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IAEE Energy Forum

Second Quarter 2012 International Association for Energy Economics

President's Message

A couple of weeks before writing this Message I had the pleasure of attending The 3rd IAEE Asia Conference in Kyoto, Japan. Needless to say the General Conference Chair Masakazu Toyoda, the former IAEE President Kenichi Matsui and their team had organized a very interesting conference. Among many other themes the consequences, in many dimensions, Fukoshima disaster was on the agenda. The delegates formed a very international group, but also a group with many young members. Obviously energy economics is a vibrant field of research, attracting many young researchers.

The conference venue was the Kyoto University Clock Tower, and the peak of the social events was a very Japanese dinner with entertainment in the form of classical Japanese dances at the Sa-Ami restaurant. For those who had time to stay a couple of extra days Kyoto had a lot to offer, not the least around 2 000 temples.

In a somewhat broader perspective I think that the Kyoto conference represents one of the unique features of IAEE. The energy and environmental issues commonly dealt with at our conferences are truly international in nature. As a consequence IAEE:s membership is very international, and as a consequence of that IAEE conferences are organized in essentially all parts of the world. This means that some of the conference trips tend to be very long. But most of all it means that IAEE conferences offer a unique mix of professional and cultural experiences. Moreover, the perspectives on various energy and environmental issues differ between different parts of the world, and to learn about these differences is a real bonus of an IAEE conference.

From the point of view of mixing professional and cultural experiences the 2012 IAEE conference program has a lot to offer. The next item on the agenda is the International Conference in Perth, Australia, June 24-27, followed by the European Conference in Venice, September 9-12, and the North American Conference in Austin, Texas, November 4-7. And 2013 will not be less exciting in terms of opportunities to travel across the globe to IAEE conferences. Planning meetings for the 2012-13 conferences were held in Kyoto, and everything I heard suggest that we can look forward to very interesting programs in the best of IAEE traditions.

Travelling from Stockholm to Kyoto means a lot of time for reading, for example, the first issue of *Economics of Energy and Environmental Policy* (EEEP). I think that the authors and the editors have done a great job, and that EEEP represents a major new service to the members of IAEE, particularly the non-academic members who find articles in *The Energy Journal* too long and too technical. I also think that EEEP will offer the academics an opportunity to present their findings and views in a non-technical format. Yet *The Energy Journal* remains a very important outlet and source of inspiration for energy economics research.

The Energy Forum, being a forum for discussion, ideas and reflections on energy and environmental issues, has a slightly different role than EEEP and *The Energy Journal.* This issue of the Energy Forum is devoted to wind power. The topic has attracted a record high number of contributions, showing that the economics of wind power has many interesting aspects and that the IAEE members are active writers. Personally I am not very surprised. Wind power has a prominent place in energy policy documents in many countries, as well as in the investment plans of many energy companies. Moreover, there is a major concern about the cost of wind power, and the potential cost reductions stem-

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Editor: David L. Williams

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ming from technological development and learning by doing. There is also concern about the design of electricity markets in view of the stochastic nature of electricity generation from wind power plants. In other words, there is a lot of energy economics related to wind power.

Lars Bergman

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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

This issue focuses primarily on the various aspects of wind energy though we take time out from that subject for two articles on the oil industry. We will continue with the topic of wind energy in the third quarter issue.

Michael Jefferson writes that capacity factors are the key measure of the efficacy of wind energy developments. The UK's relatively good wind resource is unevenly distributed and planning failures, exaggerated claims, and inducements for unsuitable onshore siting, mean a sub-optimal policy is pursued.

Matthew Hulbert and Jochem Meijknecht report that oil is currently split into two parallel worlds. One is called 'day to day reality' where prices have just reached historic highs due to shattered supply side dynamics. This isn't just a short term spike, but reflects structural problems affecting international markets: oil prices averaged $109/b in 2011. The other, called 'U. S. energy nirvana' relays a narrative that new found oil riches across the America's have instantly fixed American economic ills, and more importantly, will quarantine Washington from broader international energy trends. That may, or may not prove to be true in the longer term, but if the U.S. continues to play its regional card too quickly in an inherently complex energy world, expect major geopolitical gaps to appear.

Julian Silk discusses the application of international trade analysis of quotas to the economics of offshore wind power production. Current Maryland plans are discussed. Binding quotas enforce a market price for all energy, not just wind, equal to the wind energy price, except in special and unrealistic cases. Significant deadweight loss is thus generated. Price ceilings lessen the immediate consumer impact, but make the long-run market impact worse, unless there are significant increases in demand. The prospects for such demand increases vary from case to case; Maryland's do not seem obviously promising.

Silvia Micheli explores the recent environmental economics literature on incentive mechanisms for energy from renewable sources, focusing on the learning by doing effects in the wind power industry.

G. Cunha, L. A. Barroso, F. Porrua and B. Bezerra discuss the Brazilian auctions to deploy renewable energy sources with a focus in wind power. Since 2009 about 7,000 MW of wind plants have been contracted through this competitive mechanism at prices around 60 US$/MWh.

Joerg Moczadlo and Wang Ye report that Chinese energy policy, considerable electricity demand and significant wind resources predict a bright future for the wind power in China. However, a closer look, which they provide, has to be taken in order to gain a clear picture.

Jean Balouga notes that Nigeria is an important OPEC member. Corruption, mismanagement and heavy subsidies, which the government can no longer bear, prompted her decision to fully deregulate the downstream sector and use the freed resources for welfare needs, with particular emphasis on the poor. However, the sincerity of government is in doubt.

Catherine Colby and Bari Dominguez report that the companies EGE Haina and CEPM have employed innovative strategies to improve the quality of life of residents in the communities surrounding the first wind farms in the Dominican Republic, the Los Cocos and Quilvio Cabrera Wind Parks, breathing new life into in the South-West Dominican Republic.

DLW

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 Protocol, 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? Plenary sessions will examine these questions from industry, government, and academic perspectives.

OVERVIEW

The conference will address the full range of energy economics and policy 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.

Please visit **www.iaeeperth2012.org** for complete information and updates on confirmed speakers. A sample of confirmed speakers includes Ambassador Richard Jones, Deputy Executive Director of the IEA and Dr. Paul Appleby, Head of Energy Economics, BP.

CONFERENCE REGISTRATION FEES

(all fees are in Australian dollars, inclusive of 10% GST)

	EARLY before 1 May 2012	NORMAL 1 May 2012 & after
Speakers/Chairs/ Discussants (Members)	A$770	A$855
Speakers/Chairs/ Discussants (Non-members; includes membership)	A$850	A$935
IAEE Members	A$855	A$940
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Students	A$440	A$440
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CONTACT INFORMATION

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Ronald D. Ripple, PhD, Director
Centre for Research in Energy
and Minerals Economics
Curtin University
GPO Box 1987
Perth, Australia 6845
Email: r.ripple@curtin.edu.au
Phone: (61 8) 9266 3935
Web: business.curtin.edu.au/creme

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Capacity Concepts and Perceptions – Evidence from the UK Wind Energy Sector

By Michael Jefferson*

Introduction

We all know that the wind is intermittent. As a rough measure, wind turbines can only operate when wind speeds are between 4 metres per second and 24 metres per second. There is a further technical limit, which need not concern us here, Betz's Law – the maximum theoretical efficiency of a wind turbine is the ratio of the maximum power obtained from the wind to the total power available from the wind. This ratio is 0.593, thus under Betz's Law wind turbines can never be more than 59.3% efficient.

Here, however, we focus on 'capacity factor' (sometimes termed 'load factor'). This is the ratio of the actual output of a wind energy development (an array of wind turbines at a particular location, or locations if a country is under consideration as is the case in this paper) to the installed capacity. We will be considering actual wind energy performance in the UK, sub-divided for England, Scotland, Wales, and Northern Ireland against claims that in general have been grossly exaggerated. The implications of the actual performance against claims will finally be considered.

The UK Wind Resource

The UK's main wind energy industry association has long been prone to gross exaggeration and unqualified generalisation. For example, this body – formerly known as the British Wind Energy Association and now RenewableUK – states:

> "The UK is the windiest country in Europe, so much so that we could power our country several times over using this free fuel." (1)

There are some problems associated with this statement. There can be little or no doubt that Scotland is the windiest country in Europe. But England is far from being as windy as, say, Denmark. Wales is somewhat windier, but less so than Denmark. Most of Southern England (i.e., areas away from the coast) and the Midlands have as little wind as most of Germany and France. (2). Yet it is in the heavily populated areas of England's South and Midlands where wind energy developers have sought planning permission, all too often with success, despite concerns about visual intrusion and adverse effects on residential property values and sleep patterns for those living in close proximity. These 'social' and 'aesthetic' issues lie outside the scope of this paper, but although such concerns are dismissed as NIMBY-ism (Not In My Back Yard), there are legitimate counter-arguments based upon the conservation and stewardship motivations of those living in remaining rural areas. (3)

The key issue which this paper addresses is: what capacity factors are actually achieved in the various parts of the UK. Because the wind resource is so variable around the country it is not surprising that capacity factors achieved vary so widely. The industry seeks to disguise this fact, since its admittance might be thought to prejudice public opinion and political decision-making. However, the industry managed to make a pre-emptive move when advising public officials on planning guidelines for renewable energy in the UK. Thus Key Principle 1 (v) of Planning Policy Statement 22 (the main official guidance on renewable energy) states:

> "Regional planning bodies and planning authorities should not make assumptions about the technical and commercial feasibility of renewable energy projects (e.g., identifying generalised locations for development based on mean wind speeds)." (4)

This guidance does not apply to offshore areas, where mean wind speeds tend to be significantly higher and issues of visual intrusion, residential property values and impacts of aerodynamic modulation do not apply. Installation and maintenance costs, proximity to bird migration routes and marine mammals, and potential interference with communications may be issues. The only point relevant to this paper is that the intermittency of wind also applies offshore, and the idea that offshore supplies may be maintained by switching to other areas (from the Irish Sea to the North Sea, and so on) have been challenged on the ground that frequently these other offshore areas will also be suffering loss of wind. (5)

This paper focuses on onshore wind energy developments only.

* Michael Jefferson is Professor of International Business & Sustainability, Centre for International Business & Sustainability, London Metropolitan Business School. He may be reached at m.jefferson@londonmet.ac.uk

Capacity Factors

Reference to capacity factors is, of course, standard practice. There is little value in quoting the amount of total installed capacity of wind turbines. What matters is the megawatt hours of electricity produced by these turbines. This is not closely related to the efficiency of the turbines themselves, which may vary for obvious reasons, but is a critical measure of the efficacy of the various developments.

Fortunately in the UK the necessary data are supplied by the operators to the official body responsible for oversight of the electricity market and payment of subsidies (funded by domestic and business electricity customers via their utilities). This organisation is Ofgem (Office of Gas & Electricity Markets). Their data is publicly available and can also be readily accessed from the website of the Renewable Energy Foundation (at http://www.ref.org.uk/roc-generators/index).

Quotation of these official figures, provided by the operators themselves, can, however, have some surprising results. Thus the Chief Executive of RenewableUK has been known to reject reference to these figures as: "bizarre pseudo-science", "ill-informed and disingenuous", and "absolute nonsense". (6) Further diversion has been offered by stating that: "There is no Government subsidy for building wind farms" (6) and: "The Renewable Obligation is not a subsidy." (7) The subsidy is nonetheless present, coming from electricity customers who have no choice but to pay up. For them the efficacy of wind energy developments in producing electricity efficiently and at low cost is important.

There are two further statements that are relevant before the actual evidence of capacity factor performance is provided. They both come from the Companion Guide to the PPS 22 document already referred to. First:

"A machine located on a site which has an annual mean wind speed of 6 metres per second will typically produce only half as much energy as the same machine on a site where the annual wind speed is 8 metres per second."(p. 164.)

Many sites where wind energy developments have been proposed and passed in Southern England and The Midlands have mean wind speeds under 6.7 metres per second according to the UK Government's wind speed database. This is hardly optimal or likely to result in sound capacity factors. [A more technical discussion of wind speeds, the Weibull or Rayleigh distribution, and the power weighted average of wind speeds can be found at (8).]

Second:

"Capacity factors in the UK may generally fall anywhere between 20% and 50%, with 30% being typical in the UK." (p. 165)

How does this "typical" average (mean?) measure up to the facts; and how accurate is the claim that the range is 20% to 50%?

Performance

Examining the evidence provided by the UK's onshore wind energy operators to Ofgem a very different picture emerges. The writer's interest began when, as the then Chairman of the Policies Committee of the World Renewable Energy Network/Congresses, he noticed a discrepancy between the claims of PPS 22 (and the main industry body) in England for 2007. The mean capacity factor achieved by onshore developments in England was 22.7% in 2007. Capacity factors ranged from 35.09% (Haverigg 3) to 24 developments achieving less than a 20% capacity factor (out of 81 operational throughout 2007). Of the latter, six developments achieved a capacity factor below 10%.

In 2008 the performance was somewhat higher, as it was a windier year, with capacity factors for wind energy developments in the Eastern part of England up from 22.7% in 2007 to 26.2% in 2008, for example. This benevolent wind regime meant that in 2008 the Burton Wold development achieved a capacity factor of 24.2%. This example is provided as it appears in the Wikipedia entry for "Capacity factor", where it is used to provide an example of how the figure of "just under 25%" is arrived at. (9) Burton Wold development (visually not a particularly sensitive site, and with turbines 25 metres lower to blade tip than most being currently promoted) has achieved the following full-year capacity factors since it started operating: 2007 – 22.2%; 2008 – 24.2%; 2009 – 19.0%; 2010 – 16.3%; and 18.9% for the twelve months to September 1, 2011. This example, in a less sensitive location than many proposed and approved in Central England (others are much closer to important historic assets or attractive landscapes) illustrates the rather modest performance of modern wind energy developments approved for relatively low mean wind speed sites. [Burton Wold started operating in January, 2006.]

By 2009 and 2010 the number of developments had expanded considerably – data for 105 onshore wind 'farms' were available in England for 2009, and 142 for 2010. The average capacity figure achieved in 2009 was 21.2%, and the range ran from 32.0% (Workington) to 4.9%. Eight developments achieved a capacity factor of under 10%, and 35 under 20%. Eight also achieved 30% or more. All were operational throughout the year. Thus one-third of all onshore wind energy developments in England fell below the 20% to 50% range given out in official documents and by the industry.

In 2010 the average capacity figure achieved in England was 18.7%, and the range 33.6% (only one development achieved 30% or more –the revamped Ramsey in Cambridgeshire) down to 81 developments achieving below 20%. Thus of the 142 developments considered, nearly 60% failed to fall within the 20% to 50% range officially declared as extant.

Not surprisingly, given the higher mean wind speeds prevalent in Scotland, higher capacity factors have been recorded than in England. In 2009 the average was 28.46%, with a range from 48.3% (Baradale Phase 2) down to 15.8% (Isle of Luig) - noticeably higher at both ends of the scale. Out of 70 developments for which data were provided, 23 achieved a capacity factor of 30% or more. An impressive result: only eight developments fell below 20%. But this still meant just over 10% of the total fell below the 20% to 50% range officially claimed.

Then in 2010 Scotland achieved an average capacity factor of 23.75%, indicating a less windy year than 2009. There were, nevertheless, 14 developments achieving a capacity factor in excess of 30%. This was out of a total of 89 developments reviewed. Apart from one tiny scheme (Greystone Cottage) all developments achieved a capacity factor of over 10%, although 22 recorded under 20%. This meant that 25% of developments even in Scotland fell below the officially presented range.

Wales and Northern Ireland not surprisingly turned in poorer results. In 2009 the average capacity factor achieved in Wales was 23.86% (the performance of 32 developments was covered), and in 2010 18.75% (38 developments covered). Three developments achieved a capacity factor in excess of 30% in 2009 (the highest being Moelogen at 33.4%); but the highest in 2010 was only 26.1% (Moelogen again). Seven developments fell below 20%. In 2010 there were 22 developments falling below 20%, nearly two-thirds of all wind energy developments in Wales.

In Northern Ireland 32 developments were reviewed for 2009 and 43 in 2010. In 2009 the average capacity factor achieved was 24.1%, and in 2010 17.6%. The highest capacity factor achieved in 2009 was 38.2% (at Owenreagh), and five developments achieved 30% or more. Nine developments (over 25% of the total) achieved under 20%. In 2010 the highest figure attained was 31.6% (at Corkey), when only two developments achieved 30% or more. But 22 developments (eight of them admittedly very small) failed to achieve a capacity factor of 20% (so nearly half of the total fell below the officially claimed range).

At the time of writing only data for the first nine months of 2011 are available. As 2011 was one of the windiest years in the UK for a very long period, high capacity factor performance was to be expected. High winds in May, the effects of Hurricane Katia in the second week of September, and strong winds in early December were widely noticed. The available data on capacity factors do not yet capture the latter two events, but some developments achieved their record capacity factors in December, 2011.

In the 12 months to September 1, 2011, 32 of Scotland's wind energy developments achieved capacity factors of 30% or more Burradale I achieved 49.1% closely followed by Burradale II with 48.4%. By contrast, only six developments in England achieved 30% or more (the highest being Hare Hill with 39.8% - well ahead of all but one of its rivals). There were five in Northern Ireland and only one in Wales that achieved 30% or over (Owenreagh led Northern Ireland with 34.0%; the Welsh development was Hafety Ucha 2 at 30.0%).

There were, three-quarters of the way through this exceptionally windy year, 47 developments in England which failed to even achieve a capacity factor of 20%; 19 in Northern Ireland; 14 in Scotland; and 9 in Wales. This meant that between about 20% and 25% of UK wind energy developments fell beneath the range officially provided in the Companion Guide to PPS 22.

