cubic metres. This will allow natural gas to account for 8% of annual consumption, up from 4% today.

So what does all this mean for China's transition to a low carbon economy? Taken together, the statistics for 2010 and the five-year plan show that China's economy will continue to require ever-increasing amounts of energy and of energy imports, but that the government is doing what it can to constrain the rate of growth of energy demand. What it can do is construct large amounts of new capacity to generate cleaner forms of energy, and close down old, inefficient plant. What it will find much more difficult to achieve is to rapidly change the structure of the economy, to control the rate of growth of the economy, and to constrain the use of energy by millions of small and medium-sized enterprises and by hundreds of millions of households. The path to a low carbon economy will indeed be a long, gradual and tortuous transition.

Oil Wealth and the Resource Curse in Venezuela *(continued from page 15)*

Footnotes

[1] USGS October 2009. This study is based on the three year field study conducted by the geophysics firm Ryder & Scott
[2] USGS, 2009.
[3] Barbieri, E. El Pozo Ilustrado, Ediciones Foncied, Caracas, Venezuela 1998.
[4] Barbieri, Efrain., "La industrializacion Venezolana de los Hidrocarburos en el Siglo XX" Testimonios de una Realidad Petro era, BCV Fundación de una Venezuela Positiva, Banco Occidental de Descuento, Caracas, 2002.
[5] Ibid.
[6] Import figures come from Banco Central de Venezuela, official statistics.
[7] Karl, Terry Lynn, The Paradox of Plenty: Oil Booms and Petro-States, Berkeley, University of California Press, 1997. pp 64-65.
[8] Petkoff, Teodoro, El Chavismo como Problema, Editorial Libros Marcados, Venezuela, 20102010, 54-55.
[9] Ibid, 58-59.

South America: A Case for Decentralized Energy Solutions

By Karl Reinhard Kolmsee*

Introduction

Energy in South America is often synonymous with large hydro power systems. Approximately 60% of installed electrical capacity comes from hydropower – slightly less in Chile, even more in Brazil. In all South American countries, hydropower remains the source with the greatest development potential. Existing hydropower in South America is centralized. The grid pathways which transport electricity along the 7.600 km extension from North to South are fed by few sources. South American countries differ in many ways, but from an energy management perspective, they all face an overarching challenge: how to guarantee a reliable and affordable electricity supply to a growing population and industry.

Infrastructure Costs

In the late 19th century, when electricity infrastructure was in development in Europe and the United States, the high-energy consuming industries such as steel were located close to the most relevant sources of power, such as coal mines or hydropower systems. Because rivers ensured dependable transportation of coal for power production, population and demand expanded around them. At the same time, electricity distribution was dominated by its thermal sources that required building up a system of interconnected local grids with a multitude of sources and sinks.

Hydropowers projects—the single most important source in South America's energy matrix—are inherently defined by their geographical source and not by where demand exists. On this continent, the main energy sources and the sites of major demand tend to lie great distances from one another. The large hydropower plants in the Andes and Brazilian Itapúa, required large investments in the grid infrastructure connecting the industrial centers of Lima, Santiago or Sao Paulo. Even once a grid is installed, operations remain expensive, with losses three times greater than in Europe and low reliability of technical structure. Taking a look at Brazil´s transparent pricing system which presumably reflects the cost of generation and transport, peak electricity prices for industrial clients can be more than triple the base price.

Therefore, new hydropower plants in South America are challenged not only by environmental reasoning but also an economic factor: infrastructure is expensive.

Some Arguments for Decentralized Energy

There are three main arguments for a more decentralized energy system in South America: (1) centralized systems increase the costs of the grid network, (2) the demand in South America is shifting, (3) South America has a unique potential with renewable sources. As argument one has been addressed, arguments two and three will now be explained.

Many South American countries are experiencing growth rates of above 5%. Much of this growth is coming from emerging industries and companies. An example: In Brazil the market for eggs and chicken is growing by more than 10%. Most of these producers are either entirely new or only a few years old. The largest egg producer is currently constructing the world's largest production facility in Mato Grosso – far away from the traditional centers in southern Brazil. From an energy management perspective, these economic developments require a rapidly changing electricity network. Centers of demand are relocating and expanding at a much faster rate than the infrastructure can be adapted. This increases the challenges for modern grid management.

Bio-ethanol plants and food processing plants are just two examples of growing industries that have the opportunity to use their own organic residuals for energy production. Compared with Europe, where decentralized energy generation is mainly spurred by subsidies, South America is naturally inclined towards its application because of a strong agricultural industry and unique geography.

Both arguments might convince policy makers with a long term perspective. But energy users look only at costs. This is especially true for emerging markets where the payback period is not expected to exceed three years. The main argument in favor of the centralized, hydropower-dominated electricity system is obvious: electricity prices for low voltage industrial consumers (even if not subsidized) are as low as 0.10 USD for base price power including grid costs.

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Waste to Energy

Agriculture and adjoining industries account for approximately 30% of South America's GDP. Manure, bagasse, vinasse, waste from slaughterhouses or fish processing plants, are some of the major organic residual streams of these industries and can be used for generating energy.

While the level of automation in agro-industrial plants is growing, yet still varying widely by industry and country, there are four characteristics nearly all agro-industrial production processes have in common. (1) They combine the need for electricity with a strong demand for heat or steam. (2) They are volatile or seasonal with regard to energy demand. (3) Sudden energy shortages can cause high losses. (4) Treatment of residuals is expensive. One might add that many agro-industrial plants are in remote areas where levels of noise and smell do not affect neighboring populations. All four characteristics make the case for decentralized energy as they either drive the electricity price from the grid, (constant demand in peak hours) or they give some additional value (waste treatment) to decentralized energy generation.

While semi-liquid organic residuals can be used as input for anaerobic digestion in biogas plants, solid residuals can go into gasification plants or boiler houses. In all three cases there is a by-product besides the generation of gas, heat, or (using a small gas turbine or Combined Heat Power Plant - CHP) electricity. Anaerobic digestion as gasification and combustion transforms the organic waste so it can be used as fertilizer without harming the environment or endangering health.

While in the past, the treatment of organic residuals was mainly driven by projects in the scope of United Nations Clean Development Mechanism (CDM) which produced more or less successful Certified Emission Reductions (tradable CERs), recent projects show a more explicit focus on energy. Peru's largest egg producer uses its daily 150 tons of chicken manure for biogas production which makes the farm independent of propane or carbon. The residuals from the biogas plant are used directly in the irrigation system, thus reducing the need for chemical fertilizers. One of the large slaughterhouse companies in Brazil is redesigning existing CDM projects towards co-generation in order to decrease the high costs for peak electricity.

Micro Hydro Power

While waste-to-energy is attractive for many agro-industrial sites regardless of where they are; micro hydro power serves a very particular South American market. The large river systems of Amazonas in the North and the Parana-Paraguay in the South remain accessible only with difficulty; large areas of Bolivia, Brazil, Columbia, Paraguay and Peru are still without consistent electricity. Depending on legislation, the national utilities and/or, local political bodies have the mandate for electrifying these rural areas. There are two main alternatives: (1) build up large local grids fed by mid size hydropower plants, (up to 50 MW) or in some cases diesel generator systems; or (2) implement many small generators between 5 to 50 kW capacity, supplying micro-grids, or even individual sites. A third, although not a technically or economically desirable option, would be to connect these areas to the national grid.

Local grids are an interesting option wherever (a) hydropower plants can be realized, (b) a larger population with some industrial activity promises a base load demand, and (c) the area is accessible for grid construction. Each of the three premises is difficult to realize; the probability that all three factors exist is rather low. Centralized hydropower applications can seem less attractive when faced with the environmental issues associated with using the river for a local grid establishment. If these grids are to be sustained by diesel generators, the generation costs increase dramatically. As diesel has to be transported by motor vehicle or boat in the Amazonas, prices vary between 1.15 USD per L in the main centers, to up to 15 USD per L in remote areas. Average electricity from diesel generators is at 0.32- 0.42 USD per kWh.

The high prices for electricity from diesel generation also apply to small generation sets, which makes their implementation unattractive. But, there is an alternative technology based on micro hydropower plants which is currently developed in Brazil, Columbia and Peru. These micro hydropower plants are using the kinetic power or linear flow of rivers only and are, therefore, limited to 5 to 10 kW at average river flow and depth. Even if the investment per kW is close to photovoltaic, due to 95% efficiency, (8300 hours p.a.) generation costs can be reduced to 0.12 - 0.18 USD per kWh. This becomes the most competitive option.

Conclusions

South America has a case for decentralized electricity generation. Large scale, central power plants – most importantly hydropower – must remain for a stable base power supply. But under South American conditions, biomass and micro-hydropower as decentralized energy forms can economically compete against centralized forms. No form of decentralized energy will ever dominate the energy matrix, but they are complimentary in meeting the growing South American demand for reliable and affordable electricity.

A New Framework for Rural Electrification Programs

By Kristin Dietrich, Álvaro López-Peña and Pedro Linares*

Background

Access to modern forms of energy is a key element for the development of human societies. The United Nations Energy (2005)[1] argues how this access is key for achieving the Millennium Development Goals. The International Energy Agency[2] highlights electricity as the most critical energy carrier for development. But in 2008 1.45 billion people worldwide didn't have access to electricity.[3] Electrification rates (percentage of households with access to electricity according to the World Bank's definition) amount to 99.8% in transition and OECD countries, but to only 72% in developing countries. Among these countries, low electrification rates are concentrated in rural areas (electrification rate of 58.4%, versus 90% in urban areas), where 55% of the population lives in the less developed regions.[4] In addition, in absence of vigorous policies, in 2030 1.3 billion people in the world will still live without access to electricity.[5]

Therefore, the need to foster electricity access in rural areas in developing countries seems urgent. However, this task is very complex; rural areas in developing countries are usually very poor and their inhabitants' per capita energy consumption is (as a cause and as a consequence) very low. Thus, the benefits of electrifying these areas would be low and risky for private companies[6]. In addition, households tend to be dispersed over remote and inaccessible areas, and the low consumption levels do not allow for taking advantage of the economies of scale present in the electricity sector. Thus, electrification costs are very high. This combination makes rural electrification activities (network expansion and operation, as well as possible investments in new generation capacity) very unattractive for private investors. This is one of the major underlying causes of low electrification levels in rural areas in developing countries.

