IAEE
WWW.IAEE.ORG
INTERNATIONAL ASSOCIATION for ENERGY ECONOMICS

IAEE Energy Forum

Third Quarter 2009 International Association for Energy Economics

President's Message

An outstanding International IAEE Conference lies behind us. The 32nd International IAEE Conference this June was a great event of our association. Thanks to the careful organization of the USAEE under the leadership of Joe Dukert, delegates attended exciting sessions with lots of highlights in a rather convenient location in the centre of San Francisco.

I would take this opportunity to comment on some of the messages that had been discussed. One particularly interesting theme was the impact of the financial and economic crisis on energy markets. A key message was that now is the time for preparing the market entry of novelties. Hot topics are, among others, green chemistry, valuable products out of CO_2 waste, electricity storage, smart metering, and many others. A lot of successful and important companies had been founded in recession years. For several reasons depressive periods offer a particular window of opportunity for start-ups: Now it's time for developing ideas into new products, acquiring skilled people, and rethinking business plans. The timing for innovations is optimized if the result is market ready when the economic recovery drives up demand and consumer confidence. The question of sourcing the seed money was answered from the venture capitalist point of view. For innovations to be attractive, appropriate business plans should show an extraordinary growth potential even without government support and sponsorship. Venture capital investors dislike markets that are influenced by government interventions which is today the case for many renewable power markets. Such markets tend to attract lobbyists rather than innovators. If you live in California such views may be common for you. But for all other delegates the discussion along these lines was quite enlightening.

Another topic discussed was the future role of shale gas. The recent two digit growth rates of U.S. shale gas production imply that the assessment of energy resources should not be based on conventional fuels any more. Taking the most recent BP Statistical Review of World Energy, conventional natural gas resources in the U.S. have an R/P-ratio of roughly 11 years. But recent reports presented at the IAEE conference showed that the R/P-ratio in the USA increases to values up to 120 years, if unconventional natural gas resources and in particular shale gas is included. The new assessment of shale gas resources is the result of new technologies that have become economical in recent years thanks to high gas prices. Now "the ghost is out of the bottle" and changes the prospects and the level playing field of the gas industry in the U.S. and – most likely – in other countries and regions as well.

A third conference topic I would like to highlight was the discussion of the next steps towards global climate protection. The IAEE international conference saw many sessions where energy and environment economists presented their models on greenhouse gas abatement strategies and emission markets. Since 2005 the focus moved to empirical investigations on the system of tradable CO_2 emission rights implemented in the European Union and covering more than 10,000 installations. With the Clean Energy and Security Act recently the new President Obama administration wants to create a similar emission trading system for the U.S. It was interesting to observe that this initiative in the U.S. created a debate that is dominated by stakeholders. The same happened in Europe prior to 2005, but with a different focus. By pointing to the rather volatile European CO_2 prices, speakers in San Francisco showed a preference for a CO_2 tax that would create more stable ground for business decisions than a system of tradable emission rights.

(continued on page 2)

IAEE INTERNATIONAL ASSOCIATION for ENERGY ECONOMICS
WWW.IAEE.ORG

CONTENTS

Editor: David L. Williams

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

In Europe this argument played virtually no role, but it is obviously well taken. Unfortunately, there was no European speaker on the podium that could answer the many questions that had been raised on details of the European emission trade system. But from a Californian point of view, Europe is, of course, rather far away …

One of the strengths of discussing these and similar issues at IAEE conferences is the balanced participation of scientists from universities and research institutions on the one hand and colleagues from energy companies, consultants, governments and international institutions on the other. A novelty in San Francisco was that the organizers allocated a lot of time for questions and discussions – much more than in former IAEE conferences. The positive impact was threefold: First, the extensive discussion gave deeper insights into the statements and implications of the papers presented. Second, through the many statements it became obvious that conference delegates are rather interesting colleagues and have something to say even if they are not present in the conference program. I was quite impressed by how much I was able to learn from the "non-speakers". Third, the lively discussions at the conference identified colleagues that are working on similar topics. Many delegates took the opportunity to address colleagues after the sessions to continue the discussion and to check for deeper collaboration.