But the relatively windy conditions during 2011 came at a cost to the electricity customer. As a result of pressure on matching electricity supply to demand, which requires the UK's National Grid to resort to a Balancing Mechanism, generators were paid to reduce output because more electricity was being generated than could be used. This was particularly the case for wind energy which could have been generated in Scotland but could not be used there, and the grid interconnections between Scotland and England was unable to cope with the excess. This was the result principally of high winds in Scotland and relatively low demand there for electricity. Constraint payments to wind energy generators for them to reduce output began in 2010. These payments are significantly greater than the level of subsidy (£220 per MWh against £55 per MWh for the ROC subsidy in 2011). The result was that electricity customers were obliged to bear additional costs during 2011 of over £12.8 million. In May, 2011, alone the constraint payments totalled over £2.6 million; in September, 2011, nearly £5.3 million; and in December some £820,000.

Policy Implications

Support of the wind energy industry in the UK is sub-optimal. Although wind energy operators only receive subsidies reflecting the amount of electricity their schemes generate, there are considerable costs in installing equipment (mostly imported – and therefore containing significant 'embedded' emissions). The contributions of far too many of these developments to electricity generation and carbon emissions avoidance are sub-optimal. As a first step to introducing greater rationality UK planning guidance (PPS 22) should be amended (a) to permit planning bodies to assess the likely contributions to electricity generation and carbon emissions avoidance based on the UK Government's wind speed database; and (b) for those developments where capacity factors achieved fall below 30% subsidies should be incrementally reduced so that where capacity factors below 20% are achieved little or no subsidy should be received.

A further useful step would be to introduce a minimum mean wind speed barrier (of, say, 7 metres per second at 45 metres above ground level, according to the UK Government's wind speed database, below which planning authorities would be empowered to refuse to consider any development application). This would save substantial planning resources and costs.

Further work also needs to be done to assess the costs of the intermittency of wind energy. These include the costs of building and operating traditional sources of supply (coal and natural gas, for example) required to back up wind energy when the wind fails. There is a growing body of research evidence which suggests that the carbon emissions associated with the short-term operation of traditional natural gas and coal-fired electricity generating stations are so increased that they offset the gains derived from wind energy production to a considerable extent. (10) It is simply not good enough for the UK's main wind energy industry body to dismiss serious research as "a report based on the work of anti-wind cranks." (11) It has long been agreed in the industry that if the share of wind energy approaches 20% of total electricity generation serious disruption can occur. Research done on the power system in Eire suggests severe disruption and little carbon emissions avoidance may occur with wind energy's share as low as 10% - a figure which the UK is already close to in a windy year. (12)

Finally, both the grid system needs improvement to overcome current constraints (especially between Scotland and England), and a much more concentrated effort is required to investigate the validity of claims that wind power cannot be stored in significant volumes. (13)

Given that the UK authorities are relying principally upon wind energy to provide the bulk of future renewable energy used in electricity generation these are important and urgent issues.

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Global Oil: U.S. Independence

By Matthew Hulbert and Jochem Meijknecht*

Supply Side Risk Returns

If we thought 2011 was rough, 2012 has seen a serious return of supply side risk. It has come in its most vivid forms as far as political and security risks are concerned. Forget the normal rough and tumble of contractual wrangling and fiscal fights that have dominated energy headlines of late. These factors will gently rumble on in the Middle East, Latin America, Central Asia and even major resource players in Australasia. What we need to focus on now, is what used to be coined 'black swan' events, that now resemble 'common Canadian geese': that's to say, truly explosive political and security risk factors afflicting key producer states, both on an internal and external basis.

Top of the list is Iran. One of OPECs larger producers (3.3mb/d) is starting to come under serious economic pressure from Western sanctions, yet Tehran remains adamant that nuclear enrichment is a national priority. This Iranian 'hedge' between enrichment ambitions and threatened oil price spikes will continue to unfold until someone makes a rash – or indeed radical – move. Markets will keep misreading long term Iranian intent relative to short term theocratic bluster. Benchmark prices will be heavily influenced by Persian politics as a result; especially when the Strait of Hormuz is put into the mix.

Then there is Iraq. US exit has been rapidly filled by renewed sectarian politics that bode very badly for oil production. With Shia and Sunni fighting things out in Baghdad, and Kurds understandably trying to stand above contractual fray, expect Iraqi production to remain closer to 3 million barrels a day by 2016, rather than the 12 million barrels a day the central government has envisaged. Head North towards Libya, and despite initial recovery, 1.3mb/d production still remains significantly below original output levels as internal 'East-West' divides sharpen. Indeed, the Arab Awakening is still keeping Gulf States on edge across the Peninsular; a point that can be applied to the UAE, as much as Kuwait and the world's largest producer, Saudi Arabia. The closer the Saudis get to maxing out production, the closer the market spotlight will be on Riyadh. Risk premiums have been adjusted accordingly; the IEA have similarly warned of tight inventories.

But beyond OPEC heavyweights, problems have been cropping up in more marginal, yet still significant non-OPEC players. State implosion in Syria has seen 150,000 barrels a day slip offline to Europe through sanctions, a move that IOCs should have seen coming without dragging their feet to exit Damascus. Yemen is in a similar state of disarray, while Sudan is vastly reducing African production on the other side of the Gulf of Aden. Some 350,000 barrels a day are locked into a resource rich South Sudan, production that is seemingly impossible to ship through northern networks to bring precious hydrocarbon supplies to international markets. Meanwhile Russia has failed to attract major upstream investment into its Artic riches after the Kremlin botched the BP-Rosneft deal. No one is sure whether Moscow is adhering to 'rule of law' or the 'iron law of Vladimir's politics' to make investments stick. Few answers will be provided until President Putin is properly back and settled in the Kremlin. Things look a little steadier in Central Asia, although hydrocarbon lynchpins, Kazakhstan and Turkmenistan, still sit on unsecure political ground. Even where oil supplies look remarkably benign in places such as Canada, heavy carbon footprints are making things increasingly hard for Toronto to feed international markets.

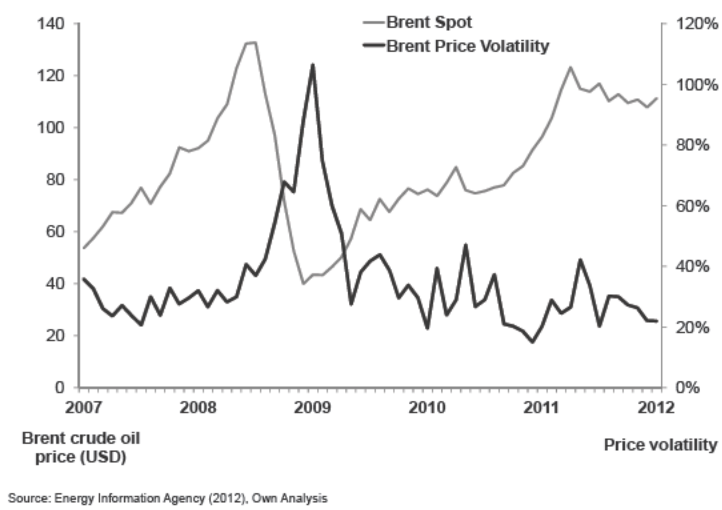


Figure 1: Oil Price Volatilty: Rough Ride Ahead?

Dislocation

What this leaves us with is a massive supply side mess: The fact that Brent has hit historic $125/b highs (in real terms Euro & Stirling) despite deep-seated Eurozone problems, inflationary bubbles bursting in China, and a mispriced U.S. dollar, should give serious cause for concern. Supply side disarray has won the 'price war' over dubious demand fundamentals. Market sentiment was always going to be influenced more by which part of the supply-demand equation

*Matthew Hulbert is a Senior Research Fellow and Jochem Meijknecht is a Researcher in the Clingendael International Energy Programme at the Netherlands Institute of International Relations. Hulbert may be reached at mhulbert@clingendael.nl

proved to be *most* dysfunctional, not which element 'performed' best.

You'd think this would be enough to get the IEA to consider releasing strategic reserves to quell market concerns. The Paris based body certainly didn't waste much time last year when Libya flared prices up to $127 a barrel. But this time around, the IEA has only started making noises over the strategic reserve due to price increases in the U.S. WTI benchmarks are trading around $110 a barrel – 'super cheap' as far as Europeans are still concerned, but still enough to translate into $4 a gallon at the U.S. pumps.

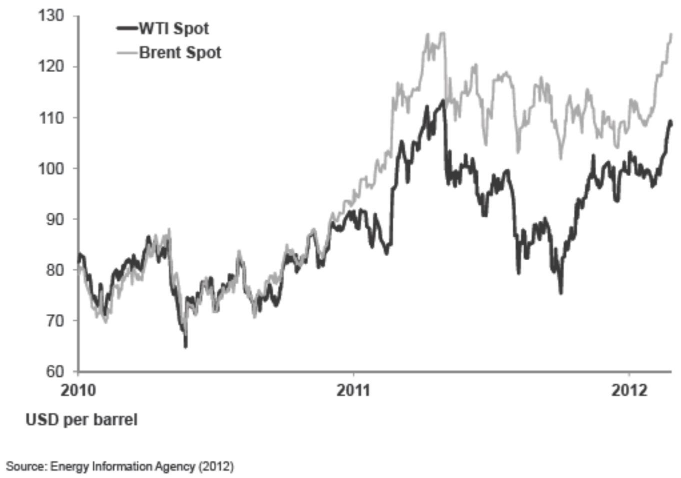


Figure 2: WTI vs. Brent: Cheap, but not Cheap Enough?

This 'iconic' $4 figure has trigger visceral U.S. political attacks on producer states across the board, and especially from Republican presidential candidates. GOP Congressmen are even pitching the related idea that U.S. resources should be strictly used for domestic purposes only. While we'd normally pass this stuff off as campaigning hot air, the problem is that similar thinking is now deeply embedded in the Obama Administration. President Obama made significant reference to U.S. energy independence in his latest State of the Union address, and more importantly, looks likely to give the go ahead to the Keystone XL pipeline from Canada, a pipeline that had previously faltered on environmental grounds. Obama is well aware that elections aren't fought on environmental pledges, but cheap energy, new jobs and America prosperity. The overriding message is clear: the U.S. wants 'American oil for American consumers at American prices'. Hence the Strategic Reserve debate is merely symptomatic of a far larger problem: U.S. disconnect between mounting international oil pressures and domestic American rhetoric. Washington not only demands cheap oil under $4 a gallon, it is trumpeting the virtues of energy independence, at precisely the same time that supply side states are in serious turmoil.

Numbers Narrative

None of this should come as a major shock. The U.S. has long proclaimed energy independence as a top-line political priority dating back to President Nixon, but it's been subterranean shifts that are starting to make this narrative far more serious. Headline figures show 6.4 trillion unconventional barrels of oil across the America's running from Canada all the way down to Argentina vs. 1.2 trillion conventional barrels in the Middle East & North Africa. According to industry forecasts, we should expect to see anything up to 22mb/d of North American oil production over the next decade. The U.S. would not only be the world's single largest producer of crude; oil will flow from North to South across the America's rather than 'East to West' across the globe.

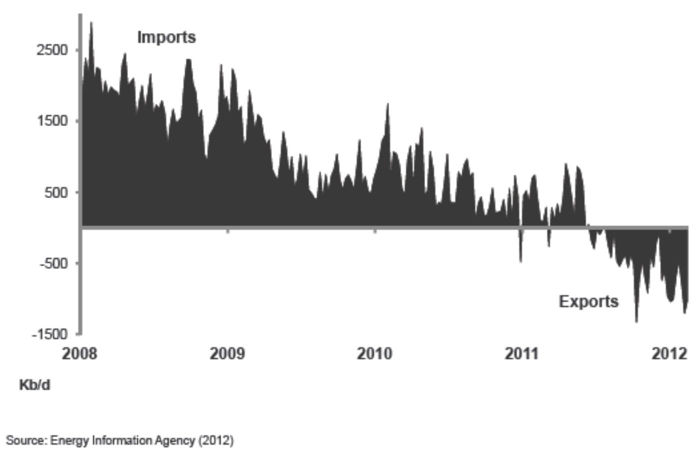


Figure 3: U.S. Looking Good - Net U.S. Crude and Oil Products Import (2008-2012) kb/d

Whether you believe this or not, and whether the numbers eventually stack up, isn't the important point. Thanks to its shale gas bonanza, the U.S. is in *no doubt* that it can apply the same rules, lessons and conclusions for unconventional oil. Political messages are already being put out to this effect. U.S. oil imports fell to their lowest level for a decade to under 9mb/d in 2011 (around 45% of total consumption); the EIA thinks net oil imports will fall further to 36% over the next twenty years or so, while industry estimates think 1.6 million jobs will be created in the energy sector over the same period. The deficit can supposedly be clipped by $145bn towards 2020 assuming benchmark prices remain around $100/b – and more importantly, greenbacks will stay in U.S. pockets rather than filling OPEC coffers. Heck, the U.S. could even take the leading producer spot as early as 2017 if North Dakota plays pan out: this is nothing short of American 'energy independence nirvana'.

U.S. Perception, Global Realities

For now, let's put aside depletion rates, cost uncertainties for viable extraction, local environmental risks, contrasting production priorities across the America's, and the small fact that oil and gas output accounts for just 1% of U.S. GDP (J.P. Morgan Chase). We can also overlook the fact that Asian NOCs have been some of the key investors in the America's oil rush to date: none of that stuff really matters. The *core* problem is not where U.S. energy independence *ultimately* ends up, but the fact that American politicians are *already* touting energy independence as a self-fulfilled prophecy being played out in 'real time' today, rather than seeing it as a gradual process of increments and change.

This flies in the face of global hydrocarbon realities, and what's more, it's going to leave major geopolitical gaps on international markets. The blunt fact is that over the next decade, OPEC market share is going to be more concentrated than ever. The cartel will control over 50% of physical market share as mature non-OPEC reserves continue to drain and new finds in Russia, Central Asia and Africa struggle to make it to the wellhead. Prospective U.S. reserves and potential production will do nothing to change that. But what it has *already* shifted, is a sharp withdrawal from Washington's long standing role as the guarantor of global oil supplies. That's deeply problematic, precisely because supply side dynamics are looking more fragile now than they have done for a very long time; what's more, the U.S. is playing two versions of its energy independence geopolitical game.

Version one is Libya. The U.S. made it crystal clear to Europe, that Tripoli was not considered a vital national interest of the United States. Britain and France were left doing most of the heavy geopolitical lifting relative to U.S. firepower and political muscle that *could* have been brought to bear. The chances of that happening had the U.S. not struck its new found oil would have been unthinkable in the 2000s. Europe will need to adapt to such shifts if it wants to secure new supplies from North Africa, Central Asia and the Middle East without a U.S. flag to cover them.

Version two is Iran. The U.S. has applied major sanctions pressures over the Iranian Central Bank, safe in the knowledge it now takes less than 15% of its oil supplies from the Middle East, and that WTI (U.S. benchmarks) continue to trade at steep discounts. But the same can't be said for U.S. allies such as Japan and South Korea, who will feel severe economic pain if they fully apply the letter of U.S. law. Europe has followed the U.S. lead to appear a credible actor in the Middle East, but an embargo on Iranian oil is about the last thing Southern European economies need right now – especially debt ridden Spain, Greece and Italy. Containing nuclear enrichment has been deemed a higher priority policy in Washington than the collateral impacts this will have on European oil prices. Roughly translated, this is a Southern European economic funeral, sponsored by U.S. cremation policies on Iran.

The upshot is that the U.S. will increasingly only act in its own perceived national security interests. As long as these interests went hand in hand with safeguarding international oil supplies, consumer states could rest easy. But perceived U.S. energy independence has torn up the script, and the new narrative has created a blunt bottom line: we have a brave new world in which Washington is not only no longer willing to cover prospective supply side gaps through military/political action (Libya), but if needs be, will put its own perceived national security interests ahead of oil market stability (Iran). The core factor opening this policy space is U.S. energy independence; an article of 'political faith' in Washington that is now rapidly being translated into actual policy practice.

International Realignment

We shouldn't blame the U.S. for following through on its own energy independence instincts, of course. As misguided as it might prove to be, it's entirely up to the U.S. whichever path they chose to take. The important point for net importers to register is that American geopolitical gaps resulting from this are only going to get wider from hereon in.

Logic dictates that consumers, therefore, need a plan B, and fast. The good news is that China already has one. It is expanding its international energy footprint in the Middle East, Africa, Russia, Central Asian, Asia-Pacific, reaching as far as resource plays in the America's to secure its energy needs. We could hardly blame China if it decided to enhance its 'equity' oil options in future given U.S. rhetoric. As the second largest consumer of oil in the world and one of the most import dependent, Beijing is well aware that it will have to ensure its own security of supply over the next decade as the U.S. winds down its hydrocarbon presence. China doesn't expect the U.S. to step back into Iraq to shore up oil supplies should things take a serious turn for a worse, any more than it thinks Washington will provide serious state building measures in jurisdictions such as Sudan. Likewise, U.S. strategic interests in Central Asia now have more to do with vested American concerns over South Asia (aka Afghanistan) than they do hydrocarbon provision. If Russia decided to re-exert its regional dominance over the Caucuses, as it did in 2008, the U.S. would be highly unlikely to take any assertive measures to the contrary. Such out-posts are now seen as 'nice to have' assets for U.S. geopolitical standing, not crucial global oil interests for the U.S. to critically underwrite and secure.

As usual, the EU has been slow to cotton onto this. Europe still assumes that transatlantic relations hold good, and that U.S. will secure its hydrocarbon flows. That's looking increasingly unlikely in the Middle East, Central Asia or North Africa. So far, Europe has only had the imagination to talk to prospective suppliers adjacent to Charlemagne's borders; it has totally failed to appreciate that it needs to work hand in hand with consumers at the other end of the Eurasian pipeline - namely China - to ensure its own security of supply. As the Middle Kingdom comes to play a more prominent energy role, European energy security will increasingly depend on its ability to exploit Chinese influence in Central Asia as a mutual Beijing-Brussels 'hedge' against Russia, while working towards a consumer driven market to enhance supplies from the Middle East and North Africa. In effect, Europe is far better served looking for scraps off China's energy table rather than relying on an increasingly isolationist U.S., hell bent on 'energy independence' to keep plugging global oil supplies. Fundamental demand side realignment is therefore badly needed; the question is whether we are going to wake up to this in time.