On the other hand, access to modern forms of energy is in many countries a constitutional right, which makes government the subsidiary authority in charge of making sure that this right is fulfilled. This, added to the above-mentioned advantages for economic and social development, has led many governments to propose large investments in rural electrification, although it is difficult for them to cover the usually high costs. Therefore, it is necessary to involve private initiatives in the process; not only large multinational energy companies, but also small private arrangements such as cooperatives.

The sustainability of these installations is also a key aspect to be considered. Rural electrification programs should be based on a solid economic regime that provides economic sustainability for the installations. And they should also take into account environmental concerns, and ensure, through participatory instruments, social sustainability.

In this paper we propose a new regulatory framework for Guatemala by which governments would only provide the funds needed to make these projects profitable for private investors, closing the gap between the (low) expected revenues from consumers, and the (high) expected costs of providing the service. In addition, this new regulation must be integrated easily in the existing general energy regulation of the country.

A New Regulatory Framework for Rural Electrification

Basic principles for rural electrification programs

The development of the regulatory framework proposed required first the definition of basic principles on which to base it. The basic principles identified in this case were:

Universal access: The importance of electricity in sustainable development requires that all the population that demand electricity should have access to it in order to foster this development. This may imply the need for subsidies, given that the cost of supplying electricity to rural areas may exceed the capacity to pay for it.

Subsidiarity of the State in the electrification of rural areas: The electrification of remote areas, usually characterized by a sparse population, should be planned, realized and maintained first and foremost at the local level by local authorities, since these are closer to the needs of the population and know better their particular needs.

Local community participation: It is a right of the citizens to actively participate in political decision processes. This participation is particularly relevant in rural electrification, since its influence in the maintenance of the equipment is

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key to the sustainability of these programs. Educational programs to train the local population may be necessary.

Fair prices and reasonable quality: Although the quality of supply should be reasonable, it will seldom be possible to achieve the quality levels of those areas supplied by the grid. Therefore, the cost for the consumer of the electricity in rural areas should never be higher than the cost for grid-connected ones, as that would be discriminatory. Subsidies may be required to achieve this principle.

Promotion of private initiative and competition: As said in the introduction, the promotion of private initiative is crucial for rural electrification in order to raise the capital required. Competition will also help to achieve lower costs, and therefore minimise the need for subsidies

The elements of the proposal: translating the basic principles into the framework

This section describes how the basic principles identified are translated into the elements of a proposal for the regulation of rural electrification. A major feature of this proposal is that it is a service-based model, rather than investment-based, as will be described below.

Promotion of private initiative and competition

This would be achieved by a competitive tendering process, by which private investors would compete for the subsidies available for the electrification of the rural areas previously identified in a National Rural Electrification Plan. These subsidies, which should cover the gap between the costs incurred by the investor and the income received from consumers, would be released by the public administration according to the correct installation and operation of the equipment.

Under this scheme, a potential supplier must bid the minimum subsidy to be received for each connection point

Type of developers

Although this proposal does not specify the type of developers that should carry out the electrification projects, it is recommended that local ventures and communities are incentivized to participate in the tenders and in the maintenance of the installation, given their crucial role in the sustainability of the project.

Financial regime

Given that income will usually be lower than costs, subsidies will be necessary. These subsidies may come from different sources: other energy consumers, national budgets, advanced financing mechanisms like the Kyoto Protocol's Clean Development Mechanisms, or national, regional or international development agencies. However, in order to guarantee their availability, and also to decouple funding agencies or sources from investors, we propose the creation of a dedicated fund, which on the one hand aggregates the different sources, and on the other hand, guarantees its exclusive use for rural electrification.

In order to achieve the sustainability of the projects, subsidies must be released upon the provision of the service, and not associated to the investments. Therefore, subsidies will be paid to investors during the lifetime of the project, to deter "build-and-run" behaviors. This should be governed by a contract signed between the electricity provider and the public administration managing the subsidies. The disadvantage of this proposal is that, by deferring the grant, the contractor will need more funding, which means that only those agents who have borrowing capacity could engage in this type of competiton. This aspect should, therefore, be carefully evaluated.

The payment of the subsidies must be subject to the verification of the continuity and quality of the electricity service.

Electricity rates

Electricity rates must be calculated in reference to the existing social tariff for grid customers, and should never be above them. However, they must cover at least maintenance costs to ensure the financial viability of the project. Different rates may be set depending on the quality of service.

Ownership of the equipment

Being this a service-based model, the achievement of rural electrification should be measured in terms of the quality of the electricity service provided, rather than on the number of installations. This results in that the ownership of the generation equipment belongs to the supplier, rather than to the final users. This in turn places the responsibility for maintenance on the suppliers, which usually have expert

personnel, instead of on the final users.

Other elements promoting sustainability

The following elements are introduced to ensure the sustainability of the project, in addition to those previously described:

The temporal scope for the regulation and the financial regime must always go beyond the investment phase

The costs to be recovered must include not only investment ones, but also replacement, operation and maintenance costs during the lifetime of the installation.

The user price for this service must be sufficient to cover maintenance, but should not exceed the social electricity rate for grid-connected users. Making users pay involves them in the scheme, makes them conscious of the cost of electricity, and makes them require a certain quality for it.

Local administrations become the monitoring agents for the technical and economic terms of the electricity service, thus involving local communities and decentralizing the administrative process.

A fraction of the dedicated fund must be devoted to training and education for electricity users.

An Application to Guatemala

Guatemala is the most populated country in Central America and at the same time the largest economy in the area. Nonetheless 57% of the population lives in poverty, 21.7% in extreme poverty. Seventy four percent is concentrated in rural areas and 76% is indigenous population. The electrification rate rose from 37% in 1990 to 84% in 2002. The major part of the electrification has been achieved via extension of the national electricity grid. Rural and mountainous areas have been left apart and are nowadays isolated. These areas are at the same time those with the highest poverty indices. The characterization of demand for housing, schools or medical centres was taken from Rafael Landívar University[7], CIEMAT[8] and own estimates. This framework would provide electricity to 700,000 people (6% of the Guatemalan population).[9]

The basic level of electricity supply has been set at 150 Wh/day. We have assumed that there is a school and a medical center for every five communities.

We considered three different configurations: home systems, battery charging stations, and micro grids. We examined various generation technologies: photovoltaic panels, diesel motors and hydro units.

Solar home systems have the advantage of the proximity to the user, low maintenance, and ease of installation. They do not need measurement devices as most of their costs are investment costs. In return, its low concentration may make the maintenance more difficult.

In principle the use of fossil fuel-based solutions such as stand-alone diesel generators was considered as not suitable. Although they can be attractive due to lower initial investment, the volatility of fuel prices could result in very expensive operating costs and could jeopardize the economic sustainability of the projects. From an environmental sustainability perspective, these systems are not a good option. However, the decision to include them has been taken because the main objective of this regulatory framework is electrification, not environmental sustainability (dedicated legislation exists in Guatemala for that purpose)

Battery charging stations allow aligning photovoltaic generation with the load. They also facilitate the maintenance of the system centrally. On the other hand, they show some problems of discomfort, as they require moving batteries from the docking station to the individual houses, and also entail a risk from the discharge of battery acid.

In general, micro grids optimize power generation, distributing it more efficiently within the community, while avoiding the drawbacks of battery recharging stations. The practical problem is that micro grids may need separated meters to control each consumer's consumption. Three possible micro grids have been considered: with photovoltaic panels, with hydro plants and a mixed one with photovoltaic panels and an auxiliary diesel generator.

For the economic evaluation we calculated first the cash flows over the lifetime[10]: 20 years assumed for each type of installation. The cash flow is considered as the difference between income and expenditure for each installation. Income is the result of the sale of electricity at the rate considered (which equals the current social tariff set in Guatemala for grid users). Costs are all payments of the investment or operation. Cash flows for individual systems (IS), for battery charging stations (BSC), for Microgrids (MG), for photovoltaics (FV), and diesel, hydro and mixed systems were calculated. Those for photovoltaic installations are shown in Figure 1. Starting from the cash flow for each technology, we determined the amount

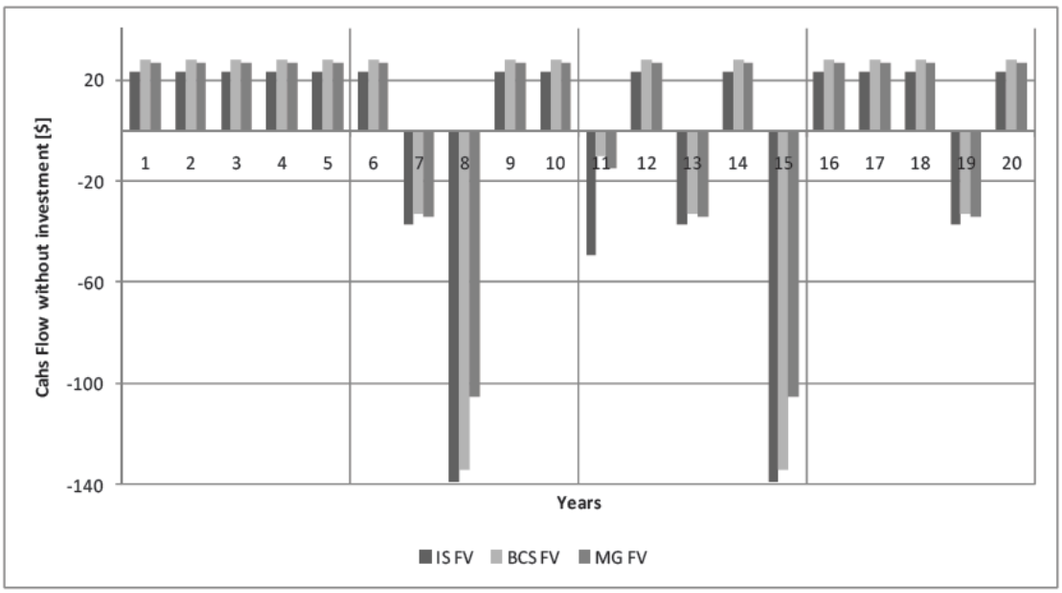

Figure 1
Comparison of Cash Flows of Different Systems

of subsidy required.