Unfortunately, due to the new form of conference organization, an unusually large share of paper submissions had been rejected because of time limitations. Council and conference organizers got some feedback from those unhappy colleagues that were concerned. Some of them did not register for the conference. So there are also lost opportunities with this new conference model. Alternative educational formats, such as poster sessions or short research presentations, may need to be considered as future conference programs are designed. I would rather welcome your suggestions to this topic.

Last but not least IAEE welcomed two new affiliates at the San Francisco International Conference, namely the Chinese Committee for Energy Economics CCEE and the Saudi Association for Energy Economics SAEE. I am rather happy that the mission of our association becomes more and more accepted outside of the traditional IAEE membership, and I welcome all new IAEE members that receive this *IAEE Energy Forum* for the first time. Council and headquarters will work hard to satisfy your expectations and interests.

Georg Erdmann

IAEE Mission Statement

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

We facilitate:

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

We accomplish this through:

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

Editor's Note

In this issue we continue our series of articles on renewable energy. Our call for papers on the subject has been particularly bountiful and we will finish the theme in the Fall issue.

Sander Cohan notes that for nearly a century the dominance of gasoline and diesel in the transport fuels market has been relatively unchallenged. In a forthcoming study he reports that a process of market transformation has begun in response to developments in technology, changing environmental attitudes and the tightening of global supply and demand for petroleum and petroleum products. The multiple drivers of alternative fuel pathways are inconsistent and have resulted in a process of scatter shot reform where policies endorse market efforts in a seemingly haphazard fashion.

Abubakar Sambo reviews the energy situation in Nigeria and notes that renewable energy is considered a viable solution to the energy challenges of the country, especially in the rural areas, and to the restrictions posed by the rising cost of conventional or traditional energy. The role of renewable energy technologies in meeting the energy challenges is discussed.

Aitor Ciarreta and Carlos Gutiérrez-Hita note that reduction of greenhouse gas emissions is a main target of the energy policy in the European Union. Within the ongoing liberalization process in the Spanish electricity sector, the transposition of the EU regulatory regime has enhanced generation from Renewable Energy Sources (RES). The Special regime is the regulatory framework that gives incentives to promote installations using RES.

Marco Nicolosi and Michaela Fuersch note that the EU parliament recently adopted very ambitious RES-E targets, which require a close look in terms of efficient policy implementation. Still, the optimisation of the RES-E "submarket" does not necessarily lead to an overall efficient solution as additional costs in the conventional power market have also to be taken into account.

Christine Rösch and Johannes Skarka note that in January 2008, the European Commission proposed a directive on the use of energy from renewable sources. This proposal defines ecological criteria to ensure the sustainable production of biofuels. They summarize the known and foreseeable ecological and social impacts of biofuels production and identify weaknesses in the EU proposal.

Guido Castelluccio discusses his plant, Biomasse Italia, whose main mission is to produce clean energy from the recycling of vegetal wastes and other renewable sources. He discusses the raw materials used, the production process, fuel mix, waste disposal and other aspects of the young company's operations noting that it's success earned it the *Environmental Enterprise Award* in 2007.

F. W. Rusco and W. D. Walls write that biofuel use is being proposed or mandated in an effort to reduce greenhouse gas emissions and to reduce consumption of petroleum products. They question the efficacy of a rapid expansion of biofuel use and call for policy makers to consider coordinating biofuel production and blending standards to reduce the eventual number of non-fungible liquid fuels.

Daniela Sica and Ornella Malandrino note that the EU Roadmap for 2020 promotes the widespread use of renewable energy sources to challenge dependency on imports, short supplies of fossil fuels and climate change. Italy has introduced initiatives including the Renewable Energy Certificate System. Nonetheless, effective "take off" also needs sustainable environmental policies and industrial strategies in place.

Finally, Nihan Karali summarizes the highlights of the 32nd International Conference in San Francisco.