Irony all Round

If anything, the core problem we currently face from a hydrocarbon perspective isn't that China is becoming too dominant in its own back yard, but that it isn't yet sufficiently advance to fill in all the geopolitical gaps being left by the U.S. energy independence band wagon. U.S. global draw-down should always have been a function of unsustainable public finances kicking in around 2020 – not an active political choice made from domestic resource booms. What's worse, is that this à la carte approach to global energy security, still entails that Washington can promote its broader geopolitical interests at the expense of others deemed fit. The U.S. will do all it can to contain the rise of China, even to the point of preventing a credible 'G2' geopolitical division of labour in key producer regions. If Beijing wants to become the key external player in Asia-Pacific and MENA regions, they will have to do so through political *fait accompli* towards Washington, certainly not by way of U.S. invitation.

The deep irony for the U.S., of course, is that it would actually be in American interests to let China play a more prominent hydrocarbon role, precisely because U.S. energy independence is a myth – at least in the form that U.S. politicians are currently peddling. No matter how far removed the U.S. thinks it is from international oil markets or supply side shocks, American prices will remain linked to global trends to one extent or another, particularly if its neighbours including Canada, Venezuela, Brazil, Mexico, Argentina and Ecuador all strive to keep feeding global oil markets as a fungible, free flowing commodity rather than a regional affair. What happens in the Gulf of Aden still ultimately affects the Gulf of Mexico. Whether Washington likes it or not, global oil supplies still remain a vital national security concern for the U.S.

Iran is actually living proof of this. U.S. sanctions against Tehran have ultimately rebounded into a political crisis in the U.S., not least because American consumers are now paying $4 a gallon at the pumps. If energy independence was 'real' and the U.S. was truly divorced from international price pressures, President Obama wouldn't now be facing an unedifying choice of either backing down over Iran and face looking weak in the Middle East, or going into a Presidential election with American consumers disgruntled every time they top up their tanks. This strikes at the heart of the problem to hand: America believes its own energy independence press, and assumes cheap oil is now a national right. That will prove a costly political mistake for U.S. politicians as global realities continue to batter U.S. consumers at the pumps, but not as costly as it will be to international consumers generally – and especially the likes of Japan, South Korea and the EU who have blindly followed the U.S down a sanctions path. 'Iranian egg on Western faces' will be the likely result as and when the US. gets '$4 a gallon' cold turkey.

We desperately need the 'real world' of historically high oil prices to realign with U.S. fantasy land of cheap and abundant 'national oil'. If the U.S. keeps following its own energy independence logic, then global gaps will continue to widen. This will prove disastrous for oil supplies over the next decade, where the only serious game in town is OPEC to meet global demand. Energy independence might look more credible in the 2020-2030s, but all things being even, Asian and European consumers need to work on the basis that the U.S. will keep buying into its own energy hallucinations long before then. That being so, new demand side agreements are needed across the board, and especially between China and Europe; it would also be nice to see more ships and more international flags making their way across 'hydrocarbon oceans'. After all, America is fully energy independent: Republicans and Democrats have told us so…

Welfare Analysis of Offshore Wind

By Julian Silk*

Introduction

International trade analysis has been used to evaluate government interventions in markets, and to evaluate the welfare losses of these interventions relative to free trade. A good example is the work of Professor Ian Sheldon, (see http://aede.osu.edu/sites/drupal-aede.web/files/AEDIS540TradePolicyI.pdf.

What is not generally recognized is that these methods can be used to evaluate government interventions to support renewable energy as well. A particular electricity market plays the role of the domestic economy in the international trade analyses. The pre-existing fossil fuel producers that supply this electricity market play the role of the domestic producers, and renewable energy plays the role of the imports. Quotas are a more general example of renewable portfolio standards (RPS), which have been adopted around the world and by many American states as mechanisms to speed the adoption of renewable energy. There are some differences, but the same general principles apply.

Off the Cumbria coast of Irish Sea of the United Kingdom, a consortium of DONG Energy, Scottish and Southern Energy (SSE) and OPW, itself a consortium of the Dutch pension fund service provider PGGM and Ampere Equity Fund, have just opened the Walney wind farm. Walney comprises the Walney 1 and 2 projects. It is the largest offshore wind site ever constructed, at 367.2 Megawatts (MW) capacity. For more details, see the news release at http://www.pggm.nl/Over_PGGM/Pers/Persberichten/Nieuws_en_persberichten/120209_Worlds_largest_offshore_wind_farm.asp.

Governor Martin O'Malley of the American state of Maryland plans to outdo this, however. He advocates the construction of a 450 MW wind farm off the coast of Maryland in the Maryland Offshore Wind Energy Act of 2012. The specific legalities of the bill are in http://mlis.state.md.us/2012rs/billfile/sb0237.htm, with a statement of claims about the bill in http://www.energy.state.md.us/documents/MDOSWEnergyActof2012.pdf. These claims are not modest. A good evaluation of the specifics of the plan is by Todd Griset, in "Analysis: Maryland's New Offshore Wind Plan", 26 January 2012, at http://offshorewindwire.com/2012/01/26/analysis-md-new-plan/, which also discusses how the plan differs from a similar act proposed in 2011 which failed in the Maryland legislature.

The plan will be evaluated theoretically using the international trade tools herein. Maryland's RPS requires that 20% of the state's energy be supplied by renewable sources by 2022. The 2012 bill only requires that 2.5% of the 20% be directly supplied by offshore wind. But given the size of the project, it is very reasonable to assume that it will by its very nature fulfill more than this: it is being taken to fulfill the entire 20% in this analysis.

The other major feature of the bill is that if Maryland's Public Service Commission projects that the wind farm will add more than \$2 per month to the average of residential customer electricity bills, the program will be suspended. This represents a price ceiling in the early going, but a price floor later, and it can be analyzed by these same standard welfare analyses.

Starting Conditions

To analyze the problem, suppose that an electricity market is originally powered by fossil fuel suppliers, who supply 100% of the energy required with no scheduled or unscheduled outages. The electricity market is perfectly competitive, and both upward-sloping supply and downward-sloping demand are linear. The market settles into equilibrium, with an equilibrium price p and an equilibrium quantity q. All quantities to be discussed for all graphs are quantities of electricity, and all prices are prices per kilowatt-hour (kWh) for electricity, unless specifically noted otherwise. No outside supply or demand affects this market. There are also no other renewable energy sources besides offshore wind.

A requirement that a fraction z of offshore wind be taken as supply is now imposed upon the market. Offshore wind is assumed to be available in unlimited quantities, at a constant supply price, without fail, all the time. The only distinction is that the price of the electricity generated by the offshore wind, $p_{ow} > p$.

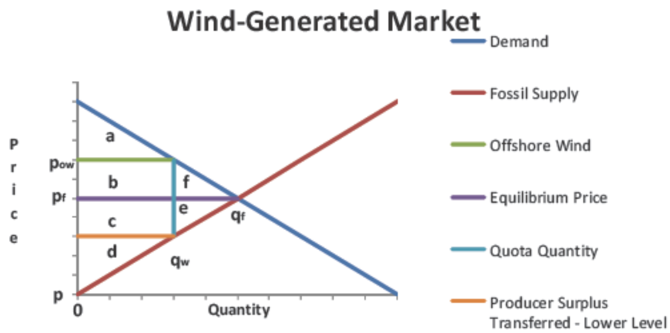
The requirement represents a quota restriction on the fossil fuel suppliers who are currently in the market. Suppliers must collectively import a quota such that the resulting fossil supply of electricity is (1-z)*q' and the resulting offshore wind supply is z*q', where q' is the new equilibrium quantity established in the market at the new equilibrium price p'. The demand schedule is unchanged. For Maryland, the proposed z is 0.2, or 20%. This is an unusual quota, as the usual quota is a restriction on low-cost unlimited foreign supply, while this is a mandate of purchasing

* Julian Silk is an Adjunct Professor at the University of Maryland. He may be reached at silk30918@earthlink.net He would like to thank Jaime Rund Veracka, Steven Anthony, Albert Hsu and Kevin Forbes for helpful suggestions. All errors are mine.

some of unlimited high-cost supply.

Segregation – the Best Case

The best possible case for wind is one in which the wind supply can be completely segregated from the existing market, and the wind supply can be devoted to a segregated wind energy market. If this occurs, deadweight losses, and price rises are minimized. The wind market is shown below. Call the additional quantity that would be purchased in the wind-generated market if it were to be powered by fossil fuel q_f, with corresponding price p_f, and call the quantity that is purchased when powered by wind q_w.



It is reasonable to assume that fossil fuel could supply the additional market less expensively than offshore wind. If wind is mandated, then there is producer surplus transferred to the wind suppliers equal to area c, and consumer surplus transferred equal to area b. Consumer surplus would be the sum of areas a + b + f without the mandate; it is now only area a with the mandate, for a deadweight loss (hereafter DWL) of area f. . Likewise, producer surplus would be the sum of areas c + d + e without the mandate; it is now only area d with the mandate, for a deadweight loss of area f. As usual, deadweight loss is the loss of a potential transaction that could benefit all parties involved in the transaction that does not occur – the trades you do not make that you could have and wanted to (see http://market.subwiki.org/wiki/Deadweight_loss).

If it is not unprofitable or impossible to transfer electricity between the original and additional markets via transmission lines, there will be arbitrage and some response to it unless a response is prevented or impossible.

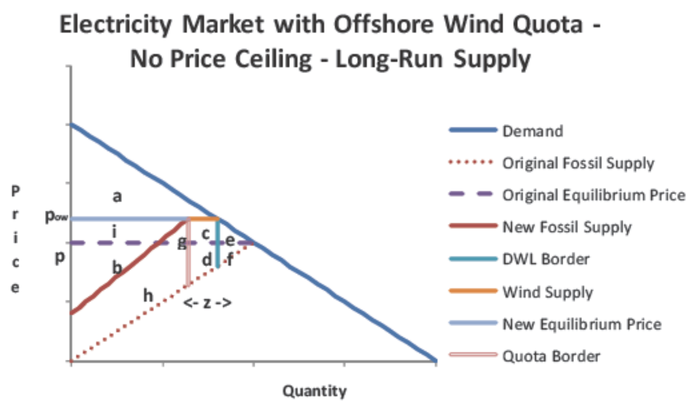
A Quota With No Subsidies

A quota with no subsidies is where standard international trade analysis can be directly applied.

First, in the absence of production subsidies, the price going to the wind suppliers will be p_{ow}. If the price is higher, more wind supply will come into the market to drive it down. If it is lower, wind suppliers will exit the market. Since the quota restriction is assumed to be binding, below z*q' will not be allowed, and so the suppliers who make up the quota get just enough to cover their constant reservation price and no more.

Second, it will be the case that the higher-cost fossil-fuel suppliers will be the ones who are driven out of the market by the quota requirement. This is just a matter of the producers acting to minimize losses they must suffer because of the imposition of the requirement to make room for the new higher-cost supply.

Third, the last, marginal, fossil supplier has a supply price equal to p_{ow}. If this fossil supply price is higher, more wind will be purchased, and the price will be driven back down. If it is lower, the electricity market will attempt to purchase more fossil energy, and come upon the binding quota restriction, which will drive the price back up.



Fourth, the resulting leftward shift in fossil-fuel supply will be a parallel shift, since there is no *a priori* reason to assume that the quota will affect different fossil fuel suppliers differently.

The resulting situation is displayed in the adjacent graph.

The original price p is displayed by the dashed line. The original supply is displayed by the dotted upward sloping line. Demand, which is not changed, is displayed by the solid downward-sloping line. Original consumer surplus is all of the areas a + i + g + c + e. Original producer surplus is all of the areas b + h + d + f. The fraction z is denoted by the horizontal length between the quota border and the DWL border divided by the entire horizontal length that denotes market output.

After the quota is installed, fossil fuel producer surplus is now b + i. Consumer surplus is now only a. Areas g + h can be considered to be costs for fossil fuel producers. Areas c + d are transferred to the wind suppliers. Areas e + f are now DWL. For elastic demand, this is a significant loss, but not for inelastic demand. If we accept the sensible definition that areas g + h are simply increased costs that do not lead to increased output, then areas g + h are also DWL, and these areas do not depend on the elasticity of demand.

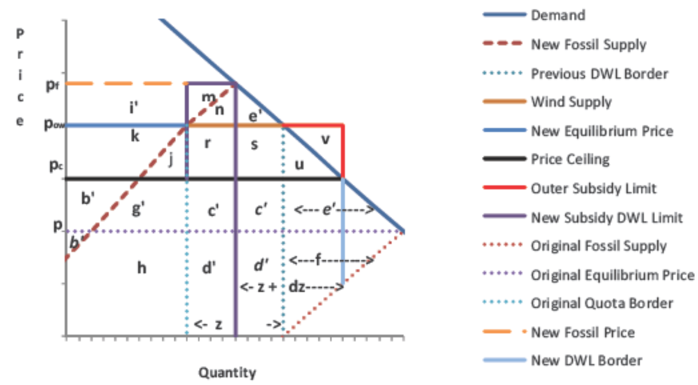
Price Ceilings

Governor O'Malley's plan makes Renewable Energy Certificates (RECs), the right to dispose of a certain amount of wind-generated electricity, a very important vehicle.

In the absence of outside financing, a REC for 1 megawatt-hour (MWH) of electricity would have an initial price equal to p_{ow}. But it would be reasonable for generators to purchase the REC, and immediately sell 1 MWH of their own generation. The meaningful criterion then becomes the net price, or the profit of p_{ow} minus their own generation cost. A fair-market net price for a REC would then seem to be $p_{ow} – p$, which would recreate the price difference in the generation market in the REC market. Suppose that p_c is the ceiling price, and $p_c < p_{ow}$. Then demand increases over what it would be before. Call the quantity of offshore wind that must now be supplied z + dz, with dz > 0.

The fossil fuel quantity that must be supplied also goes up. But it is supplied according to the same fossil supply function as before, the new fossil supply. The subsidies are applied to the price of output, not the production process itself. Call the price the fossil fuel producers would have to receive to supply the new total quantity of output they must supply p_f, with $p_f > p_{ow}$. The situation is displayed in the, unfortunately busy, graph adjacent.

Electricity Market with Offshore Wind Quota and Price Ceiling - Long-Run Supply



It is important to recognize that fossil fuel electricity producers *must* also receive some subsidy, since the price they have to receive to produce is not being covered by the ceiling price. The distinction in this case is that they are assumed to receive it immediately.

Consumer surplus has shrunk to the triangle above areas i', m. n and e'. Areas i'+ m+ n represent the subsidy that must be transferred to the fossil fuel producers. Area n + e' is a new addition to DWL, just because of this transfer. The sum of areas k + b' + *b'* is equal to area b before. So the producer surplus of the fossil fuel suppliers must go up from b to b + i' + m. The sum of areas g'+ j is equal area g before; that DWL does not change. Areas h and f do not change. The offshore wind suppliers must receive area equal to the product of (z + dz)*p_{ow}. Area s can be considered a legitimate transfer from consumers to the offshore wind suppliers now. (If stretched, it might be possible to claim that area u is as well, but consumers didn't really need to pay it.) The DWL that was area e has shrunk to area *e*' now. But areas r + c' + d' have been added to DWL because of the change, leaving only areas s + *c'* + *d'* out of the original transfer c + d as not being DWL. In sum, DWL has increased by areas n + r + *c'* + *d'* + e' + v, a very considerable amount. (Even if we subtract area u, the result is quite an increase.)

No subsidies have been announced for Maryland offshore wind. If this is the case, how does this miracle of increased output with no explicit means of support occur? Through the RECs and a schedule of rate increases for the offshore wind output itself.

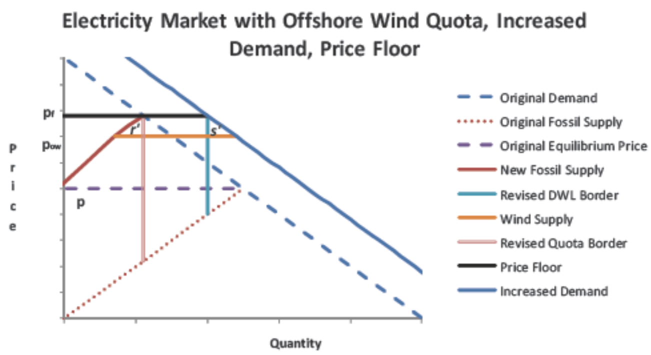
The Cape Wind Farm, which is discussed by Avalon Energy Services, LLC, in its weblog, online at http://avalonenergy.us/blog/?p=176, provides an example of what might be expected for Maryland. The initial price is 18.7 cents (¢) per kilowatt-hour (kWh), and given the compounding rate and the 15-year period of the contract, the wind output reaches a price of 30.3 ¢/kWh at the end of the contract. Avalon states that these prices are significantly above the New England average, or what can reasonably be forecast to be the New England average. (Avalon does not mention a price ceiling per year for the Cape Wind output.)

Why are these prices what they are, if offshore wind is supposed to be financially competitive with fossil fuel energy? Because the prices, discounted back to the present, have the subsidies for both wind and fossil fuel embedded within them, so that owners of fossil fuel generators who purchase the RECs receive a financial subsidy for the output they have to produce. If they don't, under these conditions, the fossil fuel producers are producing at a loss. Length of contract may also be longer under the wind agreement than what the fossil producers could get on the open market. The fossil fuel producers who survive, and the wind producers, may not see the entirety of the subsidies in the prices they receive in the first year, but eventually they all must be paid.

Demand Increases

Demand increases in later years wash away a host of sins in earlier years. This does not include eliminating the early DWLs, but it does (or can) include paying for losses suffered by the fossil fuel electricity producers in the early years as they subsidize the wind producers, so that the fossil fuel electricity producers are willing to suffer them. The major difference between demand increases and delayed subsidies is that with demand increases, since quantity is neither fixed nor declining, the supply schedules of the fossil fuel electricity producers and the wind suppliers come into play.