If we assume that the program would use 25% hydro microgrids, 25% solar home systems, 25% PV microgrids, and 25% battery recharging stations with PV, and we also assume a 20% overhead cost (which should cover training, dissemination and other administrative costs), the average cost of the program would be $111 million (net present value over the 20-year lifetime), or $804 per household.

The estimated income for the program (assuming the current social electricity tariff) is $30 million, or $216 per household (again, in net present value terms). Therefore, the subsidies required are $79 million, or $572 per household.

However, as mentioned previously, these subsidies should be spread over time. The initial subsidy would only be 70% of the investment cost, and the remaining amount would be paid in years 5, 10 and 15. If we assume that the total program will be developed in 10 years, the money to be paid from the dedicated fund would be the ones shown in the Table 2, for the first ten years.

The remaining subsidy to be paid would be $138 million ($61 million in NPV terms). As may be seen, this seems an affordable schedule for a country like Guatemala.

Year	1	2	3	4	5	6	7	8	9	10
Annual Expenses	4	4	4	4	4	6	6	7	8	8

Table 2
Expenses and earning rights from the dedicated fund (million US$)

Conclusions

This paper has presented a regulatory framework for the electrification of rural areas in Guatemala. The electrification program would cover around 137,500 households, or 700,000 people.

The objective of this new framework is to solve the current problems detected in previous rural electrification programs, basically access to capital, and the sustainability of electrification projects over time.

The new elements of the framework presented are: a service-based model instead of an installation-based one; a competitive tender mechanism to select suppliers, a dedicated fund to manage the subsidies, a temporal release of the subsidy that ensures the sustainability of the project, and the setting of a tariff that covers maintenance costs, but is never higher than the current social tariff for grid-connected users.

All these elements have been integrated in a single regulatory and economic model, which is expected to improve the sustainability of rural electrification projects in Guatemala, and, therefore, will contribute, from the electricity provision side, to improve living conditions in these areas.

The proposal is currently being studied by the Guatemalan government, and funds have already been secured from the Inter American Development bank. It is hoped that rates of rural electrification in Guatemala will increase very soon.

Footnotes

[1] United Nations Energy (2005). *The Energy Challenge for Achieving the Millennium Development Goals Energy and the Millennium Development Goals*. New York.

[2] International Energy Agency (2010). *The Electricity Access Database, World Energy Outlook*. Retrieved from http://www.iea.org/weo/electricity.asp.

[3] According to International Energy Agency (2010).

[4] United Nations Department of Economic and Social Affairs (2009). *World Urbanization Prospects. The 2009 Revision.* Retrieved from http://esa.un.org/unpd/wup/index.htm.

[5] International Energy Agency (2008). *World Energy Outlook 2008,* Energy and Poverty Slides. Paris.

[6] In fact, this is also the reason why network extension does not usually reach these areas, which have therefore been neglected largely in these programs.

[7] Rafael Landívar University, Guatemala (2008). *Caracterización de la Demanda de Energía en Zonas Rurales Aisladas de Guatemala* (Characterization of the energy demand of rural isolated areas in Guatemala). Final Report.

[8] CIEMAT (Centre for Energy, Environment and Technology) (2009). *Electrificación Rural en el Municipio de Cobán,* Departamento de Alta Verapaz (Guatemala) según el Modelo Intigis (Rural Electrification of the municipality of Cobán, Department Alta Verapaz, Guatemal). Informes Técnicos Ciemat 1160, enero 2009 (Technical Reports CIEMAT 1160, January 2009).

[9] This corresponds to the electrification of 137,470 households in 3,722 communities. These numbers are taken from note 8.

[10] For the calculations, an exchange rate of 7.5 Quetzales per U.S. dollar has been assumed. A discount rate of 12% is considered including the official interest rate of 7.5% in Guatemala (March 2009) plus a 4.5% risk premium.

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Review of Support Schemes for Renewable Energy Sources in South America

By Luiz A. Barroso and Carlos Batlle*

Introduction

The South American region is among the most promising lands for the development of non-conventional renewable energy sources (RES, i.e., wind, small hydro, solar, tidal, geothermal and in some cases waste) or "green" energy. First, the region shows a huge "green fuel" potential: strong and persistent wind flows, rich country lands, availability of biomass, potential for small hydros and thousands of sunny hours a year. Second, in many cases, RES would be economic, not only from the carbon saving perspective but also due to the fact that the cost of energy in some of the regions is undergoing a significant increase. Third, there are many isolated areas for which distributed generation is truly the "great white hope". And finally, the high proportion of large-reservoir hydro plants that some of these systems present provides a suitable environment for the deployment of non-dispatchable RES.

Nowadays we count on a very significant number of experiences and literature that can help us assessing the efficiency of the different alternatives promoting RES. The problem is that many of the conclusions, particularly the ones extracted from the experiences in developed countries, cannot be exported to other systems, particularly the South American ones (different not only due to their topological nature but also the particular socio-economic environment).

This article reviews the current experiences undertaken to promote RES. We briefly describe first the particular characteristics of the territory which make it so appealing for RES deployment. Then we scour the continent examining the mechanisms implemented to date. We conclude by pointing out what should be expected in the years to come.

Renewable Potential in South America

South America has one of the cleanest energy matrices in the world, mainly due to its intensive use of hydro power for electricity generation and more recently the growing use of sugarcane ethanol for transportation in some countries.

The power sector of this region contributes very little to greenhouse gas emissions. The strong and persistent wind flows, rich country lands and thousands of sunny hours a year provide a significant potential for several types of RES. Some examples include cogeneration from sugarcane bagasse and small hydropower plants. In addition, in most cases hydro reservoirs can easily smooth out production fluctuations of intermittent (wind and solar) or seasonal energy sources (biomass), thus providing an operation flexibility that facilitates their technical and economic integration. In other words, hydro reservoirs play the role of "energy warehouses" that may "store", besides water, other types of energy such as wind, solar and biomass.

While the "conventional" RES (mainly large hydro plants) have a major share in the region, the penetration of non-conventional RES (wind, small hydro, solar, tidal, geothermal) has occurred mirroring the developed world but is still small. Despite the primary objective of increasing the population's access to electricity, budget constraints have not allowed South American countries to set a priority for renewables for the past decade. This situation is, however, changing and renewables have started this decade with a fast penetration in these countries due to the increasing awareness of the crucial role of clean energy supply, a need to diversify the generation mix and a pressure to conform to world efforts in this direction.

The downside of renewable energies in South America is first the higher economic cost as compared with standard generation options (although recent prices resulting from long-term auctions in Brazil or Peru might show that the gap is near to nil, see next section) as well as, in some cases, the weak state and instability of transmission networks.

However, energy power systems in the region present a number of particulars that if the costs keep on decreasing can turn RES into an interesting generation option:

- From the security-of-supply perspective, RES represents an opportunity to diversify the current generation mix, currently heavily based on hydro facilities, which leads the power systems to be critically vulnerable to the El Niño/La Niña-Southern Oscillation. Also, in contrast to the last five years for "regular" hydro, their construction time is short (around

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See footnotes at end of text.

18 months). This allows flexibility in the entrance of new capacity; which is valuable as a hedge against the countries' load growth uncertainty[1]. RES are also the best solution to provide access to electricity to the large numbers who live in isolated areas of the continent.

- From the economic perspective, the new "regular" hydro plants expected to be built in the years to come, may in many cases be large scale projects (examples include the 11,233 MW Belo Monte plant in Brazil and the 2,400 MW Pescadero plant in Colombia – both under construction - and the large Peruvian hydro projects on the right-hand-side of the Andes, which can easily total over 6,000 MW[2]). Because of the large capital costs of this type of investment, the number of qualified investors expected to enter electricity markets in the region is limited. This in some cases reduces competition. In contrast, due to their smaller scale RES increases the range of potential investors. Also, the substitution for imported oil- or gas- or coal- fired generation by locally available RES could save expenses in foreign currency and foster the installation of local manufactures, which increases job creation and contributes to economic growth.

Renewable Support Schemes in South America

RES energy support mechanisms have been present in the South American region for the past 10 years under the form of some sort of fiscal or tax incentive for renewable development in a state or municipality. In the beginning of the last decade Brazil, Argentina and Ecuador implemented feed-in tariffs to foster renewables. However, due to various reasons, such incentives have not been successful (see below). The countries of South America also have never had binding renewable targets in their electricity matrices. Some isolated initiatives appeared at the beginning of the decade in some countries but were not binding.

With the implementation, beginning in 2004, of the second wave of sector reforms to attract new generation, (see Batlle et al. 2010), long-term auctions for energy contracts or capacity payments (e.g., Brazil and Colombia) gained momentum and started to be used in several countries as their main support scheme for RES. The auctions function as an indirect way for feed-in price discovery and manage to reach the right amount of investment and to reduce risk aversion with long-term contracting. This is the case of Brazil and Peru, where renewable auctions complement the regular auctions to attract conventional generation. Argentina and Uruguay have also implemented specific auction processes to attract RES. Chile has opted for a quota scheme placed on generators. All other countries do not have an explicit support mechanism besides soft loans, tax credits, fiscal incentives or specific funds to foster RES investment in isolated areas.

Following are reviews of the current situation of RES regulation in the largest countries in the region.

Brazil

The "Proinfa" program, launched in 2002 was the first scheme adopted in Brazil to foster RES. It was essentially a feed-in tariff designed to contract for 3,300 MW of wind, biomass and small hydro until 2006. Each RES had a different tariff and first priority for 1,100 MW. The energy produced by participating plants is purchased by Eletrobras (the holding company for power utilities owned by the Federal Government) through 20-year contracts, which then resells the energy to all consumers in proportion to actual consumption (formally a levy is paid). Consumers are then entitled to portions of Proinfa energy in their contract portfolios. The average price paid to Proinfa wind farms for 2010 is about 140 US$/MWh. Proinfa was responsible for jumpstarting the wind industry in Brazil but completion has been delayed (the original deadline of 2006 was extended several times and is now 2011) and its performance has been criticized on grounds of (the lack of) economic signals for efficiency and for technological improvement.

In 2007 a second support mechanism, now in the form of discounts on transmission and distribution tariffs for free consumers who purchase energy through contracts that are backed up by RES, was implemented. In practice, this is a cross subsidy on the 'wires' cost, paid by captive consumers and received by free consumers who purchase RES. Depending on the location of the consumer the benefit is significant and allows RES to sell high-priced energy contracts.