DLW

33rd IAEE
rio de janeiro 2010

The Future of Energy:
Global Challenges, Diverse Solutions

IAEE's Rio 2010 International Conference
June 6–9, 2010
InterContinental Hotels & Resorts • Rio de Janeiro, Brazil

CALL for PAPERS

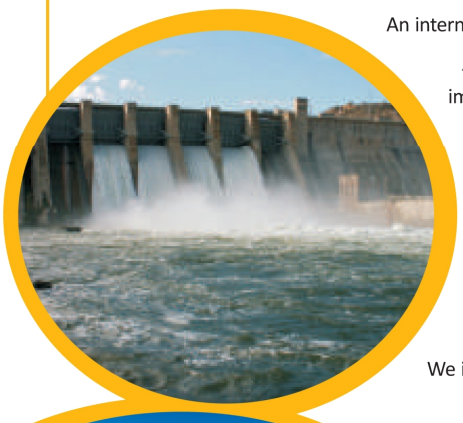
Submission deadline for abstracts:
January 15, 2010

The Event

We are pleased to announce the Call for Papers for the 33rd IAEE International Conference to be held 6-9 June 2010 in the beautiful city of Rio de Janeiro, Brazil.

The world energy future appears exceedingly uncertain. Different countries in the world will have to manage the enormous energy challenges rising from the transition to a sustainable global economy, in a context of economic crisis. It will be a scenario of swift and possibly disruptive change.

Since the 1990 decade, the energy sector is experiencing a process of rapid change in market organization, government policy and business strategy. During the 1990s, actions were directed at deregulating energy markets everywhere. There was then a wide consensus on what should be done. However, new challenges emerged in the last 20 years. Climate change and energy security issues are more and more influencing policies and strategies. The proposed actions to respond to current concerns are no longer convergent.



An international energy conference in Brazil makes it a privileged forum to analyze the current world energy scenario. Latin America and Brazil have been the stage for important technological and policy changes in the energy industry. Brazil has been the scene for important technological changes in the biofuel and petroleum industries. Furthermore, new energy policies in Latin America have driven reversion in market deregulation in many countries. These aspects raise important questions for energy economists.

Rio de Janeiro – considered by many the energy capital of Brazil – will be the perfect setting for professionals from academia, business and government to debate solutions to the common global challenges in a highly uncertain energy future. The focus of the conference will be to discuss possible changes in energy policies, technologies and markets, taking a careful look of the diversity of solutions currently available.

We invite you to come to Rio de Janeiro to experience the warmth of our people and the beauty of one of the most stunning scenery in the world.

José A. Scaramucci (conference chair)
Edmar L. F. de Almeida (conference co-chair)
Rogério C. Cerqueira Leite (conference chair emeritus)
Helder Queiroz Pinto Jr. (program committee chair)
Sergio V. Bajay (program committee co-chair)
Felipe A. Dias (local organizing committee chair)

Program Committee

- **Helder Queiroz Pinto Jr.** - Federal University of Rio de Janeiro (chair)
- **Sergio V. Bajay** - University of Campinas (program committee co-chair and plenary sessions chair)
- **Arnaldo C. S. Walter** - University of Campinas (concurrent sessions chair)
- **Alexandre S. Szklo** - Federal University of Rio de Janeiro
- **Carlos Felipe Lodi** - Petrobras
- **Christoph Ruehl** - BP
- **Edvaldo Alves de Santana** - Aneel
- **Einar Hope** - Norwegian School of Economics and Business Administration
- **Georg Erdmann** - Berlin University of Technology
- **Gerardo Rabinovich** - Instituto Argentino de la Energía
- **Gürkan Kumbaroğlu** - Bogaziçi University
- **Hillard G. Huntington** - Stanford University
- **Hoesung Lee** - Council on Energy and Environment - Korea
- **Jean-Michel Glachant** - Florence School of Regulation
- **José Cesário Cecchi** - ANP
- **Lars Bergman** - Stockholm School of Economics
- **M. Regis L. V. Leal** - Cenea
- **Maria Isabel R. T. Soares** - Universidade do Porto
- **Michael G. Pollitt** - University of Cambridge
- **Paulo de Tarso G. Paixão** - CPFL
- **Reinhard Haas** - Vienna University of Technology
- **Ricardo Gorini de Oliveira** - EPE
- **Ricardo J. Raineri Bernain** - PUC/Chile
- **Ronaldo G. Bicalho** - Federal University of Rio de Janeiro
- **W. Michael Griffin** - Carnegie Mellon University

Call for Papers

You are cordially invited to submit proposals for presentations at concurrent sessions on a range of topics including – but not limited to – those highlighted below. **Deadline for receipt of abstracts is January 15, 2010**.