The arrangements between the fossil fuel electricity producers and the wind producers are summarized in the following graph. The graph is showing the second year, in which the price ceiling has just increased enough to cover the supply price for the fossil fuel electricity producers, and is greater than the offshore wind price, so it (p_f) has become a price floor. Demand has just increased enough to take the place of the government subsidy paid at the end of the first year to the fossil fuel electricity producers and the wind producers above. Suppose interest rates are zero. The fossil fuel electricity producers *loan* the wind producers the equivalent of the government subsidy for the first year. The second year comes, and demand increases just enough to pay the fossil fuel electricity producers back, as long as they aren't undercut by the wind producers, which is part of the loan agreement.



The DWLs for the second year are, however, much more modest, and are just ***r'*** and ***s'*** in the graph.

RECs can also be the vehicle through which the loans are made. If they are purchased for a year at a time, without any overhangs, then the clientele for the RECs changes from what it was in the case when the price ceiling was below the price of offshore wind. Once the ceiling rises above it, and becomes a price floor, the purchasers are looking to make profits, not just cut losses. So the purchasers become those whose supply costs are in between the price floor and the price of the offshore wind. (The wind producers could still sell to those whose costs are above the price floor, but unless those producers are willing to offer more than the floor price for the RECs, it makes sense not to sell to them but to hold onto the rights and sell into the market and receive the floor price. The reduction in losses which was important no longer is so.) Again, the price of the RECs must make the marginal purchaser just indifferent between holding the REC and producing. For a perfectly competitive market, without lumpiness, the REC price would then be the average of the shore price and the offshore wind price; for a more lumpy market, the REC price would then be the median fossil fuel electricity cost between the two.

Is It Worth It Regardless?

The DWL is essentially a reduction in consumption and ongoing, regular business expenditures. The wind farm would nevertheless be validated as an investment if it spurred either private or public investment in addition. Because of the large minimum scale of public investment, and the relatively small savings the wind farm would generate, since the share of energy costs in total costs for public investment is small, it is doubtful that public investment will be elastic enough to validate the wind farm on its own. School construction, road repair and building, and septic system upgrades are not the ideal consumer base for the wind output.

That leaves private investment. Andy Bollman, E.H. Pechan & Associates, "Characterization and Analysis of Small Business Costs", April 2008, at http://archive.sba.gov/advo/research/rs322tot.pdf, goes into useful detail on how the shares of energy costs vary across businesses. The only remotely reasonable nonagricultural businesses for which energy shares are high (as a percentage of the value of shipments) are hospitals, accommodation, truck transportation, couriers and messengers, chemical and nonmetallic and metallic product manufacturing, textile mills and wood product manufacturing and possibly plastics manufacturing. Each of these face the same problem: because of its distance from metropolitan areas and major transportation routes, increased transportation costs would eat up any saving that might accrue from low-cost wind energy, if it is low cost.

It thus appears that the wind farm, if kept at its current size, imposes significant DWL, at least in the early years, and possibly significant costs and systemic instability in its later years. Because of its location, it requires significant investments in transmission, and its success requires that transmission losses be zero or low.

SPECIAL OFID/IAEE SUPPORT FUND FOR STUDENTS FROM DEVELOPING COUNTRIES

IAEE is pleased to announce the continuation of a special program which offers support to students from developing countries (for a list of qualifying countries please visit http://www.iaee.org/documents/LIC.pdf If your country of origin is not on this list your application for support will not be considered) to participate in four of the Association's conferences in 2012. This program is generously underwritten by the OPEC Fund for International Development (OFID) and the International Association for Energy Economics. The support will consist of a cash stipend of up to $1500.00 plus waiver of conference registration fees for a limited number of eligible students, who are citizens of developing countries and current IAEE members (the student can be registered as full-time student in programs of study anywhere in the world), to attend either the 5th NAEE/IAEE International Conference in Abuja, Nigeria, April 23-24, 2012, the 35th IAEE International Conference in Perth, Australia, June 24-27, 2012, the 12th IAEE European Conference in Venice, Italy, September 9-12, 2012 or the 31st USAEE/IAEE North American Conference in Austin, Texas, November 4-7, 2012.

Application deadlines for these conferences are as follows: Abuja Conference – application cut-off date, February 15, 2012; Perth Conference – application cut-off date, March 21, 2012; Venice Conference – application cut-off date, June 1, 2012, Austin Conference – application cut-off date, July 18, 2012.

Please submit the following information electronically to iaee@iaee.org to have your request for support considered. Make the subject line of your email read "Application to OFID/IAEE Support Fund (mention the conference you wish to attend)."

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

Please note that students may apply for this support at only one of the above conferences. Multiple requests will not be considered. Further note that you must be a student member of IAEE to be considered for this support. Membership information can be found by visiting https://www.iaee.org/en/membership/application.aspx

Applicants will be notified whether their application has been approved approximately 14 days past the application cut-off date above. After the applicant has received IAEE approval, it will be their responsibility to make their own travel (air/ground, etc.) and hotel accommodations, etc. to participate in the conference. Reimbursement up to $1500.00 will be made upon receipt of itemized expenses and after the conference is held. The cash stipend can only be used to cover transportation and lodging expenses. No other expenses will be covered (e.g., paying for Visa's/Passports, meals outside the conference provide meal functions, no more than 4 nights lodging, etc.).

For further information regarding the IAEE support fund for students from developing countries to participate in our conferences in 2012, please do not hesitate to contact David Williams at 216-464-5365 or via e-mail at: iaee@iaee.org

For a list of qualifying countries please visit http://www.iaee.org/documents/LIC.pdf If your country of origin is not on this list your application for support will not be considered.

Scenes from the 3rd IAEE Asian Conference (February 20 - 22, 2012)

3rd IAEE Asian Conference in Kyoto

The 3rd IAEE Asian Conference entitled *Growing Energy Demand Energy Security and the Environment in Asia – Challenges under Enormous Uncertainty* was held at Kyoto University from February 20 to 22, 2012. The conference was attended by about 180 energy specialists, including scholars, researchers, businessmen and members of governmental and international organizations from Asia and other parts of the world. The conference had Welcome and Opening Remarks, Starting Plenary Session, Concluding Plenary Session, four Dual Plenary Sessions and 30 Concurrent Sessions.

On the first day, at the beginning of the Starting Plenary Session, Dr. Fatih Birol, Chief Economist at the International Energy Agency (IEA), was the key note speaker, pointing out that:

- The growth of energy demand will be driven mostly by non-OECD countries, particularly by India, China and other developing countries of Asia.
- Natural gas and renewable energy will mainly support this growth.
- In these regions, demand for petroleum will grow due to the increase in automobiles.
- Limits to nuclear power after Fukushima will seriously affect the energy supply-demand situation and energy economics.

Mr. Makoto Yagi, President of Kansai Electric Power, also at the session emphasized the importance of “S+3E” (energy security, environmental conservation and economic efficiency premised on safety) as he spoke about the post-Fukushima scheme of electric power supply.

Then Mr. Hiroshi Ozaki, President of Osaka Gas, pointed out the potential and importance of natural gas in Asia and expressed his expectations for natural gas infrastructure in Asia.

Also at the session, Dr. Fereidoon Sioshansi, President of Menlo Energy Economics, spoke about a case of renewable energy in California and emphasized the importance of governmental policy in promoting renewable energy.

114 papers were presented at the concurrent sessions on topics in Energy Modelling and Demand Analysis (28), Renewable Energy (25), Climate Change (20), Electricity Markets (20). Energy Security (12), Oil (3), Nuclear Energy (3), Fossil Fuels (2) and Others (1). See pictures on page 18.

Kenichi Matsui
Councilor, The Institute of Energy Economics, Japan

In memoriam

Lennart Hjalmarsson

Professor Lennart Hjalmarsson died in an accident felling trees in his beloved forest, February 21st, five weeks from his 68th birthday. He was born in Borås (Sweden) on a farm and lived with his wife and raised two sons on her farm near his birthplace. He loved to look after the forest and do some cleaning up felling trees with his chainsaw, helmet and the rest of the gear. This was his exercise and recreation and a way to get a break from his university job and problems within academia. At the farm the wood from the farm was the main source of energy for heating and hot water. At some point Lennart stopped attending conferences in the summer season and stayed at the farm, doing chores like putting up hay for his wife's sheep and fishing in their lake. Crayfish were his favorites. Lennart loved to take guest to the economics department in Gothenburg to his farm. His wife's hospitality and fantastic home cooking was unforgettable. The farm was an idyllic place far from the standard environment of us city slickers, so it was easy to understand that Lennart wanted to stay there during the summer.

After working on his PhD in Oslo for three years under Leif Johansen he took his PhD at University of Gothenburg and became full professor there at a young age in 1979 and remained there for the rest of his carrier. He became one of the most outstanding economists in Sweden. His main research fields were industrial economics, productivity, production theory, energy economics, deregulation, public economics and taxation. He published regularly in top journals in these fields. He served as editor for Scandinavian Journal of Economics and was a founding father as well as associate editor of Journal of Productivity Analysis, and was associated with several other production and industrial economics journals.

He was an early member of IAEE and enjoyed many conferences over the years. Energy problems were close to his heart. In his CV he listed no fewer than 162 publications within energy economics, ranging from academic papers to government reports and popular outlets in Swedish. He was a member (often the chairman) of no less than seven government commissions on energy issues, like energy taxation, over a time span from 1977 to 2009. He was a board member of Vattenfall, the biggest Swedish electricity producer, for 10 years. Lennart was a proponent of nuclear power and followed the development of this industry closely. He was a member of the International Panel of Experts on the Closure of Chernobyl Nuclear Power Plant. He was also used as an international consultant on energy issues including being a member of a panel for the European Commission on Nuclear Safety in Central and Eastern Europe. He was involved in deregulation and restructuring of electricity markets and electric utilities in Sweden, Norway, New Zealand and Thailand.

For many years he had been a member of the Royal Swedish Academy of Engineering Sciences and the Royal Society of Arts and Sciences in Gothenburg, 1987. Other accolades include the Erik Lindahl Award, the Jan Wallander Award for International Scientific Publications and an Honorary Professorship and an Honorary doctorate at the Academiei de Studii Economice, Bucuresti, Romania.

Lennart had many doctoral students over the years in Gothenburg working within his favorite themes, and he encouraged students from aboard to join the PhD program.

Lennart was full of positive energy and had this unique warmth and generosity and concern for those that were so lucky to have him as their friend. He will be deeply missed by everyone that knew him.

The Learning-by-doing Effects in the Wind Energy Sector

By Silvia Micheli*

Introduction

How to control climate change and to spur green energy are among the most important challenges facing the world today. This research attempts to study the reason why governments subsidize green electricity. We know that the regulator can charge a Pigouvian tax on emissions that internalizes all damage from pollution. Nevertheless, countries have chosen subsidies to green electricity. The reasons often put forward are the learning by doing effects from the production of energy from renewable resources on the cost of future production. The main idea is that a critical mass of production has to be reached first, and then costs will be reduced thanks to R&D activities.

In this article, I review the recent environmental economics literature on the incentive mechanisms for energy from renewable sources, and the motivations for such supporting policies. Among renewable energies, I take into account wind power, that is growing at a rapid pace not only in Europe, but at a global level.

There is a long history of economic incentives in the European Union aimed at promoting the use of renewable resources. Policy instruments are usually divided into two classes: they can be either price-oriented or quantity-oriented. European countries differ in the scheme they adopt, but most of them rely basically on price-driven strategies. For instance, subsidies are directed to wind power and not to turbine producers. The reason for subsidizing wind energy is essentially that higher demand for wind electricity stimulates the turbine producer industry and it can be a spur to learning and reducing production costs.

In this study I investigate three reasons why an environmental policy of taxes and subsidies to wind power should be implemented by the government.

First I discuss the feasibility of charging firms that produce polluting emissions with a Pigouvian tax. There are some problems for governments to levy a Pigouvian tax both for difficulties in evaluating quantitatively the marginal damage from pollution to society and also due to lobbying activities by firms that use fossil fuel and attempt to achieve less regulation.

When Pigouvian taxes are not feasible, I consider instruments such as emission taxes and subsidies that may lead to Pareto-efficient levels of pollution.

Second, I consider an environmental policy to be implemented which comes from the "big push" literature, as in the paper by Murphy et al (1989). It focuses on the contribution of one firm to the market in a setting with imperfect competition and demand spillovers. One of the models presented in that paper takes into account investments in infrastructure; the example they consider is the possibility of building a railroad, which is particularly important for industrialization.

The link I find between the model presented by Murphy et al. and environmental policy may be understood if one thinks of "building a railroad" as "achieving a level of investment in wind power that will make green energy as competitive as fossil fuel due to investment and learning-by-doing spillovers." In the renewable energy sector, and more specifically in wind power, every firm benefits both from its own investment and from spillovers that come from the industry. With coordination of investment by the government, such as taxes and subsidies, it is possible to reach the 'good equilibrium' that is, to achieve an environmental big push through large-scale adoption of energy from renewable resources.

The article ends with the analysis of the learning by doing effects from the production of renewable energy, such as wind power, on the cost of future production, that is, cost reductions as technology become more mature.

Policy Analysis

I analyze three reasons why the government should implement the use of energy from renewable resources: the increase in polluting emissions from fossil fuels, learning by doing effects and the big push.

Tax versus Subsidy

Polluting emissions create a damage to society; without a price system, firms see a price of zero for pollution and it leads to the wrong amount of pollution. Since the "right level" of pollution will not emerge in a spontaneous way, the government must increase the cost of pollution by raising a tax, in order to reduce pollution generation. If pollution becomes more costly, the producer will produce less pollution. If the tax is at the optimal level, it is called a Pigouvian tax. The optimal amount of

*Silvia Micheli is with the Department of Economics, Finance and Statistics, University of Perugia. She may be reached at silviamicheli@unipg.it

pollution is the amount that minimizes total costs from producing one more unit of pollution and total damages from pollution. Thus, the condition that marginal cost (or marginal saving) equals the marginal damage leads to the generation of the right amount of emissions. This is the main idea of the Pigouvian tax: “A Pigouvian fee is a fee paid by the polluter per unit of pollution exactly equal to the aggregate marginal damage caused by the pollution when evaluated at the efficient level of pollution. The fee is generally paid to the government” (Kolstad, 2000).

Note that the Pigouvian tax is also equal to the marginal cost from pollution generation at the optimal level of pollution. The difficulty for the government in levying a Pigouvian fee is that there are reasons why it is not feasible. First of all, it is not easy to do a quantitative evaluation of marginal damage. The number of activities and the number of people affected by pollution are so great that it is quite hard to estimate in money the damage from pollution. Moreover, the optimal tax level on polluting emissions is not equal to the marginal net damage that the polluting activity generates initially, but to the damage it would cause if the level of the activity had been adjusted to its optimal level (Baumol and Oates, 1971). If we are not at optimum, the Pigouvian tax will be neither the marginal cost of pollution nor the marginal damage from pollution. Basically we can say that in a perfect environment, like an economy in which there is perfect information and no constraints on government tax policy, only the Pigouvian tax is necessary to achieve efficiency.

If there are other distortions in the economy or limitation for the social planner, then other taxes and subsidies are needed to achieve efficiency.

Environmental Policy for Generating a Big Push

The other reason I consider for an environmental policy comes from the “big push” literature; here I consider the paper by Murphy et al (1989). It focuses on the contribution of one firm to the market size, in a setting with imperfect competition and demand spillovers. Such spillovers might lead to multiple equilibria and the economy might be in a bad equilibrium (no industrialization) if coordination of investments among sectors does not occur. The ‘big push’ amounts to moving from the bad to the good equilibrium, even if no sector could break even industrializing alone.

One of the models presented in that paper takes into account investments in infrastructure. Let us consider a large infrastructure project such as the building of a railroad, which is particularly important for industrialization because it significantly lowers production costs. The externalities from building the railroad are not captured by firms, but with coordination of investments we can move to the ‘good’ equilibrium’, that is, the big push takes place. The authors assume that the railroad builder is a monopolist. There are mainly two reasons why the monopolist might decide not to build it. First, if he can’t price discriminate among users, then he can’t extract all the surplus generated by the railroad. Moreover, there is uncertainty about industrialization even if the railroad is built, and the monopolist might be afraid of ending up with a “white elephant”.

The link between the model presented by Murphy et al. and environmental policy may be understood if one thinks of “building a railroad” as “achieving a level of investment in wind power that will make green energy as competitive as fossil fuel due to investment and learning-by-doing spillovers.”

In the renewable energy sector, and more specifically in wind power as we will see in my model, every firm benefits both from its own investment and from the spillovers that come from the industry. These spillovers will lead to a reduction of costs and it is expected that green energy will be competitive with fossil fuel in the long run. Because of the uncertainty within the energy industry about the level of investment in renewables made by the firms themselves, it is possible that no one invests in the production of energy from renewable resources. With coordination of investment by the government, such as taxes and subsidies, it is possible to reach the ‘good equilibrium’, that is, to achieve an environmental big push through large-scale adoption of energy from renewable resources. With respect to externalities, the model I present can be seen as a “shortcut” when compared to Murphy et al. In the latter, resources invested by a firm go to the monopolist, who might build the railroad and then lower production costs for other firms; in the former, resources go directly to other firms. This means that the problem of no price discrimination is exacerbated (no pricing at all), while the ‘white elephant’ risk is not relevant: once investment takes place among all the firms in the green energy industry, the production cost is lowered and every firm can take advantage of it even without coordination. Note that if the other firms in the industry do nothing, the investing firm ends up with a “white elephant”. Even with such a shortcut, the baseline of our model is precisely the same: “an industrializing sector essentially has the effect of reducing the total production costs of other sectors” (Murphy et al, 1989). Then we might think of taxes and subsidies as a tool box governments can employ to internalize environmental externalities, achieve coordination and reach the big push in the energy industry.

Learning by Doing

The last motivation I analyze for an environmental policy for the development of energy from renewable resources is represented by the experience curve. The future growth of the economics of energy from renewable resources is shown by the trend of experience gained; the learning curve relates the cumulative quantitative development of a product to the development of the specific costs.