The revised power sector regulation implemented in 2004 allows the use of contract auctions as a backstop mechanism for the development of specific technologies driven by energy policy decisions or to increase the system's reserve margin ("reserve energy auctions"). These auctions are organized in a similar way to the long-term auctions to supply the distribution companies (which act as regulated retailers for small consumers), (see Barroso et al. 2006), with some implementation differences. In the case of RES, the government has the prerogative to call an auction to contract a government-selected volume of RES, even if it is not contemplated in the demand forecasts prepared by the distribution companies,

as well as to select the participant technologies. All consumers pay for this energy as a system charge. It works as a feed-in tariff scheme, but, as opposed to Proinfa, the consumers are not assigned a share of the contracted energy to their portfolio of contracts.

The auction-based approach has become the main tool in Brazil to foster RES. Its "technology-specific" approach allows the organization of auctions to specifically contract one or another RES. The first auction was carried out in August 2008 to contract new energy from the cogeneration of sugarcane bagasse for delivery in 2011 and 2012. Some 2,400 MW (gross capacity) were acquired in 15-year contracts for an average price of 80 US$/MWh. The net capacity available for the power sector is about 1,500 MW.

In December 2009 a similar auction to contract for wind power for delivery in 2012 was carried out. The product that was offered to potential investors, a 20 year energy contract with delivery starting in 2012, has a very specific accounting mechanism designed to provide investors with a fixed payment (for financing purposes) while managing the quantity-price risk and incentivizing/penalizing production above/below a given energy threshold (see Porrua et al 2010). 13,000 MW of wind projects registered for the auction, and some 1,800 MW of capacity were contracted for an average energy price of 77 US$/MWh (21% below the initial auction price). A diverse mix of investors (local and foreign private generators, manufactures and government-owned companies) won the contracts, and three new wind turbine factories are to be installed in the country. An impressive issue is the fact that the average capacity factor of winning projects hovers around 45%. Another RES auction was carried out in Brazil in August 2010, resulting in an additional capacity of 2,900 MW. This includes 70 wind farms, 12 sugarcane cogeneration plants, and seven small hydro plants. Wind energy totaled 2,050 MW at an average rate of US$75/MWh. Biomass came second with 713 MW of capacity at an average rate of US$82/MWh, and small hydro reached 132 MW at an average rate of US$81/MWh. Once more, the average capacity factor of winning projects of the 2010 auctions is high: it hovers around 45% with some projects having capacity factors over 50%.

Tax incentive programs have also been implemented and direct subsidies to pre-investment assessments. A reduction of 75% on the income tax during the first 10 years of operation and special financing conditions were given in some regions of the country.

Chile

Chile has followed a different path than its neighbors. Distribution companies hold long-term energy contract auctions to supply their regulated consumers in which no technology discrimination is applied. In 2009 a wind farm won a 275 GWh/year, 15-year energy contract for a price of 93 USD/MWh[3]. However, the electricity regulation was modified in 2008 and a quota system was introduced, which required that at least 10% of the energy traded by generators be produced by RES. The requirement starts with a 5% obligation in January 2010 until 2014, and from then on there will be an increase of 0.5% annually until reaching 10% in 2024. In case the requirement is not met, a fine of is established.

It is uncertain if the quota-mechanism will be successful due to the (currently) limited number of RES projects readily available to be developed. The remuneration of such projects is also an uncertainty (the spot market or firm energy contracts with production-delivery risk are the alternatives) and some developers have requested the implementation of feed-in tariffs or another RES support mechanism.

Argentina

The strong intervention in Argentina's electricity market after the 2001 political-economic crisis had several effects including the stalling of generation investments and freezing of commodity prices that have contributed to an aggressive energy demand growth. With the increase of regulatory uncertainty, the drivers for new investments in generation clearly shifted, from the private sector (previously to the crisis) to the National Government (after the crisis).

In May 2009, Enarsa (the State-owned energy company created in 2004) organized a specific auction to develop renewable technologies, basically wind power (the so-called GENREN program). The renewable auction offered a 15 year contract signed between the winning generator and Enarsa and a mirror contract signed between ENARSA and Cammesa. The total offer was about 45% greater than demand. The offers were broken down by technology: 1,155 MW for wind power; 155.4 MW biofuels; 54.1 MW biomass; 14 MW biogas; 22.5 MW photovoltaic solar energy; and 12.7 MW from small hydro projects. The auction awarded 895 MW of new capacity to be built in two years, of which 754 MW were wind power plants (the remaining 140 MW were distributed among biomass, geothermal, solar and plants burning biofuels). These wind offers were around 130 US$/MWh with capacity factors around 40% (the

adjudication process required projects with capacity factors higher than 35% and the weighted average price of all bids was fixed as auction cutting price, this was 136 US$/MWh).

Uruguay

UTE, the Uruguayan national vertical integrated electricity utility, ran two successful auctions for low-scale wind projects (total 50 MW awarded). Then in 2010 promoted an auction to acquire 150 MW of wind power, expected to come online by 2014, through 20 year contracts. UTE received 950 MW of proposals from 22 projects of 15 companies for a 150 MW tender. The clearing rules of the auction were pretty complicated (for instance, national-component levels were favored and a two-round auction system was implemented, in such a way that first participants bid without transmission costs and on the basis of the results they had to rebid with such costs after a reference network was planned by UTE).

At the time of this writing the UTE indicated its preference for the three cheapest bids at prices around 85 US$/MWh but rivals allege there are a number irregularities in some of the bids and threaten legal action (Sciaudone, 2011). A new tender has already been announced for April 2011 to contract an additional 150 MW.

Peru

Peru has also adopted technology-specific contract auctions for RES according to the targets established by means of an RES development plan approved by the government. Although this plan has not yet been released, in February and July of 2010 procurement auctions were applied to contract small hydro, photovoltaic, wind and biomass generation. Winning generators were awarded contracts for up to 20 years to deliver the annual amount of energy offered at its offered price for 3 years ahead. As in the Brazilian case, demand pays a fixed annual amount and collects the spot market revenue.

About 140 MW of wind power were competitively contracted at energy prices averaging 80 US$/MWh. Contracting of 160 MW of small hydro, 90 MW of solar plants, and 27 MW of biomass was observed with prices of about 60 US$/MWh, 220 US$/MWh and 63 US$/MWh, respectively. These energy prices had discounts of 50% (biomass), 27% (wind) and 18% (solar and small hydro) with respect to the auction price cap and winning investors are mostly foreign private companies.

Bolivia

Currently the Bolivian system is completeing a strong restructuring process. Nationalizations have occurred in generation and distribution (it is not yet clear if they are not going to affect the whole system) and most developments are driven by the recreated state-owned vertically integrated company (ENDE).

Currently, the tightness of the reserve margin is worrying and the planned new generation investments are basically gas-fired. In the five-year expansion plan made by the system operator (CNDC) no development of RES is foreseen. The only hints about RES initiatives are some news about the presumed interest of ENDE in developing geothermal sources in the south of the country.

Ecuador

In Ecuador, RES activities have been small and sporadic. A law passed in 2000 established a feed-in tariff for photovoltaic installations (520US$/MWh), but once implemented, it was never paid. Installations of some hundreds of isolated photovoltaic systems was done between 2003 and 2006 by means of a public fund (Marginal Rural and Urban Electrification Fund, Ferum) based on a 10% tax on the power consumption for commercial and industrial consumers. In any case, the current regulation passed by President Correa has allowed the State to re-take full control of the electric power system and bans private initiative to invest in generation facilities. This will definitely postpone any plans to foster RES developments.

Colombia

No explicit support mechanism for RES is in force in Colombia to date. Quite the contrary, a recent study published by the governmental UPME (Mining and Energy Planning Unit) clearly states that "at least during this decade, it is clear that reducing emissions is not a priority that determines (at least significant) investment goals". And even if this would be the case, large hydropower and also the rehabilitation of existing thermal plants are seen as the least-cost power options and also the best from the CO_2 emission reduction point of view. The only advantage the government sees in wind generation is, as is the case in Brazil, it being complementary to hydro energy resources. But at least for the moment, no explicit RES support mechanism is in place and the most likely way to hedge the system against scarcity appears to be the expansion of coal-based generation.

Venezuela

In Venezuela no RES support mechanism has been implemented to date. In 2007 the government created the National Registry of Renewable Energy. This registry is nothing but the first bureaucratic condition to supposedly be able to opt to join any potential (yet to come) program on RES promoted by the Ministry. However, the new law passed at the end of 2010 establishing the "socialist management model", declares the public utility of all goods related to the electric power service and centralizes all the electricity activities in a fully State-owned vertical utility. The law announces a Development Plan of the National Electric Power System, which, among other objectives, will eventually contain 'actions aimed at promoting the use of alternative sources of energy, renewable and environmentally sustainable'.

Paraguay

99% of the generation capacity in Paraguay is large-hydro-based (Itaipú). There are no plans to undertake any initiative to deploy any alternative RES.

Conclusion

Long-term auctions are the main tool to promote RES in South America. Auctions appear as an effective mechanism to stimulate competition between RES investors, to provide price disclosure while managing the right amount of investment and reducing risk aversion with long-term contracting. On the other hand, its main challenges include the definition of criteria to select the quotas for each RES, the design of a relevant set of guarantees (financial, technical and operational) and the attraction of competition in order to avoid the mixed experience with auctions promoting RES in other parts of the world.

Efforts were devoted in South America to both the design of the auction and the product. However, some of the auctions had shown excessive political interference: capacity factors for wind plants estimated from short historical records of wind measurements and aggressive bidding. The proof of the pudding will be in some years' to come, when the winning projects will have to start delivering energy.

Footnotes

[1] Additionally, the lack of a coherent policy for environmental licensing often leads to delays of such large plants, which might affect supply reliability. RES are usually spread out over several plants with smaller capacities, providing a sort of hedge against project delays.

[2] Eastern Peru has a large hydro potential, enough to supply the whole county, export energy to its neighbours and to use its reservoirs to regulate downstream run of the river plants located in Brazil. Brazil and Peru are currently discussing commercial and scheduling arrangements to allow Peru to develop such projects, being Inambari (2,200 MW) the first hydro plant in the pipeline.

[3] RES are entitled capacity payments in Chile. They amount about 9 US$/KW month and are paid in proportion to the project's expected capacity factor de-rated by a factor of 30%.