Those interested in organizing a concurrent session should propose topic and possible speakers to Arnaldo C. S. Walter, concurrent session chair, at the email **rio2010@ab3e.org.br**. Please keep in mind that all speakers that present in organized special concurrent sessions must pay registration rates and attend Rio 2010 conference to present their papers.

Conference Themes and Topics

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

- **Energy and macroeconomics**
- **Energy pricing**
- **Energy efficiency and electricity consumption**
- **Electricity supply**
- **Electricity and CO_2 emissions**
- **Energy efficiency and the transportation sector**
- **Organization of markets for biofuels**
- **The economics of natural gas**
- **LNG market development**
- **Energy and environment**
- **Regulation of the energy industry**
- **Energy industry reform**
- **Energy policy**
- **Energy modeling**
- **Alternatives for coal**
- **Distributed electricity generation**
- **Implementing renewables**
- **Energy and geopolitics**
- **Institutional aspects of the energy industry**

Abstract Submission

• Abstracts must be submitted online – no later than January 15, 2010 – at **www.ab3e.org.br/rio2010.** Differently from other recent IAEE events, a short CV should **NOT** be included, as a blind peer review process will be used to select the abstracts. Paper acceptance will be based solely on the extended **two-page** abstract (approximately 1,500 words), covering (1) a brief overview, (2) methods, (3) results, (4) conclusions and (5) references.

Note: The lead author submitting the abstract must provide complete contact details: mailing address, phone, fax, e-mail. At least one author of an accepted paper must attend the conference. Authors will be notified by March 1, 2010. Authors whose abstracts are accepted will have to submit their full-length papers (10-page limit) by April 19, 2010. While multiple submissions by individual or groups of authors are welcome, the abstract selection process will seek to ensure as broad participation as possible – each speaker is to deliver only one presentation in the conference. If multiple submissions are accepted, then a different co-author will be required to present the paper. Full submitting instructions will be available at the website.

Students

Students are encouraged to submit papers for consideration of the IAEE's Rio 2010 student best paper award, which include cash prizes plus waiver of conference registration fees. Students may also inquire about registration scholarships for complimentary conference attendance. Information regarding these two programs will be posted to our website in the fourth quarter of 2009.

Travel Documents

International delegates are urged to contact their respective consulate, embassy or travel agent regarding visa requirements for entering Brazil. We recommend start processing documents well in advance. A Visa to Brazil is not required for citizens of the following countries: Argentina, Austria, Belgium, Bolivia, Bulgaria, Chile, Colombia, Costa Rica, Croatia, Czech Republic, Denmark, Ecuador, Finland, France, Germany, Greece, Honduras, Hungary, Iceland, Ireland, Israel, Italy, Luxemburg, Macao, Malta, San Marino, Monaco, Morocco, Netherlands, New Zealand, Norway, Paraguay, Peru, Philippines, Poland, Portugal, Slovakia, Slovenia, South Africa, South Korea, Spain, Suriname, Sweden, Switzerland, Thailand, Trinidad & Tobago, Tunisia, Turkey, United Kingdom, Uruguay and Vatican. Brazil has diplomatic representation in several countries in all continents around the world.

	Early registration (US$)	After May 1st, 2010 (US$)
Speakers/chairpersons	600.00	700.00
IAEE members	700.00	800.00
Non-members	800.00	950.00
Students	355.00	455.00
Accompanying persons	400.00	450.00

About Rio de Janeiro

Rio de Janeiro is considered one of the world's dream cities – it is located in a beautiful natural environment which brings dramatically together mountains and the sea in a luxuriant tropical setting, all this highlighted by the friendliness of its people. The city is renowned for its white sandy beaches, rain forests and breathtaking views from the mountain tops which surround it, two bays, and many lagoons, also being one of the main cultural capitals of Brazil – museums, cultural centers, historical buildings, musical halls and theaters; great choice of restaurants, shopping malls and tourist sites. If you have never been to Rio, this is your best opportunity. If you already know Rio, the city is for sure prettier than ever before.