On the existing literature on learning by doing, the paper by Petrakis et al. (1997) is an interesting work to study the effects of learning by doing in a competitive industry. Basically they show that learning by doing is compatible with perfect competition if the industry presents increasing marginal costs, and that the equilibrium outcome is socially efficient. More specifically, the point of departure of our study that explain the reasons for a policy in presence of learning by doing is the model proposed by Bläsi et al. (2007) focusing on the right subsidies in the presence of learning by doing in a competitive market. It develops a two-period model in which there are two types of electricity producers that are: producers of energy from fossil fuel generating polluting emissions, and producers from wind power. In this framework, the energy market is competitive, and also the market for wind turbines is competitive. The wind-turbine operators are heterogeneous because their productivity depends mainly on the location of the turbine; they buy turbines from turbine producers and these latter firms incur decreasing costs in the second period of production through learning. In the paper there is a distinction between pure private learning and learning spillovers; pure private learning means that costs in the second period are lower thanks to the quantity of energy produced by the firms themselves, while learning spillovers means that firms benefit also from the quantity produced by all the firms in the industry. They focus their analysis mainly on the wind turbine producers. Total learning that occurs in the upstream sector is the sum of private learning that comes from the turbines produced, and the spillovers from the quantity of turbines produced in the industry.

Note that in this study, they relate learning only to the quantity of turbines produced. The cost function of a firm that produces wind turbines depends on his own output and, in the second period, on total learning or experience. The cost function has positive and increasing marginal cost in output in each period and experience by the firm or by the industry will reduce marginal cost in the second period. Concerning a producer of energy from wind power, he faces a cost function that depends on the output and on a firm specific parameter that can be interpreted as the location of the turbine. We have that the cost function has positive and increasing marginal costs in output and in the location parameter. The total output in the electricity market comes from both fossil fuel and wind power. They first investigates the case in which economic incentives are given to the turbine's producers, so that the profit function of a typical turbine producer has an entry premium and an output subsidy. In this setting, the authors find that in a decentralized economy the optimal policy of the regulator, in order to implement first best consists of three instruments: a Pigouvian tax (equal to the marginal damage), an output subsidy per turbine and an entry premium for turbine producers. Both subsidies depend on the spillover coefficient. If there are no learning spillovers, the regulator should internalize externalities from polluting emissions by setting a Pigouvian tax; no subsidies are needed.

In reality, as we have seen before, it is hard to set taxes at Pigouvian level and in addition in several countries subsidies to wind turbine producers are not allowed. For these reasons, the authors study the second-best optimal subsidies when Pigouvian taxes and subsidies to turbine producers are ruled out. Subsidies are paid to producers of energy from wind power; the economic concept is that higher demand for wind turbines stimulate and accelerate learning by doing in the wind turbine industry, so that costs will be lower as learning proceeds. With only private learning among turbine producers, the authors eliminate subsidies from the turbine's producer profit and they consider an output subsidy on wind power. In this scenario, the interesting results are that, first, if the subsidy or the tax rate is raised in one period, the amount of energy produced from fossil fuels decreases in both periods; the quantity of wind power and the number of firms that produce wind energy increases in both periods. Moreover, while the price of electricity is unchanged because of the competitive market, an increase in the subsidy or in the tax rate leads to a higher price of wind turbines in the first period, and to a reduction of the price itself in the second period. This is because the higher demand of turbines can be satisfied at higher prices in the first period since turbine producers incur in increasing marginal costs. At the same time, higher demand stimulates learning and we will have both lower costs and lower prices in the second period.

When learning is private, the second-best optimal subsidy rate takes into account the marginal damage from polluting emissions from fossil fuel and the sub-optimal emission tax rate. They find out that the subsidy paid to firms that produce energy from wind power should be higher in the first period with respect to the second one. This is because increasing output in the wind industry today accelerates learning by doing and then decreases costs in the future. Moreover, they find that if marginal damage is constant, the quantity of energy generated by fossil fuel is higher than the one in the first best, and then environmental damage is higher than optimal, while the output of energy from wind power is equal to the first-best level.

In the presence of learning spillovers the authors obtain a subsidy that is equal to the marginal damage plus a term that comes from the externality generated by learning spillovers. In this case there is ambiguity in the paper since the authors don't know the sign of the term due to spillovers and so they can't sign the subsidy itself.

The paper by Bläsi et al. basically shows that the regulator has to take into account the learning effect to implement the first-best policy. In particular, when learning occurs, the regulator should tax polluting emissions and subsidize the production of turbines. There is some ambiguity on the sign of the subsidy to production of wind energy, but the paper is interesting and it is the point of departure of our work.

Conclusions

This study has explored the learning by doing effects from the production costs of wind power as a justification to the observed environmental policies.

When investments and production of wind energy generates learning externalities that help reduce costs of future production, the regulator should subsidize wind power to make it competitive in the energy industry. Firstly, I have analyzed the policies of the European Union to implement the use of wind power among EU member states and I have seen that these strategies are mainly price-driven. I have analyzed three reasons why governments should enforce the use of energy from wind power. these are the increase in polluting emissions from fossil fuels, learning by doing effects and the big push. In particular, since Pigouvian taxes are not feasible, the government has a tool box of instruments such as environmental taxes and subsidies to wind industry that would lead to Pareto-efficient levels of the polluting activities. I have shown that with coordination of investments that are taxes and subsidies, it might be possible to reach the 'good equilibrium', that is, to achieve an environmental big push through the large-scale adoption of energy from wind power and renewables in general. Then, the review shows that technological learning, that is, cost reductions as technology become more mature, are an important justification to the current European environmental and energy policies that strongly encourage the use of environmental-friendly technologies as renewable energy.

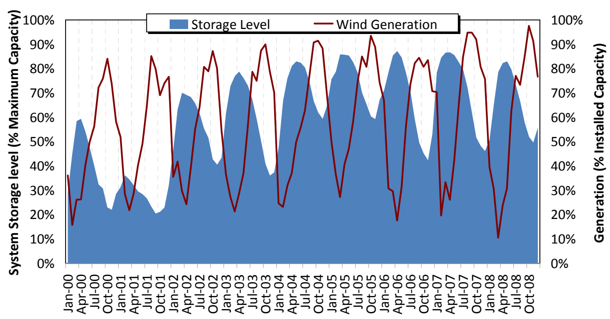
Fostering Wind Power Through Auctions: the Brazilian Experience

By G. Cunha, L. A. Barroso, F. Porrua and B. Bezerra*

Introduction

The development of energy generation in Brazil has historically been focused on hydroelectricity. Over 70% of the country's 120 GW of generation capacity comes from hydro sources, making Brazil's energy mix one of the cleanest in the world. More recently, due to environmental concerns regarding the development of large hydro projects in the Amazon rainforest region, the country has turned its attention to non-conventional renewable energy sources (NCRES).

After small hydro and bioelectricity plants (cogeneration from sugarcane bagasse), wind power has been the third NCRES to be developed at scale in Brazil. Not only are wind resources in the country very abundant, estimated at 300 to 400 GW of installed capacity, wind power presents several characteristics that give it positive synergies with the Brazilian hydro-based electricity mix. Wind power's production intermittency, which represents one of the main obstacles to the widespread development of this technology, are partially offset by the presence of significant storage capacity in the form of large hydro reservoirs, which can provide an operation flexibility that facilitates their technical and economic integration. Furthermore, since a large percentage of wind generation potential tends to peak in the dry season, combining wind and hydro sources contributes to increasing the system's supply reliability (see adjacent figure).



In addition, wind farms can be quickly built (less than two years, as opposed to large hydros which take about 5 years), which is a valuable attribute to hedge against the country's load growth uncertainty and against delays of environmental licensing of large hydros. Finally, the renewable energy sources in Brazil complement each other geographically, which is good for minimizing energy transport costs: wind resources are concentrated in the South and Northeast, while most of the untapped large hydro potential is located in the North region, and the Southeast region has significant bioelectricity potential from by-products of sugarcane culture.

Brazil has had different mechanisms to support the penetration of NCRES. The first major initiative in this sense was the Proinfa, an incentive program instituted in 2002 to contract a total 3,300 MW of new capacity, split evenly between bioelectricity, small hydro, and wind sources. Proinfa followed a "traditional" subsidy model, establishing a fixed feed-in tariff (different for each technology) for the electricity produced over the first 20 years of operation. The cost of these contracts is collected from all consumers through a levy.

Even though Proinfa's role as a pioneer program was very important, attracting the attention of manufacturers and investors to the Brazilian market, it was heavily criticized for its design choices. Some oft-cited problems were the even split among the three renewable energy sources, without taking into account particularities of the technologies, and the use of the issuance date of the environmental permit as the main criterion for deciding which projects would be built, without any incentive to energy or construction efficiency. In addition, a large proportion of nationally-manufactured equipment was required in order to obtain the best financing options available, which in the case of wind put the investors at the mercy of the only wind turbine producer in the country at the time. This resulted in significant delays in the construction of the authorized wind farms: even though in the original plan investors were supposed to sign up until 2004 and start operations until 2006, several projects did not come online until the end of 2011.

Even though another important incentive for NCRES was granted in 2007, in the form of discounts on transmission/distribution tariffs for sales to free consumers, the most important initiative by far was the auction-based approach for contracting wind power. This experience is described next.

Overview of Energy Auctions in Brazil

In parallel to the implementation of Proinfa, Brazil had been reorganizing its power sector, after a major regulation revision in 2004. The new model implemented an organized market that auctions "firm energy" contracts to acquire

* G. Cunha, L. A. Barroso, F. Porrua and B. Bezerra are with the PSR in Rio de Janeiro, Brazil. Luiz Barroso may be reached at luiz@psr-inc.com
See footnote at end of text.

new energy. The contract auction system has been very effective in promoting the development of new generation, offering long-term contracts (that ease project financing), fostering competition, and providing a transparent and objective selection criterion. Since 2005, these auctions have resulted in the contracting of 31 GW of new capacity (40% of which is conventional hydro, and 20% non-conventional renewable), awarding US$ 300 billion in long-term contracts.

Every energy auction is organized by the government. An auction committee is formed and the main auction tasks are distributed among different institutions (Ministry of energy, market operator, planning company, regulator). This committee defines the auction mechanism, suggest price caps, defines the auction product, prepares the tender documents and coordinates with transmission planning.

There is a long-list of technical pre-requisites to register a candidate project for the auction, including a prior environmental license, a grid access statement, financial qualifications, technology-dependent documents (such as certified wind production or firm fuel supply agreement), etc.

The auction mechanism follows a two-phase hybrid scheme: in Phase 1, a descending price clock auction is executed, and a final pay-as-bid round for the winners of Phase 1 is then carried out (Phase 2). An auction training takes place in advance, and the auction process is quite well documented, with plenty of information to bidders. Winning projects have to deposit several guarantees, including a bid bond of 1% of project's estimated investment cost and a project completion bond of 5% of project's estimated investment cost. Several penalties are applicable in case of delays: during the period in which the plant is delayed, contract price is reduced, replacement firm energy contracts may be required depending on the auction type, and the regulator has the right to ask for contract termination if a delay higher than 1 year in any of the project milestones is observed.

The new power sector model foresaw two main types of energy auction: *regular* new energy auctions, which contract an amount declared by the distribution companies in order to meet demand growth in the regulated market, and *reserve* energy auctions, which are used to contract supplementary energy to increase the system's reserve margin. Demand for reserve energy is entirely determined by the government following its own criteria of security of supply and energy policy, and the costs of these contracts are split among all consumers by means of a system charge. While the energy contracted in regular energy auctions is essential to meet demand, and therefore must be backed up by a certain amount of firm generation (with a firm energy settlement), reserve energy contracts do not provide firm energy to the system and therefore may have much more flexible terms.

Auctions for Fostering NCRES

In both auction types (regular or reserve), the government can interfere in the candidate projects with policy decisions. The government has used this option to organize exclusive auctions for specific large hydro projects, to keep "polluting" sources such as oil- and coal-fired generation from participating in auctions (a standing practice since 2010), and to foster NCRES by means of exclusive auctions: in 2007, there was one auction where the candidate supply was restricted to bioelectricity and small hydro projects.

Particularly, the reserve energy auction model has been strongly oriented towards NCRES development since the beginning: it was first implemented in 2008 in an exclusive auction for bioelectricity projects. This 2008 auction was responsible for the development of a method to facilitate network integration for small renewable facilities, based on the cooperative planning of an integrated transmission and distribution network and sharing collector substations – an important milestone for NCRES.

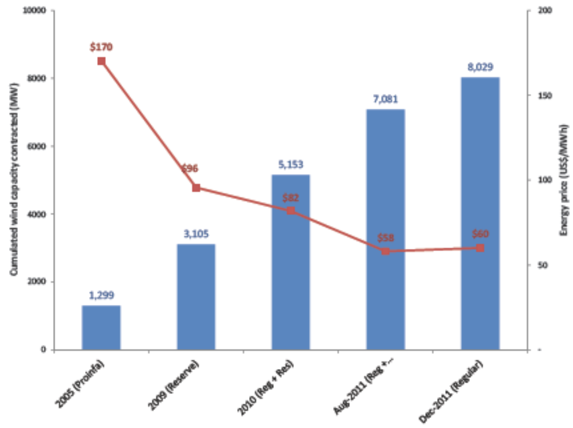
Wind power, at significantly higher costs than other technologies, was excluded from the 2007 auction for NCRES, and for several years it remained without significant incentives to its development other than the Proinfa. Its turn finally came in December 2009, when an exclusive reserve auction for wind farms took place. The 2008 economic crisis had strongly reduced demand for wind equipment in Europe and increased competition among suppliers, resulting in large price drops – which made 2009 the ideal moment to start the development of this technology in the country in large scale. This exclusive energy auction attracted a large number of investors, including local and foreign private generators, wind equipment manufacturers and government-owned companies – a total 13,000 MW in wind power projects subscribed to participate in the auction. The 20-year contracts offered for delivery in July 2012 were specifically catered to the peculiarities of wind power generation: in particular, specific accounting mechanisms allowed the wind farms to compensate in the long run for seasonal and inter-annual wind fluctuations, without compromising the project's yearly cashflow.

The results of this first auction were no less than outstanding: a total 1,800 MW of new wind capacity was contracted at an average energy price of 95 US$/MWh, representing a 21% discount relative to the government's initial asking price, and a 44% discount from Proinfa prices. These large discounts can be attributed in no small part to the lowered investment costs due to the 2008 crisis, but also to the competitive environment of the auctions and aggressive behavior of investors, as well as significant improvements observed in capacity factors, which averaged an impressive 44% for the winning projects – among the best in the world.

The excellent results obtained in the 2009 auction surpassed most expectations, and showed that wind power was very close to being competitive with other renewable energy sources. This accelerated dramatically the process of insertion of wind power technology in the Brazilian energy mix: in 2010, wind power was allowed to compete on equal grounds with small hydro and bioelectricity projects in two energy auctions for energy delivery in 2013 (one regular, for firm energy; and one reserve). The contract offered in the new energy auction, like the one formulated in 2009 for reserve wind power contracting, presented robust hedge mechanisms and accounting processes in order to shield the investor against wind generation variance. Wind power outclassed its competitors in both auctions, being responsible for nearly 80% of all energy contracted and reaching average prices of 80 US$/MWh (regular auction) and 73 US$/MWh (reserve auction). A total of 1,500 MW of wind capacity was contracted under regular contracts, and 500 MW under reserve contracts.

In August 2011, once again two energy auctions (one regular and one reserve) for delivery in 2014 were organized, allowing for the participation of wind power. However, while the reserve energy auction remained exclusive for non-conventional renewable sources, in the new energy auction wind power was allowed to compete directly with natural gas-fired thermal plants. In yet another important landmark for the full development of the technology, wind power was able to successfully compete with these thermal plants: the average wind energy price in these auctions was 60 US$/MWh, lower than the average natural gas energy price (62 US$/MWh). An energy mix including 1,000 MW of wind capacity was contracted in this auction; while in the reserve energy auction an additional 860 MW of wind capacity was acquired. Remarkably, competitiveness of wind power in Brazil was achieved in only two years without taking into account positive externalities relative to carbon emissions: wind and gas projects competed in the 2011 auction using a purely economic criterion (the lowest $/MWh offered defined the winner).

A final regular new energy auction took place in December 2011, to contract energy for delivery starting in 2016. Despite the longer construction times, final prices were quite similar to the ones obtained in the August auctions. The evolution of the contracting of wind power throughout Proinfa and all auctions carried out in Brazil is summarized in the adjacent figure. Remarkably, the energy auctions from 2009 to 2011 will increase wind capacity in the country eight-fold.



Future Challenges

Despite the undeniable success achieved in terms of prices and competitiveness of wind power in the last few energy auctions, because this development happened so quickly, in practice wind technology remains largely untested in Brazil. Projects sold in the auctions have offered very high capacity factors and whether the plants will perform adequately remains to be seen (the first wind projects from auctions are scheduled to start operations in July 2012). Because the wind production records are very short, there is a concern that "aggressive certification" is responsible for the unusually high load factor estimates. The government currently has very high expectations about wind and an underperformance in 2013 may lead to disappointment and possible regulatory "backlash", with the introduction of heavy-handed penalties (a situation that has happened before with small hydros).

An additional challenge that must yet be overcome are unexpected delays. Even though a three-year construction period is granted between the auction date and the energy delivery date, which should be more than enough for wind power, monthly reports from the energy authority indicate that several projects are suffering from various problems that may result in delays (out of 70 wind farms auctioned in 2009, 52 are behind their schedules). In the past, delays had also plagued the Proinfa wind farms, although this could be partly explained by the immaturity of the regulatory processes. Currently, problems faced by wind farms are in one of the following categories:

- Environmental permits: the Brazilian environment ministry implements a complex three-phase system for granting environmental permits. Although the first phase is completed before the energy auction, the following phases often take more than expected due to incomplete environmental studies and a lack of personnel from the environmental agency. Measures have been taken to simplify and better streamline this process, although gains so far have been small;

- Transmission delays: after the energy auction, the energy authority coordinates which transmission lines are to be built and whether some with projects will share collector substations, and organizes a transmission auction to build these lines at minimum cost. Since the time for obtaining environmental permits and constructing this system is even shorter, and since a generation project can't operate before the transmission lines are complete, this represents a significant risk (though a risk that is burdened by the consumer, not the generator);
- Financial leverage: many projects have offered in the auctions a load factor associated to the p50 of their certified production and based their prices on a 70% leverage. As banks usually define the leverage based on a financial evaluation considering the p90, the leverage is actually reduced to about 55%, which affects the project economics and profitability.
- Financing restrictions: in the specific case of the 2010 regular energy auctions, most of the energy sold was bought by a state-owned distribution company that was deemed uncreditworthy by most important banks. This reduced significantly the financial guarantees the wind projects could present to potential lenders, which proved a major obstacle. This problem should be addressed in the future with the privatization of said distribution company.