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Table of Contents

Vol. 1, No. 1, January 2012

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Dynamics of Industrial Consolidation: Mergers & Acquisitions in the Argentinean Electricity and Gas Sector

By Marc Petz, David A. Edgar, Bryan K. Temple and Klaus-Dieter Maier

Dynamics of Industrial Consolidation

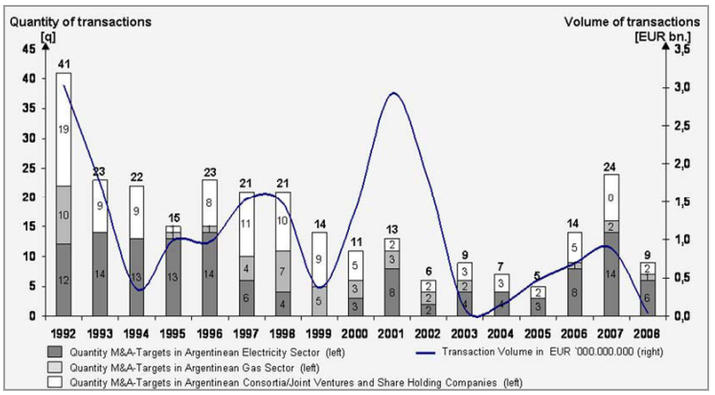
Industrial consolidation is a global mega trend that evolved during the last three decades. Privatisation, market liberalisation, new technologies and globalisation are the key drivers for the transformation processes – also in the energy industry. These drivers allowed new growth opportunities in new or emerging markets. While competitors seek to strengthen their market position, their underlying strategies reveal distinct and potentially differing degrees of performance.

The volume and number of international large-scale mergers increased and new multinational champions gained momentum (Graeme 2002). According to the industrial logic, the big players in the merger endgame focused on their core competences. The champions followed the theories of growth to realise economies of scale, scope and density (Panzar and Willig 1981; Chandler 1990).

The Argentinean M&A Dynamics

Argentina was one of the first countries that privatised the gas and electricity sectors and created - from a regulatory point of view - a perfect market structure design. Argentina accomplished the main goals set before privatisation: Attracting foreign investors and improving the infrastructure. Especially, in the electricity sector the generation capacity was extended by restructuring the existing infrastructure and building new plants to meet increasing demand.

The consolidation dynamics in Figure 1 illustrate the transaction development from 1992 to 2008 in several phases: The consolidation process started the privatisation of the state-owned companies in the year 1992, followed by the (electricity wholesale) market liberalisation in 1994.



Source: Own illustration, Global M&A Energy Database Aalen University/Glasgow Caledonian University)[1]

Figure 1
Argentinean M&A Dynamics 1992-2008

The graph of the deal volume hit rock bottom at the following events: 1994/1995 'Tequila Crisis', 1998/1999 and 2002/2003 'Argentina Crisis', 2008 'Global Finance Crisis'. The only crisis-exception is the 'Argentinean Finance Crisis' in the year 2001: During that period, mayor acquisitions and divestures, portfolio restructuring and larger mergers took place (compare Appendix). The biggest deal took place in 2002 when the Brazilian Petrobras restructured its shares and made an investment transfer of its Argentinean entity PECOM with an amount of EUR 1.1 bn..

The industry's overall performance on sales measured in local currency achieved continuous growth according the increase of gas supply and production. This is due to the regulation with fixed the prices. The installed capacity remained the same and had to satisfy an increasing demand. On the other hand, the companies were unable to invest into expansion of the installed capacity. The massive drop of net sales and net income in 2002 is explained by a profound deterioration in social and economic conditions suffered in Argentina by the end of 2001, accompanied by high political and economic instability: 'The Argentina Crisis'.

Since then the government focused on low energy prices to nurture industrial recovery. This was a resounding success with the country notching up five years of growth but was total disincentive for new energy sector investment (Webber 2008:2). Consequently, the gas sector did not recover compared to the net income of the years 1993 and 2008.

Conclusions

Firstly, after privatisation a combined set of economic determinants drove institutional and economic change, which created a friendly environment for foreign and new investors. The Argentinean government achieved in about EUR 8 bn. (ca. USD 9.6 bn.) from the sales of their state-owned enterprises (GdE, AyE,

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See footnotes at end of text.

SEGBA, ESEBA, provinces)[2] due to electricity and gas privatisation[3] from the year 1992 to 2000[4].

Different crisis made a challenging environment for the companies involved in the sector during the years of reform. The government regulated domestic prices and tariffs and raised pressure on the established energy groups after the 'Argentina Crisis'. This happened predominantly through Argentinean investors, which was widely seen as a way of the government to regain influence over the previously state owned companies in the electricity sector. Consequently, foreign investors divested and exited the Argentinean electricity market. Nevertheless, the activities in the period from 2004 to 2008 remain mainly multi- and international (about 73% of the 59 transactions).

Leveraging the analysis into pre-crisis (1992-2001) and post-crisis (from 2002) the Argentinean companies benefited by the impact of M&A, but not in terms of higher income. The quantity of Argentinean companies in the mid- and downstream sector did not change since the reshape of the gas sector. This is due to the competition design of the framework that does not allow the Argentinean firms to merge horizontally or vertically. The crisis affected the Argentinean economy gravely. The international companies had mainly to struggle with high inflation and the regulated performance of the overall gas industry.

Comparing the dynamics of industrial consolidation with other regions, it remains remarkable that there can be observed a common trend: The privatisation was the initial process driver of the M&A activities in the most regions. Also, market liberalisation was accompanied by increasing M&A activities. There are some differences in the Argentinean market observed in comparison to other consolidation profiles:

1. The average deal size is comparatively small in an international context.
2. The fixed tariffs, the market structure design and the competition framework for example limiting the economies of scale according the usual consolidation dynamics for future, pivotal investments.
3. Also remarkable are that the transactions only seem to know one direction: There have been nearly no mentionable cross-boarder transaction activities from Argentina to other countries. Internationalisation in the Argentinean case was more likely to sell-off Argentinean assets to foreign investors.
4. In addition, contrary to the global trend, wind parks (on-/off-shore) or solar parks played absolutely no role in those transactions.

Footnotes

[1] Remark: The data refers to targets in the Argentinean Electricity (up-, mid-, downstream) and Gas (mid-, downstream) sector and related Bidder Consortia, Joint Ventures and Holding Companies. Date of last revision: 2011/01/30

[2] Without YPF-Privatisation sale, which amounted about USD 2 bn. (see DB Research 1999). Argentinean privatisation sales amount in total USD 23.8 bn. from 1990-1999.

[3] Refers to electricity (up-, mid-, downstream) and gas (mid-, downstream) sector privatisation according research design.

[4] This reflects in total 75 privatisation sales (= transactions) from 1992-2000.

[5] Remark: The data refers to targets in the Argentinean Electricity (up-, mid-, downstream) and Gas (mid-, downstream) sector and related Bidder Consortia, Joint Ventures and Holding Companies. Date of last revision: 20110130

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Appendix: Top 15 Argentinean Transactions 1992-2008

Rank	Volume [EUR bn.]	Share [%]	Acquirer	Nation	Target	Year
1	1091.1	58.60	Petroleo Brasileiro SA - PETROBRAS	Brazil	Pérez Companc SA - PECOM	2002
2	770.0	49.70	EDF International SA	France	Empresa Distribuidora y Comercializadora Norte SA	2001
3	689.6	59.00	HidroInvest SA (ENDESA Chile, CMS Energy)	Argentina	Hidroelectrica El Chocon SA	1993
4	653.9	100.00	Total Austral SA (since 1996: TotalFinaElf, France)	Argentina	TermoAndes SA	2001
5	460.4	20.61	TotalFinaElf Gas Transmission Argentina SA	Argentina	Gasinvest SA	2000
		6.63	Total Fina Elf SA	France		
6	457.7	59.00	Hidroneuquén SA	Argentina	Hidroelectrica Piedra del Aguila SA	1993
7	452.2	70.00	Cía de Inversiones de Energía SA - CIESA	Argentina	Transportadora de Gas del Sur SA - TGS	1992
8	441.6	65.00	Dolphin Energía S.A.	Argentina	Empresa Distribuidora y Comercializadora del Norte – EDENOR	2005
9	434.5	60.00	AES Corp	United States	Empresa de Distribucion de Energia Norte SA - EDEN	1997
		30.00	Public Service Enterprise Group Inc - PSEG	United States		
10	420.2	51.00	Distrilec Inversora SA - DISTRILEC	Argentina	Empresa Distribuidora y Comercializadora del Sur - EDESUR	1992
11	415.8	100.00	AES Camille Ltd	Cayman Island	Empresa Distribuidora la Plata SA - EDELAP	2001
12	372.3	100.00	GPU Inc	United States	Empresa Distribuidora Electrica Regional SA - EMDERSA	1998
13	363.7	100.00	Total Austral SA	Argentina	Central Puerto SA	2001
14	346.1	51.00	Electricidad Argentina SA - EASA	Argentina	Empresa Distribuidora y Comercializadora del Norte – EDENOR	1992
15	345.7	90.00	Inversora Electrica de Buenos Aires SA	Argentina	Empresa Distribuidora de Energía Atlántica - EDEA	1997

Source: Own illustration, Global M&A Energy Database Aalen University/Glasgow Caledonian University

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IAEE/Affiliate Master Calendar of Events

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

Date	Event, Event Title and Language	Location	Supporting Organizations(s)	Contact
2011				
October 9-12	30th USAEE/IAEE North American Conference *Redefining the Energy Economy: Changing Roles of Industry, Government and Research* http:/www.usaee.org/USAEE2011/	Washington, DC	USAEE/NCAC/IAEE	USAEE Headquarters usaee@usaee.org
2012				
February 20-22	3rd IAEE Asian Conference *Growing Energy Demand, Energy Security and the Environment in Asia*	Kyoto, Japan	IEEJ	Kenichi Matsui *kmatsuijr@aol.com*
June 24-27,	35th IAEE International Conference *Energy Markets Evolution under Global Carbon Constraints: Assessing Kyoto and Looking Forward*	Perth, Australia	AAEE/IAEE	Ron Ripple r.ripple@curtin.edu.au
September 9-12	12th IAEE European Conference *Energy Challenge and Environmental Sustainability*	Venice, Italy	AIEE/IAEE	Edgardo Curcio e.curcio@aiee.it
November 4-7	31st USAEE/IAEE North American Conference *Transition to a Sustainable Energy Era/ Opportunities and Challenges*	Austin, Texas	USAEE/CTAEE/IAEE	USAEE Headquarters usaee@usaee.org
2013				
April 8-9	4th ELAEE Conference Theme TBA	Montevideo, Uruguay	LAAEE	Marisa Leon melon@adme.com.uy
June 23-27	36th IAEE International Conference *Realizing the Potential of Energy and Material Efficiency*	Daegu, Korea	KRAEE/IAEE	HoesungLee hoesung@unitel.co.kr

Venezuela's Petroleum Fiscal and Contractual Regime Flexibility Provisions

10 years of the 2001 Hydrocarbons Organic Law: A View of the Current State of Affairs

By Carlos Bellorin*

Background

The year 2011 marks the 10th anniversary of the approval of the Venezuelan Hydrocarbons Organic Law (hereinafter HOL). This law, which was passed on 13 November 2001, and started on the path to full implementation in 2006[1], is the most influential hydrocarbons law since the 1943 Hydrocarbons Law, which in turn is considered a landmark in terms of legislation enacted during Venezuela's modern times. Generally the law regulating hydrocarbons in Venezuela has been regarded as fundamental for the country's interests, and the second only to the Constitution in terms of legislative significance[2].