Technical Tours

Conference participants will enjoy the opportunity to visit a bioethanol distillery in the region of Ribeirão Preto, a Petrobras oil platform in the region of Macaé, the nuclear power plant Angra 1, Petrobras Research Center (Cenpes) and Eletrobras Research Center (Cepel) in Rio de Janeiro.

Conference and Accommodations

The conference venue is Rio's InterContinental hotel, conveniently located at the heart of the city within short walking distance to wonderful shopping, eating, entertainment and cultural sites, including a golf course and a hang-gliding facility. We encourage early reservations as hotel rooms are likely to sell out.

How to Get to Rio de Janeiro

Rio de Janeiro is linked to airports in more than 80 countries. A great number of international and national airlines link Rio de Janeiro to the main capitals of the world: Aerolineas Argentinas, Air Europa, Air France, American Airlines, Avianca, Azul, BRA, British Airways, Continental Airlines, Copa Airlines, Delta Airlines, Gol, Iberia, KLM, Lan Chile, Ocean Air, Pluna, Pro Sky, TAAG, TAM, TAP, United Airlines, Varig, Webjet, among others.

What Rio de Janeiro Has to Offer

The beautiful Guanabara Bay, Niteroi Bridge, the world-renowned beaches of Copacabana, Ipanema and Leblon, the samba clubs of Lapa and Santa Teresa, the Sugar Loaf and Christ the Redeemer statue at Corcovado mountain and the pubs of Leblon and Urca are all within city limits. Within a short drive range are the cities of Búzios, Petrópolis, Paraty and Angra dos Reis. To visit Iguaçu Falls, Salvador, Ouro Preto, Pantanal, the Amazon Forest and Fernando de Noronha archipelago you should allow extra time before and after the conference for a memorable experience. A number of half-day, full-day and multi-day sightseeing and cultural tours are available, including the following:

- **Full or half day cultural city tour**
- **Sugar Loaf**
- **Corcovado mountains by train**
- **Samba clubs in Lapa and Santa Teresa**
- **Full day tour to Búzios**
- **Full day tour to Petrópolis**
- **Full day bay cruise to Ilha Grande**

clube de ideias 05/09

Organized by:

AB3E Associação Brasileira de Estudos em Energia — www.ab3e.org.br — IAEE Affiliate

IAEE International Association for Energy Economics — www.iaee.org

ibp Instituto Brasileiro de Petróleo, Gás e Biocombustíveis

2nd Latin American Meeting of Energy Economics: *Energy Security, Integration, and Development in Latin America*

The second Latin American Meeting of Energy Economics - ELAEE – was held March 22 to 24 in Santiago, Chile, emphasizing Energy Security, Integration, and Development in Latin America

The event was a big success and in the two days of presentations attendees heard 8 plenary sessions, one panel, and 23 concurrent sessions. It was an excellent opportunity for Latin Americans to share knowledge and experiences and interact within the larger community including that of the IAEE.

As the President of the meeting, economist Ricardo Raineri pointed out, the presentations covered the challenges that the problem of climate change will put on the energy sector in Latin America, a renewed interest in the role that renewables can play in mitigating GHG emissions, a recognition of the need for better coordination and integration of the energy sector at the regional level. The importance of diversifying the energy matrix in Latin America, and achieving higher levels of security in the energy supply were also covered.

Participating in the event were leading experts in the energy sector such as Fatih Birol, from the International Energy Agency; the Energy Minister of Chile, Marcelo Tokman; the Vice Minister of Energy of Peru, Daniel Camac; George Erdmann President of the IAEE, who gave a remarkable speech on energy integration; Philippe Benoit, Chief Energy Economist of the World Bank for the Latin America and Caribbean Region; Fereidoon P. Sioshansi researcher and editor of the *Energy Informer*; Hugo Altomonte Director of Natural Resources, Energy and Infrastructure Division of Cepal; Reinhard Haas academic and researcher at the Vienna University of Technology, expert in energy policies for renewables; André Garcez Ghirardi, Advisor on International Affairs for the President of Petrobras; Gerardo Rabinovich, energy analyst of the Instituto Argentino de Energia; General Mosconi; Jorge Rodriguez, former Energy and Economic Minister of Chile; and Sebastián Piñera Echenique President of Fundación Futuro and Presidential Candidate for the election that will take place next December in Chile.