Conclusions

Long-term auctions are the main tool to promote NCRES in Brazil. Auctions appear as an effective mechanism to stimulate competition between investors, to provide price disclosure while managing the right amount of investment and reducing risk aversion with long-term contracting. The product offered will depend on the auction's main objective and is key to the auction's success (risk allocation is everything). Auctions do not operate in a vacuum: they must be an integral part of a country's overall energy and procurement policies. On the other hand, its main challenges include the definition of criteria to select the quotas for each NCRES, the design of a relevant set of guarantees (financial, technical and operational) and the attraction of competition, which is the ultimate condition for the success of an auction. Efforts were devoted in Brazil to meet these requirements and the overall experience so far is quite successful. In case of wind, the country's abundant wind resources and the positive reception from both investors in the auctions and the general public all point in this direction. A total 7,670 MW of wind capacity is expected to be developed by 2014, and five wind turbine manufacturers are currently installed in the country. Nonetheless, it is important to solve the issues discussed in the paper before they become major concerns. The proof of the pudding will be in some years' time, when the winning projects will have to start delivering energy.

Footnote

[1] Estimated potential at 100m, extrapolated from a detailed study from 2001, which calculated wind potential at 50m to be 143 GW.

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A Brief Description of Wind Power in the People's Republic of China

By Joerg Moczadlo and Wang Ye*

The Framework Conditions

There are abundant wind resources in several regions of China. Especially in the "Sanbei Region" which translates to "The Three Norths Region", significant wind resources can be found. This region includes Northeast China, the northern part of North China as well as Northwest China and constitutes the northern wind belt. A second wind belt stretches along the coastline from the province of Shandong in the north through the provinces of Jiangsu, Zhejiang, and Fujian to Guangdong in the far south of China. Even inland, some fragmented areas with considerable wind resources can be found, for example, in the province of Hubei. All in all, wind power installations can be found in 30 provinces. Even though the northern parts of China are rich in wind resources, taping those constitutes a problem. On the one hand, the grid infrastructure in the north/northwestern part of China is not well developed, making it difficult to connect larger wind farms and to ensure secure grid operation. On the other hand, the region is sparsely populated and the main consumer centers are located in the southern coastal areas, several hundred or even several thousand kilometers, away.

The Role of Wind Power in Actual Energy Policy

Renewable energies, including the promotion of wind power, are on top of the agenda of the Central Government of China. Due to significant wind resources, wind power will play a key role in China's energy mix. This is reflected in the existence of several strategy and policy papers. Even though there is no approved 12th 5-year-plan for the development of renewable energies yet, it is expected that grid-connected wind power installations will be pushed to approximately 100 GW by the end of the current 5-year planning period (2011 – 2015).

Several years ago the Central Government passed a renewable energy law which became effective in 2006. This law and its corresponding implementation rules deal with issues like grid integration, tariffing and economic incentives to promote renewable energies.

However, in the beginning the implementation of this law caused some problems. The grid integration, for example, had to be agreed between the grid operators and the renewable power generation companies. This lead to the grid operators being reluctant to integrate larger wind farms, sometimes using specious arguments. Wind farm projects were tendered and the feed-in tariffs calculated on the basis of the achieved price, with the result that bidders underpriced each other to the point that projects became uneconomical. This procedure was revised and nowadays fixed feed-in tariffs between 0.51 – 0.61 CNY/kWh[1] [1], depending on the location of the projects, have been introduced.

In 2007 the National Development and Reform Commission (NDRC), the top planning institution within the Chinese Government, released a so called "Medium and Long-Term Development Plan for Renewable Energy", which mentions a development target of 30 GW for wind power by the year 2020.

Recently the National Energy Administration (NEA) has published a guideline for provincial and local governments, grid operators, project developers and investors. The goal is to streamline and centralize the approval process for larger wind farms so that false developments, such as not properly approved wind farm projects and disharmonized development of grid infrastructure and installed capacity within the sector are avoided.

It seems that a strong political will to promote wind power exists. But are the stipulated plans really good enough so that wind power can play a significant and reliable role in China's energy supply?

The Actual Situation

Indeed, the growth rates of wind power installations during recent years have been remarkable. They exceeded the official development targets by far. By the end of the year 2010 the installed capacity of wind power had reached 44,733 MW [2], an increase of around 27,700 MW within just one year. But remarkably, at that time only 31,070 MW [3] were connected to the grid reflecting the still existing problems of improper project approvals at the local level, scarce grid infrastructure in the north and the absence of consumers close to the generating facilities.

For the year 2011 it is expected, that another 18,000 MW will have been added, so that the installed capacity should have reached around 63,000 MW by

* Joerg Moczadlo and Wang Ye are with Bright-Consult (Beijing) Co. Ltd. They may be reached at contact@brightconsult.de
See footnote at end of text.

the end of last year. Official figures are not available yet, but sector experts and the order situation on the supplier side support this estimation.

At the end of 2011 the total installed capacity in China, therefore, was approximately 1,056 GW. This includes mainly coal-fired power stations, hydro power stations, nuclear power stations, biomass, photovoltaic and wind power, which has reached a share of around 6% of total installed capacity and 2% of total power production at the end of 2011. So far, the priority lies on onshore wind farms, which are located mainly in the wind belts. From a political point of view, offshore wind farms are still more or less in a pilot phase. The existing installations are located close to the coastline. However, the local wind turbine manufacturers are keen to develop and produce wind turbines with a larger capacity which could be technologically and economically suitable for offshore wind farms.

To push technology development, various incentives were introduced to attract foreign manufactures of wind turbines or manufactures of components. These incentives include various tax abatements or the possibility of 100 % investment from abroad without involving a local partner, which is interesting to foreign investors wishing to protect intellectual property rights.

What Developments can be Expected During Coming Years?

Looking at China's energy policy and the developments during recent years it can be said, that in the future the wind power sector will continue to grow significantly. However, due to technical and economic reasons, the focus will remain on onshore installations during the next five to ten years. The exploitation of wind resources in the northern wind belt strongly depends on grid expansion in the northern region which is currently planned and facilitated by the Central Government, the Provincial Governments and the state-owned grid operator "State Grid Corporation of China".

Meanwhile, the development of suitable technologies, especially large-scale wind turbines which are required for offshore applications, will be pushed. It is expected, that the offshore installed wind power capacity will not exceed 5,000 MW by the year 2015. In the following five years, the installation of offshore wind power will accelerate so that by the year 2020 around 30,000 MW of installed offshore wind power capacity could be reached [4].

Despite the impressive development plans for wind energy, the contribution of wind power to overall electricity production in China remains questionable due to the fact, that around 70% of the total installed coal-fired power plant capacity is younger than 10 years. It, therefore, must be assumed, that the majority of the existing coal-fired power stations will be operated for at least another 20 – 30 years, probably with a higher load factor compared to the situation nowadays, where a significant number of coal-fired power stations are facing a low demand situation.

Usually the expert community looks at large-scale wind turbines and wind farms when discussing and analyzing the Chinese wind power sector. In view of the size of China, the relatively weak infrastructure in inland regions and the considerable disparities in the level of development between the rich eastern and the poor western regions, looking at niche areas is worthwhile.

Especially remote areas in the western regions as well as smaller islands in the South China Sea provide a good market opportunity for small-scale wind turbines in off-grid hybrid applications. Although expansion of grid-connected power supply to remote areas is planned, the Central Government set up funds to foster electrification on the basis of off-grid hybrid-systems consisting of small hydro power plants, photovoltaic and small-scale wind turbines and others for areas, which cannot be connected to a power grid in the near future.

Looking at the development of the wind power sector in China, it seems that the prospects for business opportunities for companies involved in this sector are quite good. At present there are around 20 major wind turbine manufacturers, and even more smaller ones, active in China. Most of them are domestic companies. Since the competition is very strong and localization of key industries is an important aspect within the Central Government's economic policy, it can be expected, that a concentration process within the wide field of manufacturers will occur. The main portion of future demand, therefore, will be met by only a few large and capable manufacturers.

Footnote

[1] Exchange rate: 1 US-$ ≈ 6.4 CNY (03/14/2012)

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1 Renewable Energy Law, People's Republic of China
2 Chinese Wind Energy Association (CWEA)
3 China Electricity Council (CEC)
4 National Energy Administration (NEA)

The Political Economy of Oil Subsidy in Nigeria

By Jean Balouga*

Introduction

Nigeria is blessed with vast quantities of oil and is the sixth largest oil exporter in OPEC. This has generated billions of dollars in revenues over the last fifty years since oil was found in Nigeria. However, as in most developing countries, this has not translated into an improved welfare condition for the people. Instead through inefficiencies, corruption, abuse of natural monopoly powers, mismanagement, smuggling, bureaucratic bottlenecks and excessive subsidizing, the supply of refined crude oil products in the country has virtually collapsed.

After many years of control and uncertainty surrounding the sale and purchase of petroleum products in Nigeria, the government is now deciding to emulate other developing and developed nations to fully privatize and liberalize the country's downstream sector which is managed by the National Petroleum Corporation (NNPC) on behalf of the government. This issue of full deregulation of the downstream subsector in Nigeria is a contentious one that has generated a lot of arguments among the people. Until 1973, the downstream sector of the Nigerian oil industry was deregulated. The nation's first refinery in Port Harcourt was a private initiative of the Shell Oil Company. If there were no policy reversals and the introduction of uniform pricing of petroleum products, Shell would probably have had additional refineries across the country. Perhaps, this would have been followed by Chevron, Elf, etc., all having functional refineries.

Full deregulation, which the government wanted to implement from December 2009, is one of the main plans of the reform programme in the oil industry. This would be the third attempt by government to deregulate the subsector. However, the efforts at deregulation and withdrawal of fuel subsidies have always been met with skepticism and strong resistance. Opposition to this policy from the Nigeria Labour Congress (NLC) and the Trade Union Congress (TUC) has been ferocious, in addition to spirited criticisms from segments of the political class. Nevertheless, pronouncements from top government officials suggest strong determination by government to carry through this policy decision this time around.

The Failure of Regulation

Government control of petroleum product prices has been a major issue before now, especially in the face of the unprecedented failure by government to get existing refineries working to full capacity. For many years now, and with the near-total collapse of the refineries, Nigeria, a major producer of crude oil in the world has depended on the importation of petroleum products to meet its domestic needs. Investors, who had wanted to invest in the establishment of refineries, were scared away by what they saw as unfriendly pricing, leaving product marketers with low or no margins, except when government stepped in with a heavy subsidy that ate deeply into its treasury.

Although started with the best of intentions, the subsidies have become a real problem for governments who attempt it. The problem is that crude oil prices are very volatile and have risen to astronomical heights. Since the subsidies are usually in the form of fixed prices for fuel, the burden on government could easily become unbearable. The over N1.3 trillion spent on the subsidy this year alone in Nigeria amounts to 20 percent of the federal budget - a scenario which is absurd, in a country like Nigeria, in dire need of crucial infrastructure.

For a policy that is apparently aimed at helping the poor, it really does not do a good job. Research on twenty developing counties (excluding Nigeria) shows that although the poorest people benefit a little from the subsidies, the bulk of the benefits go directly to the richest 10 percent. In the sample of the countries in the study, only 7.1 percent of the subsidy benefits go to the poorest 10 percent of the population. The top 10%, on the other hand, gets 47.6 percent of the benefits, with the top 20% getting 67.5% of the total subsidies. The skew is worse when you consider only gasoline. The bottom 10 percent gets only 3 percent of the benefits from gasoline subsidies, while the top 10 percent gets 61.3 percent. However, the top 20 percent gets an outstanding 80.7 percent of the entire benefits of gasoline subsidies. The number gets a lot worse if you examine only African countries. The bottom 10 percent gets only 2.2 percent of benefits from gasoline subsidies, with the richest 10 percent getting 70 percent, and the richest 20 percent, 87.2 percent.

The underlying reason for this pattern is the amount of gasoline each group actually buys. The argument is not that poor people do not use gasoline, they do. Rich people just buy a lot more. The poor enjoy some subsidy, but the policy is

* Jean Balouga is in the Research Department of the Univesity of Lagos, Lagos, Nigeria. He may be reached at balougaje@live.com

really inefficient at targeting the poorest. This pattern is true for oil-producing countries as well as Bolivia and Cameroon among the countries studied. There is no reason to believe that Nigeria is different. Another thing to note is that these numbers represent the direct benefit from public purchasing fuels. It does not include the part of the subsidy cornered by various 'cabals' or other indirect effects. The really interesting thing is that this pattern does not depend on local refining capacity. This implies that somehow, figuring out a way to refine all crude oil locally will not solve the problem. The question just changes from "should we spend so much subsidizing fuel that mostly benefits the rich?" to "should we lose so much subsidizing fuel that mostly benefits the rich?"

Energy prices have been imposed by governments on the basis of general policy objectives, such as promoting development or social equity, protecting national industry, etc. Having recognized the significance of energy for development, many governments subsidize electricity or various fuels, so that their price to the final consumer is lower than the cost of production and delivery. In many developing countries, energy prices and tariffs are much lower than in industrialized countries, although the cost of producing and delivering energy is by no means lower.

For the developing countries this has the double effect of discouraging energy conservation and creating a barrier to the introduction of new forms of energy, renewables in particular, which are not equally subsidized. Moreover, generalized subsidies (as opposed to targeted subsidies), although originally meant to alleviate poverty, actually favour the richer layers of the population. Only the rich can afford consuming substantial quantities of energy; thus, they have little incentive to spare energy or to use it more effectively, yet the resulting general costs are spread among the entire population. Poor people often have no access to commercial energy anyway, and political prices of energy as a whole discourage private entrepreneurs from extending energy services to areas judged not profitable enough.

Basically, there are two main problems with imposed energy prices. The first is that they do not allow the market to function. They have no place for competition and, therefore, either the final user pays a higher price, or public finance spends more money, or both. The second problem is that imposed energy prices are generally not instruments of an *energy* policy, but rather of other policies (social, industrial, or others). As a result, they distort the energy market and orient it towards undesired solutions. Specifically, subsidized energy prices will diminish or cancel the advantage of increasing the efficiency of energy utilization and encourage waste. Since such subsidies are generally applied to traditional fuels or energy forms, they act as disincentives for new energy sources, renewables in particular, and for new ways of producing energy, such as decentralized power production or cogeneration of heat and power. Imposed energy prices are an obstacle to the introduction of sustainable energy systems.

Prices of conventional fuels and electricity need to be based on marginal-cost pricing theory. In this way, price "forces" the consumer to use energy efficiently. If economic support has to be given to any economic agent(s) then, instruments other than "political" energy prices need to be used.

Although it is agreed that energy subsidies are generally wasteful in many countries, marginal-cost pricing application often meets with severe difficulties. Increasing the price of largely used commodities is always unpopular and often politically sensitive. People used to paying little for the fuel they use are likely to consider a sharp rise in its price unacceptable. Political crises have been triggered in the recent past by increases in the prices of energy. For example, increases in electricity tariffs in Ghana generated a wave of protests, resulting in their prompt suspension by the government and in Indonesia, mass protests by students forced former President Soeharto to resign in May, 1998 for introducing unpopular economic policies, including the removal of fuel subsidies.

However, even when the market operates fully, the price paid by the final consumer also includes taxes, that, in some cases (e.g., petrol in European countries), constitute a large fraction of the final price. It is quite common that different mechanisms are present for different energy sources (e.g., free market prices plus taxes for petroleum products and coal; regulated maximum prices plus some market elements for electricity and gas). Petroleum products and, to a large extent, coal are more amenable to market mechanism (apart, of course, from the regulation of their environmental performance, which is open to a number of options, as exemplified by the various approaches to the reduction of Sox emission).

With respect to petroleum products, Nigeria appears to have consistently engaged in de-competitive strategies through politics of hypocrisy. Our past approach to delivery of petroleum products has been based on subsidies and distortion of market forces. We failed to recognize the many business opportunities that the availability of crude presents to us. Within five decades, the potential competitive advantage that we have had has been made irrelevant through our hypocrisy that breeds corruption. Consequently, we have the shame of an oil-producing nation that imports virtually all her refined requirements. The more we got cheap refined products over the years, the more the opportunity cost.

Because of our hypocrisy successive governments' policies have ensured that we remain poor, because we could not compete. The refineries, as a symptom of the rot in government's business, could not develop sophistication in their business operation and the nation could not provide the business environment needed for global competitiveness. The refineries, for most of the time, were operating very inefficiently, therefore, unsustainably. They were run like a civil service. Presently, the four refineries in Nigeria, most of the storage depots, about 5,000 kilometers of pipelines, four jetties and two import terminals are owned by the federal government, through NNPC. When the four refineries operate at full capacity, they can only meet about 60 percent of national demand for petrol. In the past 20 years or so, they have operated under 40 percent capacity and currently supply only about 20 percent of Nigeria's gasoline demand.

As far back as June, 2003 government figures indicated that for each litre of petroleum products, N12 was spent on subsidy. This implied a subsidy of N74 billion or 1.42% of GDP. By the end of 2007 with subsidy shooting up to N450 billion, it went up to 3% of GDP. It is indubitable that we are really subsidizing inefficiencies, fraud and racketeering in the whole production and distribution chain and in that context, given the competing needs for scarce resources, government felt the need to do something.

The Need for Deregulation

Considering the fact that there are significant investment opportunities in Nigeria's downstream sector if well managed, the focus of government now is to fully deregulate the sector through the licensing of private refineries, the privatization of the existing ones and the removal of subsidies. Taking a cue from other countries that have privatized, particularly those in South America the Nigerian government intends to go ahead with this policy even against the backdrop of widespread disapproval on the part of ordinary citizens.