The full implementation of HOL in 2007 occurred at the same time as the Law on the Effects of the Migration[3] was passed. The Law on the Effects of the Migration is the final piece of legislation that ended the migration process or forced renegotiation of the contracts signed in the framework of the Oil Opening[4] plan implemented during the 1990s. This article gives an account of the provisions that have been added or implemented during the last four years to make the conditions of the Venezuelan hydrocarbons fiscal and contractual regime more appealing to foreign investors[5].

Nowadays, the most pressing issue for Venezuelan hydrocarbons policy is to increase the country's production levels, which have been decreasing in the last 10 years or so. The principal strategy to achieve this objective is to develop the huge heavy and extra-heavy oil reserves of the Orinoco Oil Belt, but this entails huge investments. This delvelopment requires that the heavy and extra-heavy crude produced must be upgraded in a special facility in order to reduce their gravity and extract their high sulphur, coke and heavy metals content before being commercialised.

These Orinoco Belt projects, as with any project involving the development of "primary activities"[7], can only be carried out directly by the state, or through a joint venture, or Empresa Mixta (hereinafter EM), in which the state has control over decision making as holder of greater than 50% of the shares. This type of company is the only form of association through which foreign investors are allowed to participate in "primary activities".

The main constraints on such projects are the high costs involved[8] combined with a "government take" of 94%[9]. The break-even price has been estimated at US$44 per barrel (for the WTI) for new projects[10]. The size of the required investment, coupled with Venezuelan NOC PDVSA's inability to carry-out these projects independently have led the Ministry of Energy and Petroleum to look for partnerships with foreign firms that can bring financing, technology and managerial skills to the country. To this end, the "government take" has had to be lowered and terms made more flexible[11]. As a result of the terms "sweetening" and after three years of negotiations, five new EMs were formed (see Table 1).

Below is a brief explanation of the provisions that have been added in order to give some flexibility to the Venezuelan hydrocarbons contractual and fiscal regime, which can be characterised as being typically regressive. It is important to notice that the majority of the flexibility provisions are designed to apply during the early stages of the process, during the construction of the upgrading facilities that these projects require, where the majority of costs occur. The below commentaries are not intended to be an exhaustive list of the flexibility options included in Venezuela's hydrocarbons fiscal and contractual regime, and instead we focus on the most important of the provisions.

Royalty

The HOL allows the royalty rate to be lowered from 30% to a floor of 20% in the case of mature fields or Orinoco Oil Belt extra-heavy oil fields. The partners in these projects must prove that the exploitation is not commercially viable under the "regular" (30%) rate. The provision also states that the regular rate can be entirely or partially reinstated "until reaching again 30%, when it is demonstrated that the commerciality of the deposit may be kept with said reinstatement."[17]

A common provision included in almost all[18] of the "new" Orinoco oil belt EM contracts[19] is a stipulation that the Ministry of Energy and Petroleum "shall grant" the reduction of the royalty and extraction tax[20] to the EM when certain

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See footnotes at end of text.

Empresa Mixta	Area	Block(s)	Estimated Production (barrels p/d)[12]	PDVSA (CVP[13]) Participation	Minority Shareholders[14]
PetroMacareo	Junín	2 (247,77 Km2)	200,000	60%	Petrovietnam 40%
PetroUrica	Junín	4 (324,42 Km2)	400,000	60%	CNPC 40%
PetroJunin[15]	Junín	5 (424,30 Km2)	240,000	60%	ENI 40%
PetroMiranda[16]	Junín	6 (447,86 Km2)	450,000	60%	*Consorcio Nacional Petrolero SRL* (Russian companies consortium) 40%
PetroCarabobo	Carabobo	1 (382,86 Km2	400,000	60%	Repsol 11%; Petronas 11%; ONGC Videsh 11%; Oil India Ltd. 3.5%; Indian Oil Corporation Ltd. 3.5%
PetroIndependencia	Carabobo	2,3 and 5 (554,54 Km2)	400,000	60%	Chevron 34%; Mitsubishi Corp. 2.5; Inpex Corp.2.5%; Suelopetrol 1%

Table 1

New Orinoco's Oil Belt Empresas Mixtas basic information

conditions are met. Simply, the reduction must be granted once the basic engineering studies[21] of the project have been concluded and the revised cash flow projections have been adjusted (on the basis of the new engineering study results), which indicates that the investment cannot be recovered in a period equal to or shorter than seven years from the beginning of commercial production of upgraded crude oil.

Certain EM contracts have been more specific in regards these conditions, for example PetroUrica and PetroMiranda conditions establish that the company's activities will be oriented to reach an Internal Rate of Return (IRR) of 18% and 19%, respectively, that will allow for a seven-year investment payback period counted from the first commercial production of upgraded crude oil.

Also, in both PetroUrica and PetroMiranda, conditions are established that the basic engineering studies will be carried out using a Class 3 cost estimate[22].

The royalty and extraction tax are for temporary application, and apply upon the commencement of commercial production of upgraded crude oil and until such time as the EM has recovered its investments. In this event, the royalty and oil extraction tax must be reinstated to their "regular" rates.

Income Tax

According to the Income Tax Law, the income tax rate for hydrocarbons activities is 50% and cannot be lowered. However, there is no obstacle in the Income Tax Law to reducing the taxable base.

Accelerate Depreciation and Losses Carried Forward

A provision which lowers the taxable income has been included under the conditions for those formed in connection to the Carabobo Bid Round[23], namely PetroCarabobo and PetroIndependencia. Under this provision:

- the EM investments in assets (CAPEX) for the development of hydrocarbon primary activities[24] will be entirely deducted in the fiscal year that they are incurred;
- the investments made in connection to hydrocarbons upgrading will be deducted during a ten-year period using the straight-line method; and
- the net operating (OPEX) losses incurred by the EM in any fiscal year could be carried forward to be deducted over the subsequent ten fiscal years from the fiscal year in which they had been incurred[25].

Extra-heavy Oil Production and Refining Integrated Project

Generally, all of the Orinoco Oil Belt EMs have been conceived as vertically integrated production and upgrading projects paying royalties and taxes as single business entities. However, a new business model called Extra-heavy Oil Production and Refining Integrated Project (hereinafter integrated project) has been introduced for the development of the Junín 5 block. This business model establishes that two EMs will be formed: one for the production of extra-heavy oil and the other for the refining of this production. These two EMs have been called PetroJunin and PetroBicentenario, respectively. This

project, which will be carried-out by PDVSA and ENI subsidiaries, bears comparison with a horizontally integrated business model, and is the first to be implemented in Venezuela breaking with the traditional model. The integrated project's raison d' etre is to benefit from the provision of the Income Tax Law Article 11 (second paragraph), which establishes that companies exclusively carrying-out hydrocarbons refining activities or the upgrading of heavy and extra-heavy oil are exempted from the 50% rate of petroleum income tax, instead being liable to the non-petroleum rate of 34%, making both projects more tax and cost efficient. In consequence, the "production" EM will be liable to pay an income tax rate of 50%, while the "refining" EM pays 34%, although both belong to a comprehensive integrated project with the same partners.

Participation Bonus

According to the provisions of the "new" Orinoco Oil Belt EMs, the participation bonus[26] is a payment that the foreign partners must pay to the state for the right to participate in the project. The participation bonus is calculated at US$1 per recoverable barrel[27] up to the non-state partner participation[28] (see Table 2).

While the participation bonus seems similar to a signature bonus, they differ in the timing of their payments. Signature bonuses are usually paid in cash, up-front, upon the contract signature. The participation bonus payments in Venezuela have been divided into several instalments that are payable throughout the life[29] of the project. For example, the participation bonus for the project PetroUrica (US$900 million) is payable as shown in Table 3.

Empresa Mixta	**Area**	**Block(s)**	**Recoverable Production Reserves (Mils Barrels) (20%*Orignal Oil in Place)**	**Participation Bonus (US$/1,000,000)**
PetroMacareo	Junín	2 (247,77 Km2)	1460	584
PetroUrica	Junín	4 (324,42 Km2)	2250	900
PetroJunin[15]	Junín	5 (424,30 Km2)	1615	646
PetroMiranda[16]	Junín	6 (447,86 Km2)	2500	1000
PetroCarabobo	Carabobo	1 (382,86 Km2	2762.5	1105
PetroIndependencia	Carabobo	2,3 and 5 (554,54 Km2)	1250	500
Total		**2381.75Km²**	**11837.5**	**4735**

Table 2
Empresas Mixtas Participation Bonuses

Event	**Percentage**	**Amount (US$/1,000,000)**
10 days after the Transfer Decree[30] publication.	20%	US$180
10 days after the signature of the Basic Engineering Study contract.	20%	US$180
10 days after the non-state participant "final decision to invest" is made.	40%	US$360
1st year after the "final decision to invest".	5%	US$45
2nd year after the "final decision to invest".	5%	US$45
3rd year after the "final decision to invest"	5%	US$45
Upgraded production commencement date.	5%	US$45
Total	**100%**	**US$900**

Table 3
PetroUrica EM Bonus Payment Instalments

Conclusion

We could say that the Venezuelan regime is regressive in nature since it is loaded at the front-end and unrelated to the project's profitability rent-extraction instruments. These resource extraction mechanisms are in essence formed of the triumvirate of royalties, the participation bonus, and state participation. This article has explored how the income tax rate, royalties and the participation bonuses have been made less stringent. In addition, the participation, also allows some flexibility: the state's participation in all the established EMs to date has been to a level of 60%. Given that the law states that only 50% state participation in EMs is required as a minimum that means that in practice the Venezuelan government could (hypothetically) dispose of 10% in any existing project, if additional investments are required.