This second meeting was a big success and a great contribution to the analysis and discussion of energy policy issues and challenges within the region. More information on the conference, the presentations and images can be found on the web page www.elaee.org.

A third Latin American Meeting on Energy Economy has been schedule in Buenos Aires in 2011, after the International Meeting of the IAEE that will take place in Rio de Janeiro in 2010.

Scatter Shot Reform

By Sander Cohan*

An Explosion of Transport Fuel Pathways

For nearly a century, the dominance of gasoline and diesel in the transport fuels market has remained relatively unchallenged. As motor transport has spread with economic development, these two products of the petroleum refining industry have driven global demand for petroleum. In an upcoming study entitled, *Scatter Shot Reform: Fuel Engine Pathways for Automotive Transportation*, ESAI analyzes how the status quo is changing through a haphazard effort at transport fuel reform. Competing and sometimes conflicting reform will result in a vastly different transport fuels market. Responding to developments in technology, changing attitudes towards environmental sustainability, and the tightening of global supply and demand markets for petroleum and petroleum products, a process of market transformation has begun. In addition to the complication and expansion of gasoline and diesel markets to include new formulations and specifications, new transportation fuel and automotive technology pathways are emerging (see Figure 1). Their emergence has created the beginnings of a sea change in transportation fuel markets.

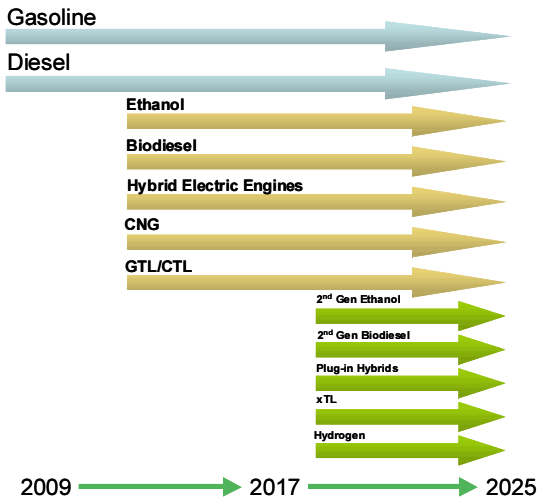


Figure 1: Scatter Shot Reform Yields an Explosion of Transport Fuel Pathways

The result of this transformational process over the coming 20 years will be the expansion of the potential number of fuel pathways from two, gasoline and diesel, to more than twelve, covering the gamut of technologies and environmental strategies. While some of these fuels will be agricultural in nature, deriving from energy crops, a substantial portion will be from the development of new technologies that utilize existing hydrocarbon resources, such as natural gas and coal.

Although the aim of fuels reform, most often, is ultimately to replace a substantial portion of gasoline and diesel consumption, these pathways were not developed in concert with each other. Instead, they are the result of a series of competing agendas and outlooks, a process of scatter-shot reform. Consequently, market conditions that promote the growth of some of these technologies hinder the growth of others.

Price is not the Only Driver

The collapse of oil prices through the beginning of 2009 does not mean that the development of alternative fuels will stop, or necessarily even slow down. The drivers of new fuel technologies are not uniform and are not connected exclusively to economic fundamentals. The motivation for market transformation comes from a variety of different sources. These shifting factors include:

Climate Change Concerns surrounding the contribution towards global climate change from conventional transportation fuels and the effect these fuels have on air quality have led to a widespread policy and market effort to encourage the use of fuels with lower greenhouse gas (GHG) emissions profiles. Despite the best efforts of policymakers under the Kyoto regime, the preferred approach and definition of these emissions varies substantially from country to country and by level of economic development.