The question now is: why do governments around the world struggle to remove such policies? The answer is that the suffering from the removal is spread across all income groups. Everybody is better off from the removal of subsidies but at the same time everybody is worse off. This suffering is felt most by the poorest, who need to be given palliatives.

Dismantling the natural monopoly of the NNPC by privatizing, removing price controls and creating a competitive environment, are expected to reduce the cost government incurs in subsidizing the sector which runs as high as N1 trillion annually. Hopefully, government will use the resources freed up to handle the socio- economic and welfare needs of Nigerians. The Ghanaians, for example, who ended fuel subsidies in 2003 eliminated fees for attending primary and junior secondary schools and funded healthcare programmes in the poorest areas.

Conclusion

The arguments in favor of deregulation are clear, but so are the arguments against. The principal argument for deregulation is that markets appear to be right more often than regulations and regulators. This is probably true on many occasions, but it is certainly not always true. The basic problem here is that many real-life markets not only do not function with the flexibility and efficiency that they display in our textbooks, but they cannot; and when these situations arise, the regulators must be called in.

Sir Alan Walters posits that government intervention is "normally suggested" when there are increasing returns to scale, indivisibilities, technological external effects, and/or market failure connected with uncertainty. The key word above is 'normally'. What it means is that there can be situations in which regulation is not advisable, even though all the above-named irritations are present to some extent. The problem is detecting, acknowledging, and/or estimating their strength and scope (Banks, 2000: 95).

After deregulation (if we have to), we have to make it work by providing the enabling environment and framework for efficient production, distribution and supply (i.e., re-regulate). Then, we will have petroleum products at prices dictated by the dynamics of the industry and markets. And then we will have a platform for a competitive strategy.

It is reported that government has concluded and fine-tuned all the perceived grey areas with stakeholders in the oil and gas sector on the planned deregulation of the downstream sector and was only waiting for the right time to implement it. For sure, deregulation should not be implemented now, because presently the monetary policy rate (MPR) is 12%, unemployment rate is 23.9% and economic infrastructure is grossly inadequate in addition to a volatile political situation.

The Way Forward

Arguably, the first challenge is deciding to deregulate. The remaining challenge is that of coming out with an appropriate action plan on the process and timeframe for the deregulation.

The Committee, set up to create a framework for the implementation of the deregulation process, must adopt a consultative approach, and be transparent in its dealings in order to avoid the pitfalls of certain recent privatization experiences in the country. In addition, a detailed and honest comparative study of countries that have undergone similar reforms can assist in selling the idea to groups opposed to deregulation.

Without reforms, creating a sound investment climate and promoting economic growth is but a wild dream. Support for property rights and reduction in the cost of doing business without competition leaves much to be desired. Private firms will only participate if changes are credible. A privatized sector unleashes competition, increases efficiency, investment and production.

However, the free market is not everything. Effective as market forces are in optimizing the allocation of resources for short and medium-term objectives, the market is known to be short-sighted, not to respond spontaneously to long-term signals. As the World Bank puts it, "..liberalizing energy markets, however important, may not be the complete answer..." Long-term and social signals should be introduced by government thereby promoting sustainability in the energy field, while using market mechanisms to the best of their potential. Hence, while "deregulation" is needed to allow space for private initiative and competition, "re-regulation" is needed to establish a set of rules that allow the market to function properly by correcting its imperfections and by accounting for the social costs of the energy system.

Another important element to be considered is the level at which energy policies should be formulated, specified and implemented. In the past, just one level (the national level) was considered in most countries. Energy policies were the responsibility of the central government, and other levels of government (e.g., regional, provincial, or local) were called in occasionally, only at the implementation stage. Recent trends, in both industrialized and developing countries, point toward a much more decentralized approach. This is exemplified by the so-called "subsidiary principle" adopted by the EU, which states that all decisions need to be taken and implemented at the lowest (most decentralized) level that is possible or practical. Central governments often retain only the powers of setting the guidelines, orientating and coordinating energy policies, as well as looking after the part of the legislation that must be common to all the country, while progressively more decisions are taken at the local level. This sharing of responsibilities has the double advantage of better adaptation to the local conditions and of involving stakeholders more directly in the process. Of course, the degree of decentralization depends on the size of the country and on its general organization, but there is hardly a small country today that does not find it effective to delegate some of the power in the energy field (and obviously in others) to smaller units, down to individual villages.

The approach must include a degree of flexibility, and it is necessary to set up a system to monitor, frequently and accurately, the results of policy measures, in order to correct them in a timely fashion.

There has been a lack of accountability (e.g., the $ 12 billion Gulf War windfall) and we do not have anything to show for previous reductions in subsidy. This should not repeat itself.

There is evidently a lack of coherence and consistency in enforcement of government policy in the household energy sector. In 2000 demand for fuelwood in Nigeria began to exceed supply. This situation might be made worse by a return of large segments of the population to the use of wood and charcoal as fuel for cooking due to a price increase of kerosene and LPG.

Regulatory boards and commissions are important actors in the governance of the energy structure of many countries. Although in many cases such boards and commissions are independent from government, their role increases with the degree of liberalization of the energy market. They have become major players in many countries, including the UK and, among the developing countries, e.g., Argentina.

The Nigerian Government, which may remove subsidies in phases, should have a timetable in utilizing the subsidies to alleviate the sufferings of the masses, for example: First six months, free treatment of malaria and typhoid. Next: rehabilitation of major roads and provision of mass transport services (bus, railways), etc. In order to "force" government to order the decision between the government and labour should be done before and agreed to by the National Assembly.

Finally, McKenzie and Tullock (1978:393) admonish that because excessive realignments in any direction can have unforeseen circumstances what government must do in structuring social order is to measure the costs in one area against the costs in the other and choose the social organizer which is most efficient for the particular problem at hand.

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CONFERENCE OVERVIEW

The sustainability of global long term energy demand, supply, and energy diversity is in question in light of growing demand for energy in China, India, Brazil, and other emerging economies, increasing awareness of environmental issues, and the need to find new ways to address related concerns. Further uncertainties are raised by changing world events such as the global debt crisis, the Arab Spring, and the impact of Japan's tsunami and earthquake disasters on the development of nuclear energy. These and other issues challenge the transition toward a sustainable energy era where the current energy needs are met without compromising the energy needs of future generations, and they also create opportunities.

If there is a need to guide this transition, what type of roadmap should be developed to show a desired path to energy sustainability? To what extent will the roadmap be determined by drivers such as public and private investment, government and environmental policy, technological innovation, and research and development funding? Furthermore, what roles will be played in this transition by conventional and non-conventional fossil fuels; renewable energy resources such as wind, solar, geothermal, and biomass; distributed resources and storage; energy efficiency; electric vehicles; and the smart grid?

This conference is intended not only to address these questions but also to address possible challenges and opportunities for the transition to such a sustainable energy era. With its record of energy innovation and accessibility, Austin, Texas is an ideal setting for bringing together key players in the global energy and transportation industries, government, and academia to address questions and concerns raised in several plenary and concurrent sessions. Those interested in organizing sessions should propose a topic and possible speakers to Robert Borgstrom, Concurrent Session Chair (robertborgstrom2@gmail.com). The conference will also provide networking opportunities through workshops, public outreach and student recruitment.

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Central Texas Association for Energy Economics

TOPICS TO BE ADDRESSED INCLUDE:

Conventional and Unconventional Gas and Oil Supplies

- Changing World Oil Supply/ Demand Balance
- Protection of Offshore Resources Versus Oil Supplies
- Exploration and Drilling Cost Concerns
- Future Utilization of Fossil Resources in Other High Value Added Products

Markets and Drivers of Renewable Energy

- Government's Promotional Role
- Integration of Solar and Wind Generation In Power Dispatch
- Mass Production for End-Use Distributed Renewable Resources
- Capital Markets – Financing Renewable Resources

Energy Efficiency – Defining and Meeting Realistic Goals

- Building Controls and Cost Allocation
- Energy Efficiency Rules for Government Sponsored Home Loans
- Tightening Standards
- The Minimal Energy Society – Danish Model
- New and Improved Automobile Efficiency Standards

Economic Analysis Methods and Assumptions

- Energy Data Sources
- EIA Reliability Amid Shale Gas Data Difficulties
- Private Surveys
- Smart Meter Consumption Data and Analysis

Role of Government in Transitioning to a Sustainable Energy Era

- Issues in Energy Regulation and Uncertainties
- Renewable Portfolio Standards (RPS)
- Goals and Standards Toward Energy Sustainability
- Incentive Mechanism to Enhance Energy Sustainability
- Financial Regulations and their Impacts on Energy Trading
- Market and Exchange Trading Efficiencies

Changing Geography of Energy Demand

- China
- India
- New Industrial Asia and South America
- North America and Europe
- Developing Countries

Climate Change Concerns

- Pros and Cons of Delaying a Decision
- Policies Compatible with Economic Slowdown
- Intergenerational Considerations
- Can Developing World Benefit from Additional Environmental Regulation?

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 Renewable Portfolio Standard or CO_2 Emission Standards

Global Petroleum Security and Pricing

- OPEC Policies in a Changing World
- Oil Supply Crisis Due to Political Instabilities in Producing Countries
- Strategic Oil Storage Policies

Electricity

- EPA's New Standards and Coal Power Plant Trade-Offs
- Natural Gas and Wind Generation – Competition or Integration?
- Adequacy of Transmission Capacity to Accommodate Massive Renewable Resource Expansion
- Market Design and Efficiency
- Electricity Pricing, Fuel Pricing and Policy
- Wind and Solar Market Penetration Issues
- Role of Demand Response in Addressing Resource Adequacy and Reliability Issues

Energy Capital Investment & Allocation

- Wind
- Solar
- Nuclear
- End-Use Distributed Resources and Storage
- Infrastructure

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
- New Energy Technologies (Distributed Generation and Storage)
- Cost Reduction
- Demand and Efficiency
- Role of Smart Meters in Enhancing Smart Pricing and Value Added Services

Issues in Moving Beyond Petroleum in Transportation

- Short-Range vs. Long-Range Electric Cars
- Electric Vehicles in Mass Transportation
- Is Natural Gas Fuel of Choice to Replace Gasoline?
- Ethanol and Biodiesel

Energy and Wealth Distribution

- Can Energy Sustainability Be Consistent with Economic Growth?
- Can Developing World Benefit from Additional Environmental Regulation?
- Can New Energy Technologies Reduce the Gap between Industrialized and Developing Countries?

Energy and Water Issues

- Impact of Drought on Energy Generation
- Water Usage of Different Electric Generation Technologies
- Hydro Generation

Energy and Food

- Energy Consumption by Food Industry
- Food Waste Reduction and Energy Savings

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31ST USAEE/IAEE NORTH AMERICAN CONFERENCE

CALL FOR PAPERS

We are pleased to announce the Call for Papers for the 31st USAEE/IAEE North American Conference to be held November 4-7, 2012, at the Sheraton Austin Hotel at the Capitol, Austin, Texas, USA. **The deadline for receipt of abstracts is May 31, 2012.**

There will be two categories of Concurrent Session Paper Presentations:

1) Reports on Current Research

This Category provides a forum for the presentation and discussion of papers that describe an analysis that has either been completed by the author since the last USAEE Annual Conference or very near completion.

Authors wishing to make presentations at the conference under this category will submit an Abstract that describes, briefly, a research project that is of significance within the field of energy economics and of general interest to the membership at large.

The Abstract must be no more than two pages in length and must include each of the following sections:

a. Overview—A concise statement of the research problem including its background and the extent of its significance (*e.g.*, locally, regionally, globally)

b. Methodology

c. Results

d. Conclusions

e. References

2) Reports on Case Studies of Applied Energy Economics

This Category provides a forum for the presentation and discussion of professional activities in the field of energy economics that have been completed by the author since the last USAEE Annual Conference or is an ongoing professional activity of the author.

Authors wishing to make presentations at the conference under this category will submit an Abstract that briefly describes an issue, problem or other challenge within the field of energy economics that is of interest to the Association's membership and that the author has addressed by personal, professional involvement (*e.g.*, field work, research and/or analysis).

The Abstract must be no more than two pages in length and must include each of the following sections:

a. Overview of the topic including its background and the extent of its significance (e.g., locally, regionally, globally) including a statement of the author's responsibility in addressing the matter.

b. Methodology. How the matter was addressed.

c. Results or current status of ongoing situations.

d. Conclusions. Lessons learned, and next steps.

e. References are optional.

Please note that the Abstract is not intended to be the proposition of either a "Desk Study" or an activity that the author intends to undertake only after the Abstract Committee has accepted the topic.

Also, presentations in this category are intended to facilitate the sharing of professional experiences and lessons learned, however, presentations that overtly advertise or promote proprietary products and/or services are unacceptable. Those who wish to distribute promotional literature and/or have exhibit space at the Conference are invited to avail themselves of sponsorship opportunities – please see www.usaee.org/usaee2012/sponsors.html.

Please visit www.usaee.org/USAEE2012/AbstractTemplate.doc to download an abstract template. All abstracts must conform to the format structure outlined in the abstract template. Abstracts must be submitted online by visiting www.usaee.org/USAEE2012/submissions.aspx. Abstracts submitted by e-mail or in hard copy will not be processed.

At least one author of an accepted paper must pay the registration fees and attend the conference to present the paper. The corresponding author submitting the abstract must provide complete contact details—mailing address, phone, fax, e-mail, etc. Authors will be notified by July 20, 2012, of their paper status. Authors whose abstracts are accepted will have until September 7, 2012, to submit their full papers for publication in the conference proceedings. While multiple submissions by individuals or groups of authors are welcome, the abstract selection process will seek to ensure as broad participation as possible: each speaker is to present only one paper in the conference. No author should submit more than one abstract as its single author. If multiple submissions are accepted, then a different co-author will be required to pay the reduced registration fee and present each paper. Otherwise, authors will be contacted and asked to drop one or more paper(s) for presentation.

Since the Austin meeting falls on election day, U.S. members are urged to either vote early or by absentee ballot, depending on the election rules of their state.

STUDENTS

Students may submit an abstract for the concurrent sessions. The deadline for abstracts is May 31, 2012. Also, students may submit a paper for consideration in the Dennis J. O'Brien 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 Student Paper Awards is July 6, 2012. Visit www.usaee.org/usaee2012/paperawards.html for full details.

Student participation is also sought via the Poster Session. In this highly interactive event, students set up a stall around a poster and present the key results of their recent academic working a quickly repeated series of short sessions that allow for real time Q&A with the conference delegates. **Abstracts for the Poster Session must be submitted by the deadline of May 31, 2012** and must be relevant to the conference themes. Posters and the presentations will be judged by an academic panel and a cash prize will be awarded to the student with the best poster presentation. Students will be notified by July 20, 2012, of their poster status. Students whose abstracts are accepted will have until September 7, 2012, to submit their final poster electronically (pdf) for publication in the conference proceedings.

Posters for actual presentation at the conference must be brought by the student directly to the conference venue and must be in ANSI E size (34in. wide x 44in. high) in portrait format.

Students may also inquire about our scholarships covering conference registration fees. Visit www.usaee.org/usaee2012/students.html for full details.

TRAVEL DOCUMENTS

All international delegates to the 31st 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.

World Natural Gas Markets and Trade: A Multi-Modeling Perspective

Edited by Hillard G. Huntington and Eric Smith

This special issue is an important outgrowth of the Stanford University Energy Modeling Forum (EMF) 23 working group. The volume explores nascent modeling efforts to represent international natural gas markets and trade for improving the understanding of key policy and investment decisions. Although formal modeling is not required to describe the growth of liquefied natural gas or the role of spot markets, decision makers can gain powerful insights from these frameworks.

Following the editor's introductory and overview chapter, the volume includes 12 technical papers by participants in the EMF study. Seven chapters provide unique perspectives on the regional price, volumes and trade estimates from individual modeling frameworks. These systems include competitive models of world natural gas markets as well as strategic models of European markets with market power. The remaining five chapters cover important topics discussed by the working group during the study.

The range of issues is comprehensive and intriguing: trans-Atlantic price convergence, the linking of oil and gas prices through future gas-to-liquid (GTL) capacity additions, the critical role of Middle Eastern natural gas supplies, the extraordinary potential for Russia supplies if key constraints can be overcome, potential collusive behavior by Russian and Middle East exporters, the dynamics of transportation and storage capacity adjustments in response to market power opportunities, European markets reliance upon Russian natural gas exports, the interrelationship between resource constraints and market power, reserve appreciation in known North American fields, and improving insights and decisions through use of quantitative models.

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CONTENTS

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Breathing New Life into in the Southwest Dominican Republic:The Los Cocos and Quilvio Cabrera Wind Farms

By Catherine Colby and Bari Dominquez*

The blades of the Los Cocos and Quilvio Cabrera nineteen windmills rarely rest, steadily turning the ocean winds into clean energy for the Dominican Republic. Since October of 2011, two side-by-side windparks in the southwestern part of the country, owned by EGE Haina and CEPM respectively, have been a breath of fresh air bringing not just electricity but hope and positive change to one of the most marginalized areas of the country. These sleek windmills tower over the construction of an additional 26 windmills, a testament to the consistent winds feeding power into the Dominican national electrical grid.

Los Cocos Windmills from the Bay

EGE Haina is the largest energy producer in the Dominican Republic, with a total installed capacity of 600 MW, 22% of the total capacity of the national system. Its Los Cocos Wind Farm is composed of fourteen Vestas wind turbine generators, model V90, with CEPM's Quilvio Cabrera Wind Farm consisting of five V82 Vestas. Together, these two wind farms deliver 33.5 MW of power to the substation, which then travels fifty-five kilometers until it is fed into the national grid .Today, these parks produce enough electricity for 60,000 homes (3% of the Dominican demand), reduce the emission of 70,000 tons of CO_2, and slash the need for the importation of 200,000 barrels of fuel. An expansion of the Los Cocos park is scheduled for completion in December of 2012, producing another 52 MWs using 23 Gamesa G97 WTGs and 3 Gamesa G90 WTGs, and reducing the emissions of yet another 130,000 tons of CO_2 to the environment.