Apparently, the state's first goal has been achieved: namely, to attract and secure enough investment to carry out the above-mentioned projects. However, it is too early to say that the flexibility provisions have paid off—all the EMs discussed here been established during 2010. In consequence, the basic engineering studies contracts are either still to be agreed or still to be carried out.

In the short run, the projects are still to clear the first acid test that would be represented by the foreign partners making a positive definitive decision to invest[31]; this decision will be made based on the results of the basic engineering studies. Until such time, the improved attractiveness of EM conditions cannot

be regarded as proved successful. The likelihood is that companies will push for further incentives and improvements in deal conditions in the future, depending on a number of factors including the movement of oil prices. What we can predict is that the balance will be in favour of the foreign partners. This situation may lead the Venezuelan policy and law makers to seek creative solutions once again.

In the longer run, the adaptability and flexibility of EMs' conditions have yet to demonstrate that the economic return is sufficiently balanced for both state and non-state participants under conditions of rapid, steep, and sometimes unexpected oil price fluctuations without triggering a contract renegotiation.

In the meantime, the continuous bargaining process that any given hydrocarbon upstream contract implies is taking place.

Footnotes

[1] On 24 May 2006, the HOL was partially amended and re-published in the Official Gazette No. 38.443. Briefly, the amendment had the effect of: a) including the associated natural gas under its scope of application; b) eliminating the definition *bitumen;* c) increasing the royalty reduction floor from 16$^{2/3}$% to 20%; d) establishing a new "extraction tax"; e) establishing the procedure for the "Mixed Companies" formation; f) establishing an investment requirement towards an indigenous development project equal to 1% of the pre-tax profits; and g) establishing a petroleum production marketing procedure.

[2] "*(…) it has to be considered that the legislation on hydrocarbons is one of the most important in the country, after the Constitution, because it must regulate, clearly and accurately, one of the foundations of the Venezuelan economy and society.*" 2001 Hydrocarbons Organic Law preamble/justification (*Exposición de Motivos*)

[3] The complete name being: "*Law on the Effects of the Migration to Mixed Companies of the Orinoco Oil Belt Association Agreements and the At-Risk Exploration and Profit-Sharing Agreements"* .

[4] A plan aimed to attract foreign investments into the country's hydrocarbons industry. It was called Oil Opening *(Apertura Petrolera)* because it was the first time after the *1975 Oil Nationalization* that foreign capital was allowed to participate in Venezuela's most important industry.

[5] For practical reasons we have used the term "foreign investor" when referring to minority shareholders participating in the Venezuelan hydrocarbons industry. However, it is important to clarify that domestic private investment in Venezuela in the hydrocarbons industry is allowed.

[6] The business model of the Carabobo blocks that were awarded in 2010 throughout a competitive bidding round requires the construction and operation of upgrading facilities in order to upgrade half of the estimated production of between 400-480 thousand b/d of 8º API to obtain approximately 180-220 thousand b/d of 32º API. Then the upgraded production must be blended with the rest of extra-heavy oil production to obtain about 360-460 thousand b/d of blended crude oil with a gravity oscillating between 16-22º API.

[7] According to the HOL these are the activities in connection to exploration, exploitation, initial gathering, transportation and storage of hydrocarbons.

[8] Each project investments range between US$10 billion to US$18.7 billion.

[9] Manzano, Osmel and Monaldi, Francisco. "The Political Economy of Oil Contract Renegotiation in Venezuela" in William Hogan and Federico Sturzenegger, *The Natural Resources Trap. Private Investment without Public Commitment.* The MIT Press (2010).

[10] *Supra* note 6. For today's standards the Orinoco Oil Belt projects break-even price (BEP) is quite reasonable. For example, a consultancy firm established the BEP per barrel in US$69 for Brazil's offshore ultra-deep (PSA assumed terms) and US$75 for Canada's Tar-Sands Mining + Upgrading.

[11] A "flexible" fiscal regime is one that provides the government with an adequate share of economic rent under varying conditions of profitability. (Silvana Tordo. "Fiscal System for Hydrocarbons. Design Issues." The World Bank (2007)).

[12] These are the averages of the blended final output (extra-heavy oil production + upgraded output).

[13] PDVSA's affiliate "Corporacion Venezolana de Petroleo" ("CVP") which is 100% owned by the national oil company and it has been used as the corporate vehicle in the Mixed Companies formed with foreign partners.

[14] Parent companies.

[15] This is the only EM created under a different business model. This EM will only carry-out "production activities". Its sister company PetroBicentenario will carry out "refining activities" exclusively (see 2.2).

[16] The EM was called PetroMiranda in honour of Francisco de Miranda, a Venezuelan independence hero that also participated in the French Revolution and in the Revolutionary Wars of the United States of America. He was also a member of the Russian diplomatic mission in London at the order of Empress Catherine II (the Great) of Russia. It is said that he was also one of the favourite lovers of the Empress.

[17] Bellorin, Carlos. "The Petroleum Royalty Reduction in Venezuela. Short Comments on Recent Projects." *The Energy Law Advisor* **(2010)** http://www.cailaw.org/iel_advisor/industry_news/petroy_venezuela.html

[18] With the exception of PetroMacareo, in which Petrovietnam is the minority shareholder.

[19] This *Agreement* is drafted by the national legislative power and although technically not a law, is has the rank and hierarchy of a law as it is the direct application of the Constitution (L.E.Andueza "Legal Regime Applicable to the Mixed Companies of Article 22 of the Venezuelan Organic Hydrocarbons Law" in OGEL (Vol.6-Issue 3-2008) www.ogel.org

[20] This tax is 1/3 (33.33%) of all produced hydrocarbons. In practice, functions as an "additional royalty" of 3.33% for the Orinoco's Oil Belt extra-heavy oil projects since the royalty (30%) can be deducted. For practical reasons, if the royalty is reduced the extraction tax must be reduced in the same proportion. The Hydrocarbons Law establishes that the extraction tax could only be reduced up to 20%.

[21] Engineering discipline dealing with the projection and basic design of a structure. It is based in feasibility studies and in the determination of the most basic structure's requirements and costs. Is the previous step to the detailed engineering study.

[22] The AACE classification establishes five estimate classes (being Class 1 the most accurate) based on the degree of the project definition. Class 3 Cost Estimate project definition ranges between 10%-40%.

[23] The *Carabobo Bid Round* was the first to be launched by Venezuela in 12 years. Consequentially, the round is also the first one to be carried out by the current administration and under the terms of the current Hydrocarbon Organic Law. The bid round was originally launched on 30 October 2008 and its first Guidelines draft issued on 2 December 2008 but and it was not until 30 November 2009 that the definitive Guidelines were agreed and the bid round was ready to be carried-out. On 28 January 2010 the offers were submitted and the bid winners were announced on 10 February 2010.

[24] *Supra* note 6.

[25] This is a big fiscal incentive for the EM, since the Income Tax Law (Article 55) only allows carrying forward exploitation net losses for up to the subsequent three years from the fiscal year in which they had been incurred.

[26] Bonuses are considered the most regressive form of rent extraction.

[27] The recovery factor for the projects that have been formed has been established in 20% of the original oil in place.

[28] Revista Magna Reserva (2010). "Interview to Rafael Ramirez, Minister of Energy and Petroleum" by Alfredo Carquez Saavedra. www.pdvsa.com

[29] The EMs duration is 25 years with the possibility to be extended 15 additional years.

[30] Decree issued by the national executive transferring the right to carried out "primary activities" (see Supra note 7) to the EM.

[31] After the costs estimates and the basic engineering studies are carried out the foreign investors have 90 days to take their definitive decision to invest in the projects or pull out from the project.

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

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

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Members from academia are kindly invited to list, at no cost, graduate, postgraduate and research programs as well as their university and research centers in this online database. For students and interested individuals looking to enhance their knowledge within the field of energy and economics, this is a valuable database to reference.

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24-27 June 2012
Perth, Western Australia

Conference Theme
Energy markets evolution under global carbon constraints: Assessing Kyoto and looking forward

Objectives and Aims
The objective of the conference is to examine the dynamism of the world energy sectors in the context of what effect the Kyoto Process, which ends in 2012, had on the energy markets, technologies, and systems of the world. Also of interest is, what technological and market developments occurred in spite of the Process? In other words, will the energy world of 2012 and beyond be purely the product of reactions to the Kyoto Protocols, or were there strong undercurrents of change that flowed throughout the period that would have occurred regardless? And from this examination, what may we reasonably expect for the near- to intermediate-future?

Overview
The conference will address the full range of energy issues that may be expected to be commanding the attention of academics, analysts, policy-makers, and industry participants in 2012, looking both forward and back. In addition to all major fields of energy economics and policy typically covered, other possible topics include:

- Greenhouse gas policy after Kyoto
- Energy supply and demand security
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- The role of unconventional energy resources
- Price volatility
- Renewable and alternative sources of energy
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- Emissions modelling
- Emission trading schemes
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We will be accepting proposals for two different structures of conference presentations. We will have the typical concurrent session paper presentations, and we will augment these with a limited number of extended presentations with formal discussants. The typical sessions include up to five papers and presentations are limited to 15 minutes, including Q&A. The extended presentation sessions will include not more than three papers, with each allocated 30 minutes, including discussant and Q&A.

Paper abstracts for the typical concurrent sessions shall follow the format of the Abstract Template, which may be downloaded at www.business.curtin.edu.au/creme/AbstractTemplate.doc, (ticking the appropriate choice). The abstract should be one to two pages in length, and it must include: a) keywords, b) overview, c) methods, d) results, e) conclusions, and f) references. NOTE: All abstracts must conform to the abstract format presented in the abstract template. Authors will be notified by 16 March 2012 of the status of their papers.

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3/11Forum

Scenes from the 4th NAEE/IAEE International Conference, April 28 & 29 in Abuja, Nigeria

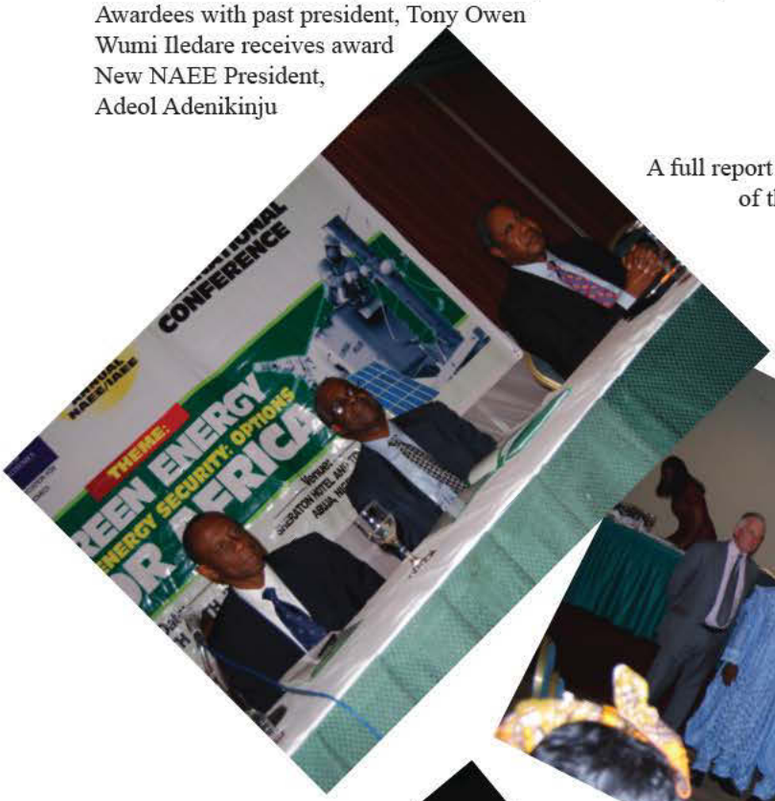
Clockwise from the left:

L to R, Conference Chair, Chima Ibinechie; NAEE President, Akin Iwayemi and Keynote Speaker, Osten Olorunsola

Awardees with past president, Tony Owen

Wumi Iledare receives award

New NAEE President,
Adeol Adenikinju



A full report on the conference will be carried in the Fall issue of the *Forum*.

Norwegian Association of Energy Economics Student Seminar

Tuesday April 5th 4.30 pm to 6 pm. (NHH, Bergen, Norway)

Since this was the first Norwegian assembly, the seminar was more like a popular event to promote the NAEE student chapter. The idea was to promote IAEE and NAEE among students, both graduate and PhD.

The seminar was located at the Norwegian School of Economics (NHH) in Bergen. The topic for the seminar was the oil market under the title"Oil markets – the bulls and bears of oil". We all agree that the timing for an oil seminar could not have been better given this year's turmoil in commodity markets in general and the oil market in particular. The general idea was to reach our traditional audience (PhD and master students with a degree in energy economics), as well as getting new faces through a more financial and commodity market approach.

Our main speaker was Thina Saltvedt. She is an oil analyst at Nordea Markets, one of the largest investment banks in Scandinavia. She is also a regular face in the business news media in Norway and also a member of NAEE.

Both the NAEE representative and students attending the conference agreed that Thina Saltvedt did a great job. In particular, many commented on her enthusiasm on the subject. The general impression is that the speaker delivered an excellent presentation on introducing and analysing the oil market. Many appreciated that she touched on both economic and political aspects. Particularly she spoke about how the event in Japan affected the oil market and scenarios for future development.

The crowd was roughly 100 students and I felt it was a good way to kick starts the Norwegian student chapter. I hope that several of these students will take part in our work in the future. The seminar was also in English because of the many international students at NHH.

Calendar

10-13 September 2011, 53rd NABE Annual Meeting: New Horizons for the Global Economics Landscape at Dallas, TX. Contact: Conference Organizer, NABE, 1233 20th St NW Ste 505, Washington, DC, 20036, USA. Phone: 202-463-6223 Email: nabe@nabe.com URL: www.nabe.com/am2011/

13-15 September 2011, 2011 Modern Energy Forum at The Ritz Carlton, Denver. Contact: Alexis Bogart, Project Manager, MiNE LLC, 300 S. Jackson St., Suite 220, Denver, Colorado, 80209, USA. Phone: 303.377.6463 Email: alexis@minellc.com URL: www.minellc.com

22-22 September 2011, Is the Future Electric? at BIS,London, UK. Contact: Debbie Heywood, BIEE, United Kingdom. Phone: +44 (0)1296747916 Email: admin@biee.org URL: http://biee.meeting.org.uk

5-6 October 2011, The Energy & Finance Conference at Rotterdam. Contact: M. Kilic, The Erasmus School of Economics, Burgemeester Oudlaan 50, Rotterdam, 3000DR, Netherlands Email: kilic@ese.eur.nl URL: http://www.eur.nl/ese/conferences/energy_finance/

5-7 October 2011, Master Class Gas Sales & Purchase Strategies in Liquid Markets at The Netherlands. Contact: Janet Smid, Account Manager, Energy Delta Institute, Groningen, Netherlands. Phone: +31 (0) 50 524 8308. Fax: +31 (0) 50 524 8301 Email: smid@energydelta.nl URL: http://www.energydelta.org/en/mainmenu/executive-education/specific-programmes/master-class-gas-sales-purchase-strategies-in-liq

7-9 October 2011, Master Class Developments in LNG at to be determined. Contact: Janet Smid, Account Manager, Energy Delta Institute, Groningen, Netherlands. Phone: +31 (0) 50 524 8308. Fax: +31 (0) 50 524 8301 Email: smid@energydelta.nl URL: http://www.energydelta.org/en/mainmenu/executive-education/specific-programmes/master-class-developments-in-lng

9-12 October 2011, 30th USAEE/IAEE North American Conference, "Redefining the Energy Economy: Changing Roles of Industry, Government and Research" at Washington, DC. Contact: David Williams, Executive Director, USAEE, 28790 Chagrin Blvd Ste 350, Cleveland, OH, 44122, USA. Phone: 216-464-2785 Email: usaee@usaee.org URL: http://www.usaee.org

10-12 October 2011, Energiemarkten at The Netherlands. Contact: Jasper Hofman, Account Manager, Energy Delta Institute, Laan Corpus den Hoorn 300, Groningen, Netherlands. Phone: +31 (0) 50 524 8308. Fax: +31 (0) 50 524 8301 Email: hofman@energydelta.nl URL: http://www.energydelta.org/en/mainmenu/executive-education/introduction-programmes/energiemarkten-2

24-28 October 2011, International Gas Value Chain Course at The Netherlands. Contact: Rik Cents, Energy Delta Institute, Netherlands. Phone: +31 (0) 50 524 83 19. Fax: +31 (0) 50 524 83 01 Email: cents@energydelta.nl URL: http://www.energydelta.org/en/mainmenu/executive-education/introduction-programmes/international-gas-value-chain

24-28 October 2011, International Gas Value Chain Course at Groningen. Contact: Joel Darius, Account Manager, Energy Delta Institute, Netherlands. Phone: +31 (0) 50 524 83 16. Fax: +31 (0) 50 524 83 01 Email: darius@energydelta.nl URL: http://www.energydelta.org/en/mainmenu/executive-education/introduction-programmes/international-gas-value-chain

6-8 November 2011, International Scientific Conference: Sustainable Consumption – Towards Action and Impact. at Hamburg (Germany). Contact: acompanying research project of the research programme "From Knowledge to Action – New Paths towards Sustainable Consumption", University of Bern, Switzerland Email: soefkonsum@ikaoe.unibe.ch URL: http://www.sustainableconsumption2011.org

7-9 November 2011, Master Class Developments in LNG at to be determined. Contact: Janet Smid, Account Manager, Energy Delta Institute, Netherlands. Phone: +31 (0) 50 524 8308. Fax: +31 (0) 50 524 8301 Email: smid@energydelta.nl URL: http://www.energydelta.org/mainmenu/executive-education/specific-programmes/master-class-developments-in-lng

13-14 November 2011, Conferencia de la Industria Solar - España 2011 at Madrid, Spain. Contact: Anika Sperling, Solarpraxis AG, Zinnowitzer Straße 1, Berlin, Berlin, Germany. Phone: 030-726296-310 Email: anika.sperling@solarpraxis.de URL: /www.solarpraxis.de/en/conferenze/cis-es-2011

14-16 November 2011, Master Class Gas Sales & Purchase Strategies in Liquid Markets at The Netherlands. Contact: Nynke Feenstra, Energy Delta Institute, Netherlands Email: feenstra@energydelta.nl URL: http://www.energydelta.org/en/mainmenu/executive-education/specific-programmes/master-class-gas-sales-purchase-strategies-in-liq

17-18 November 2011, Gas Transport & Shipping Course at The Netherlands. Contact: Jasper Hofman, Energy Delta Institute, Netherlands. Phone: +31 (0) 50 524 83 08. Fax: +31 (0) 50 524 83 01 Email: hofman@energydelta.nl URL: http://www.energydelta.org/en/mainmenu/executive-education/specific-programmes/gas-transport-shipping-course

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1-2 December 2011, PV Power Plants - USA 2011 at Phoenix, Arizona. Contact: David Gaden, Solarpraxis AG, Zinnowitzer Straße 1, Berlin, Berlin, 10115. Phone: 030-726296-373 Email: david.gaden@solarpraxis.de URL: http://www.solarpraxis.de/en/conferences/pv-power-plants-usa-2011/general-information/

12-16 December 2011, International Gas Value Chain Course at The Netherlands. Contact: Rik Cents, Energy Delta Institute, Netherlands. Phone: +31 (0) 50 524 83 19. Fax: +31 (0) 50 524 83 01 Email: cents@energydelta.nl URL: http://www.energydelta.org/en/mainmenu/executive-education/introduction-programmes/international-gas-value-chain

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IAEE ENERGY FORUM
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