Fishing cooperative with sustainable fishing promotional posters

These advanced, computerized windmills, approximately 125 meters from ground to tip, have generated more than electricity, contributing to overall development in the area. The surrounding communities have become partners with the windparks, setting long-term goals built with concrete, short-term steps to improve the region's overall quality of life on a variety of fronts; economic growth, health, access to clean water, educational opportunities and the sustainable use of area land and marine resources.

The first fundamental blocks of community development are arriving with high-quality electric power available to the region for the first time, satisfying basic needs. Now, with lights and refrigeration, many would-be entrepreneurs contemplate a variety of businesses, including ecotourism to entice tourists to a stunningly beautiful, relatively unvisited area of the Dominican Republic. To jumpstart the changes in the region's electricity situation, EGE Haina not only donated the distribution transformer for the local communities, but also financed 3.2 million dollars worth of regional network renovation.

However, EGE Haina has reached into community lives in ways that far outstrip topics directly related to power generation. Guidelines were developed to help evaluate requests from local communities, enabling EGE Haina to maintain a consistent approach in responding to area needs while not falling into the trap of replacing governmental obligations. Using anthropological methodology to help

* Catherine Colby is a Community Development Consultant to EGE Haina, and Bari Dominguez is the Plant Manager, Los Cocos and Quilvio Cabrera Wind Farms, EGE Haina, The Dominican Republic.

understand and connect with local culture, a series of initiatives were developed in response to needs, with the caveat that there must be community involvement and participation to ensure local investment in and sustainability of projects.

Thus, installing potable water systems (through a partnership with the non-profit organization, World Water Relief, based in Atlanta) involves committed local residents, not merely technical installations. In the small fishing community of Juancho, a committee of fifteen students, called the "Protectors of Water" meets monthly, learning how to care for their school's water filtration system and studying global water issues. EGE Haina is also piloting an innovative residual water treatment system using native wetland plants to process sewage before it contaminates groundwater or critical fisheries in mangroves or coral reefs. The hopes are that these low-tech solutions will be replicated at individual homes and other businesses.


Cleaning up trash so ecotourism can take off

Increasingly, families who rely upon the ocean find household incomes threatened as overfishing depletes reefs and as middle-men take the profits. EGE Haina and CEPM are committed to protecting marine resources and the families that depend on them through educational workshops on appropriate fishing techniques and through establishing cooperatives. Now, by working as a collective group, with some start-up equipment donated by EGE Haina and CEPM, fishermen will be able to get fair prices for fish, while protecting the marine ecosystem.

Though the windparks are located in a fertile valley, agricultural development has not been maximized, as impoverished farmers lack capital for machinery to clear thorny scrub. In yet another partnership, EGE Haina helped the local agricultural association prepare lands for planting. The farmers are now demonstrating their ongoing commitment to production by maximizing irrigation potential through their own efforts to enter more distant but lucrative markets.

In addition to working directly with local groups, another strategy employed by EGE Haina has been to act as facilitator; providing information to communities and assisting with connections to government agencies and other resources not previously accessed. EGE Haina has linked local women's groups to government programs providing economic development through the production of utilitarian and artisanal products. Likewise, a partnership facilitated between the Dominican Apicultural Network and a local honey-producing and woodworking community is exposing area beekeepers and wood carvers to new markets and resources. To further support small business development, EGE Haina sponsored financial education classes offered by the microfinance bank ADOPEM, training 30 area community leaders in savings, accounting, loan procurement and debt management.

EGE Haina's commitment to area education and youth was demonstrated through the installation of solar panels and a small windmill at a technical high school, supplying 100% of their electricity needs. This support of education continues with adult literacy classes, environmental education and awareness workshops, donations of educational materials, and family planning, nutrition and hygiene classes. EGE Haina also established an innovative extracurricular activity program for children of marginalized families, typically of Haitian descent. In addition, EGE Haina rounds out its efforts with youth by supporting sports programs and renovating decrepit facilities; including baseball, basketball and girls' volleyball. In each instance, team members must give back to their community through various volunteer activities.

Through true partnerships with communities, and by incorporating non-profit groups, governmental institutions and volunteers, the Los Cocos and Quilvio Cabrera wind parks contribute steadily to regional development. The uplifting winds of change, in tandem with Dominican sweat and enthusiasm, are sweeping through the south.

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, in the Ca' Foscari University campus, by the A.I.E.E - Italian Association of Energy Economists with the support of Fondazione Eni Enrico Mattei.

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

10.00–17.00	IAEE Council Meeting
16.00–18.00	**Registration**
18.00–20.00	***Welcome Reception***
20.30–22.00	***IAEE Council Dinner***
20.30–22.00	***Student Happy Hour***

Monday 10/9

08.00–18.00	**Registration**
08.00–09.00	European Affiliate Breakfast Meeting Student Breakfast Meeting
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
15.30–16.00	*Coffee Break*
16.00–17.30	Concurrent Sessions
19.00–22.30	***Gala Dinner*** - Torcello Island (boat trip)

Tuesday 11/9

08.00–18.00	**Registration**
08.00–09.00	Energy Journal Board of Editors Breakfast Meeting Daegu Conference Planning Breakfast Meeting
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*** - Ca' Foscari Palace courtyard

Wednesday 12/9

08.00–09.00	EEEP Board of Editors Breakfast Meeting Dusseldorf Conference Planning Breakfast Meeting
09.00–10.30	Concurrent Sessions
10.30–11.00	*Coffee Break*
11.00–12.30	Concurrent Sessions
12.30–13.30	**Closing Session**

The Call for Papers

Abstract submission started on November 7 , 2011 - the deadline is on April 9, 2012

Authors will be notified by **May 22, 2012** of their paper status. Authors whose abstracts are accepted will have to submit their full -length papers by **July 1st 2012** for publication on the conference website.

The conference website **http://www.iaeeu2012.it** will provide precise information regarding the format and modality for submitting the abstracts and information regarding the conference registration fees and student scholarship funds.

Topics to be discussed in the plenary sessions:

Energy supply and security; New energy policies in European countries; Climate change; Energy access; energy and poverty; Financing the transition to a low-carbon economy; Energy Markets. The closing session will try to make sense of the results of the discussions throughout the Conference.

Topics suggested for 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 - Energy poverty in developed countries - Access to energy in developing countries - Nuclear industry after Fukushima - The impact of PV on the merit order - Renewable energy policies - Sustainable communities and citizen-led activities - The "resource curse" - Energy innovation and patenting.

Although arrangements have been made for special rates with hotels of various categories, we suggest early bird reservations. September is tourist season in Venice and many hotels might be fully booked.

We welcome you in 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; info@iaeeu2012.it

http://www.iaeeu2012.it

Welcome New Members

The following individuals joined IAEE from 1/1/12 to 3/31/12

Piia Aatola
FINLAND

Badr Adas
Saudi Aramco
SAUDI ARABIA

Samuel Akpala
University of Dundee
UNITED KINGDOM

Maher Alabdullatif
Saudi Aramco
SAUDI ARABIA

Rayed Albassam
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USA

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Pablo de Juan Garcia
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Universidad de a Coruna
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NORWAY

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Benelux Association for Energy Economics (BAEE) Re-established

After a period of inactivity the Benelux Association for Energy Economics (BAEE) has recently successfully been re-established to encourage the debate on energy economics in the Benelux (Belgium, The Netherlands and Luxembourg). In 1984, the BAEE was already founded as an international non-profit association under Belgian Law and as an affiliate of the IAEE, but owing to a number of factors the BAEE was dormant since about 2005. As a result, energy economists residing in the Benelux had only spare opportunities to meet each other professionally within the Benelux and to discuss issues of energy economics in meetings with colleagues coming from different backgrounds.

In order to reactivate the community of energy economists within the Benelux, a number of IAEE members residing in the Benelux took the initiative to re-establish the BAEE. After taking a number of administrative hurdles, the first General Membership Meeting could be organised in November of 2011. This meeting approved the new articles of the association and elected the new board. The new BAEE board members are Hamilcar Knops (Delft University of Technology, Vice-president), Machiel Mulder (Netherlands Competition Authority/University of Groningen, President), Guido Pepermans (Hogeschool-Universiteit Brussels, Treasurer), Laurens de Vries (Delft University of Technology, Secretary) and Bert Willems (Tilburg University, Vice-president).

The BAEE plans to organise at least three different types of events:

- For the *Energy Economics Policy Seminars* leading international experts are invited to present their views on topical issues in energy economics. The topic of this year's seminar is expected to be climate policy. This series is jointly organised with the Dutch Ministry of Economic Affairs, the Netherlands Bureau for Economic Policy Analysis and the Netherlands Competition Authority.
- The *Energy Policy Workshops* are specialized small-scale gatherings where we discuss specific issues in energy policy. The 1st policy workshop, which will take place in The Hague on 26 April 2012, is directed at the issue of flow-based market coupling in the electricity market. This workshop is jointly organised with CIGRE (International Council on Large Electric Systems). This event is meant to learn from specialists from the TSO, market parties as well as research institutes the pros and cons of a flow-based calculation system.
- Through our *Research Workshops*, the BAEE offers Master and PhD-students the opportunity to present a paper on energy economics. The 1st research workshop is organised at the University of Utrecht on 28 September 2012. Submissions of abstracts and papers will be reviewed by a scientific committee consisting of experts from different Dutch and Belgian universities. Registration is still possible: see our website (www.baee.eu).

As the BAEE is an association for persons interested in energy economics residing in three different countries, eventually we hope to have events in each country every year. To which extent this objective will be realised depends of course on how many people are willing and able to become an active member supporting the board in organising events. Given the warm welcome the re-establishment has already received from our colleagues, the board expects that an active community of energy economists in the BAEE is going to arise again in the near future. For more information on activities of the BAEE or how to become a member of this new IAEE affiliate, please visit our website: www.baee.eu.

Machiel Mulder
President of the BAEE

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
2012				
June 24-27	35th IAEE International Conference *Energy Markets Evolution under Global Carbon Constraints*	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 *Energy Policy in Latin America: Regional Integration and the Promotion of Renewables*	Montevideo, Uruguay	LAAEE/IAEE	Marisa Leon melon@adme.com.uy
June 16-20	36th IAEE International Conference *Energy Transition and Policy Challenges*	Daegu, Korea	KRAE/IAEE	Hoesung Lee hoesung@unitel.co.kr
July 28-31	32nd USAEE/IAEE North American Conference *Industry Meets Government: Impact on Energy Use & Development*	Anchorage, Alaska	USAEE/IAEE	USAEE Headquarters usaee@usaee.org
August 18-21	13th IAEE European Conference *Energy Economics of Phasing Out Carbon and Uranium*	Dusseldorf, Germany	GEE/IAEE	Georg Erdmann georg.erdmann@tu-berlin.de
2014				
June 15-18	37th IAEE International Conference *Energy to Survive 2020*	Prague, Czech Republic	CZAEE/IAEE	Jan Myslivec janmyslivec@yahoo.com

Publications

Annual Oil Market Forecas and Review 2012. Julian Lee (2012). Price: £650. Contact: Marketing Department, Centre for Global Energy Studies, 17 Knightsbridge, London, SW1X 7LY, United Kingdom. Phone: 44-020-7309-3610. Fax: 44-020-7235-4338. Email: marketing@cges.co.uk URL: www.cges.co.uk

Calendar

6-8 May 2012, 20th Annual Middle East Petroleum & Gas Conference at Kingdom of Bahrain. Contact: Conference Organizer, 2012 Secretariat, MPGC. Phone: 65-6338-0064. Fax: 65-6338-4090 Email: mpgc@cconnection.org URL: http://www.cconnection.org/conference/MPGC/2012/MPGC2012Home.html

7-9 May 2012, Energiemarkten at Groningen. Contact: Joël Darius, Coursemanager, Energy Delta Institute, Laan Corpus den Hoorn 300, Groningen, 9728 JT, Netherlands. Phone: 003150 524 8316 Email: darius@energydelta.nl URL: http://www.energydelta.org/mainmenu/executive-education/introduction-programmes/energiemarkten-2

7-9 May 2012, Master Class LNG Chain at Brugge / Rotterdam. Contact: Thiska Portena, Coursemanager, Energy Delta Institute, Laan Corpus den Hoorn 300, Groningen, Groningen, 9728 JT, Netherlands. Phone: + 31 (0)50 524 8317 Email: portena@energydelta.nl URL: http://www.energydelta.org/mainmenu/executive-education/specific-programmes/master-class-developments-in-lng

7-8 May 2012, Gas Transport & Shipping Course at Groningen. Contact: Thiska Portena, Coursemanager, Energy Delta Institute, Laan Corpus den Hoorn 300, Groningen, Groningen, 9728 JT, Netherlands. Phone: + 31 (0)50 524 8317 Email: portena@energydelta.nl URL: http://www.energydelta.org/mainmenu/executive-education/specific-programmes/gas-transport-shipping-course

10-11 May 2012, Energy Talks Ossiach 2012 at Stift Ossiach, Carinthia, Austria. Contact: office@energytalks.com, SYMPOS Veranstaltungsmanagement GmbH, Plenergasse 1, Vienna, 1180, Austria. Phone: +43 1 409 79 36-66. Fax: +43 1 409 79 36-69 Email: office@energytalks.com URL: http://www.energytalks.com/

13-17 May 2012, World Renewable Energy Forum at Denver, CO. Contact: Conference Organizer, World Renewable Energy Network and the American Solar Energy Society URL: www.wref2012.org

21-25 May 2012, Smart Grids Week | Bregenz 2012 at Bregenz Festival House and illwerke vkw. Contact: SYMPOS Veranstaltungsmanagement GmbH, Plenergasse 1, Wien, 1180, Austria. Phone: +43 (1) 409 79 36-66. Fax: +43 (1) 409 79 36-69 Email: office@sympos.at URL: http://www.nachhaltigwirtschaften.at/results.html/id6504

18-22 June 2012, Underground Gas Storage Course at Groningen. Contact: Thiska Portena, Coursemanager, Energy Delta Institute, Laan Corpus den Hoorn 300, Groningen, Groningen, 9728 JT, Netherlands. Phone: + 31 (0)50 524 8317 Email: portena@energydelta.nl URL: http://www.energydelta.org/mainmenu/executive-education/specific-programmes/underground-gas-storage-course4-27 June 2012, 35th IAEE Intl Conference: Energy Markets Evolution Under Global Carbon Constraints - Assessing Kyoto and Looking Forward at Perth, Australia. Contact: Ron Ripple, AAEE, Australia Email: r.ripple@curtin.edu.au

25-26 June 2012, 5th Atlantic Workshop on Energy and Environmental Economics at A Toxa, Galicia, Spain. Contact: Conference Organizer, Fundación Barrié, Economics for Energy Email: toxa2012@eforenergy.org URL: http://www.eforenergy.org/toxa/conference-venue.php

28-29 August 2012, International Water Resource Economics Consortium at Stockholm, Sweden. Contact: John Joyce, Mgr Water Resource Economist, Stockholm International Water Institute, Sweden. Phone: 46-8-522-139-89 Email: john.joyce@swi.org URL: www.worldwaterweek.org

4-5 September 2012, Hydropower Africa 2012 at Cape Town, South Africa. Contact: Nicolaas Loretz, Programme Information, CTICC. Phone: 27-21-700-3500 Email: nicolaas.loretz@spintelligent.com URL: http://www.hydropowerafrica.com/en/index.php

9-12 September 2012, 12th IAEE European Conference at Venice, Italy. Contact: Edgardo Curcio, AIEE, Italy Email: e.curcio@aiee.it

10-12 September 2012, ICCE 2012: International Conference on Clean Energy at Quebec city, Canada. Contact: ICCE2012@iaemm.com, Quebec, Quebec, Canada URL: http://iaemm.com/ICCE_Home

19-20 September 2012, BIEE 9th Academic Conference at St Johns College , Oxford, UK. Contact: Debbie Heywood, BIEE, United Kingdom. Phone: +44 (0)1296 747916 Email: admin@biee.org URL: www.biee.org

4-7 November 2012, 31st USAEE/IAEE North American Conference - "Transition to a Sustainable Energy Era: Opportunities and Challenges" at Austin, Texas. Contact: David Williams, Executive Director, USAEE, 28790 Chagrin Blvd., Suite 350, Cleveland, Ohio, 44122, USA. Phone: 216-464-2785. Fax: 216-464-2768 Email: usaee@usaee.org URL: www.usaee.org

20-21 February 2013, The 9th International Energy Conference 20-21 Feb 2013 Tehran-Iran at IICC Conference Center, Tehran , Iran. Contact: M.Reza Taqavi, Coordinator Secretary, Iran National Energy Committee, No.2, Shahid Saghafi alley (Golestan 1st), Derakhti Blvd., Dadman Blvd., Shahrak e Gharb.1468764844-Tehran / IRAN, Tehran, Iran (Islamic Republic of). Phone: (0098-21)-22366140,22366230, 22366911, 22366943, 22366948. Fax: (0098-21)-22367789 Email: intl@irannec.com URL: www.irannec.com

16-19 April 2013, LNG 17 at Houston, TX, USA. Contact: Jay Copan, Executive Director, LNG 17, USA. Phone: 919-740-7799 Email: jcopan@lng17.org URL: www.ing17.org

16-20 June 2013, 36th IAEE International Conference: Energy Transition and Policy Changes at Daegu, Korea. Contact: Hoesung Lee, KRAEE, Korea Email: hoesung@unitel.co.kr

28-31 July 2013, 32nd USAEE/IAEE North American Conference - "The Commercial-Governmental Interface of Energy Development" at Anchorage, Alaska. Contact: David Williams, Executive Director, USAEE, 28790 Chagrin Blvd., Suite 350, Cleveland, Ohio, 44122, USA. Phone: 216-464-2785. Fax: 216-464-2768 Email: usaee@usaee.org URL: www.usaee.org

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IAEE Energy Forum
Energy Economics Education Foundation, Inc.
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