Energy Security: As more of the world's expected crude oil production comes from a decreasing number of countries, there is a growing concern among consuming nations that supplies of crude oil and thus petroleum products will become more vulnerable to political and economic instability in these increasingly important producing countries.

Agriculture Market Support: The production of certain alternative fuels requires the consumption of agricultural commodities. Many markets for non-petroleum fuels were developed as a way to utilize surplus crops and sustain sagging agricultural markets. Other markets emerged to support the agricultural sector by finding uses for marginal and low yield cropland.

Domestic Market Development: Alternative fuel markets also exist as a tool for economic development. The expansion of new transportation fuels pathways opens new opportunities for the scientific community, the energy industry and

* Sander Cohan is a Transport Fuels Analyst at ESAI. His forthcoming study, *Scatter Shot Reform: Fuel Engine Pathways for Automotive Transportation* became available in April 2009. He may be reached at scohan@esai.com

entrepreneurs to develop production and transport. These efforts translate into greater economic development and jobs during a time of economic hardship.

Scatter Shot Reform

The multiple drivers of alternative fuel pathways have inspired varied policy efforts to encourage their development and expansion. The policy development for new transportation fuel pathways, however, is inconsistent. The result is a process of scatter shot reform, where policies endorse market efforts in a seemingly haphazard fashion, according to regional needs and political goals.

The landscape, therefore, is characterized by several policies that prioritize radically different agendas, relevant to geography and politics. As a result, the future for alternative transportation fuel pathways is extremely varied. In some circumstances, the policy drivers work together, suggesting a consistent adoption path and a unified technology. In other circumstances, the drivers of policy and approach to market development conflict. Table 1 describes some alternative fuel policies in terms of their primary, secondary, and tertiary drivers.

	Policy	First Priority	Second Priority	Third Priority
United States	RFS I	Security of Supply	Agricultural Support	Climate Change
	RFS II	Market Development	Climate Change	Agricultural Support
	California LCFS	Climate Change	Market Development	
EU	EC Biofuels Directive	Security of Supply	Climate Change	Market Development
	20 and 20 by 2020	Climate Change	Market Development	Security of Supply
	German Biofuels	Climate Change	Market Development	Agricultural Support
Brazil	Proálcool	Security of Supply	Agricultural Support	Market Development
South Africa	GTL/CTL	Security of Supply	Market Development	

Table 1: Drivers of Alternative Fuels Markets

ESAI's preliminary research shows that the language of transportation fuel reform is very similar across markets. Most regions, for example, are concerned with security of supply. Yet beyond this common nomenclature, what each market emphasizes, results in different paths of development. A focus on security of supply, for example, will give an advantage to fuels that are derived from domestically produced sources. Combine this factor with an emphasis on agricultural support, and one finds a growing market and taste for corn-derived ethanol in the United States, or sugarcane ethanol in Brazil. On the other hand, while security of supply concerns drove the development of South Africa's coal-to-liquids policy, stronger emphasis on climate change might result in the development of fuel pathways with lower carbon impact and greenhouse gas emissions. Its market strength and support behind coal-to-liquid fuels would wane in the face of that technology's lower effectiveness at providing an economic, low-carbon fuel. Table 2, elaborates this concept further, describing emerging and existing alternative fuel technologies in terms of the drivers that promote their development.

	First Driver	Second Driver	Third Driver
Advanced Diesel Technology	Climate Change	Market Development	Security of Supply
Advanced Gasoline Technology	Climate Change	Market Development	Security of Supply
Plug In Hybrids	Climate Change	Security of Supply	Market Development
Ethanol, First Generation	Security of Supply	Agricultural Support	Climate Change
Ethanol, Second Generation	Market Development	Climate Change	Agricultural Support
Biodiesel, First Generation	Security of Supply	Agricultural Support	Climate Change
Biodiesel, Second Generation	Market Development	Climate Change	Agricultural Support
Compressed Natural Gas	Security of Supply	Market Development	Climate Change
Hydrogen	Climate Change	Security of Supply	Market Development
Coal To Liquid/Gas to Liquid	Security of Supply	Market Development	Climate Change
Biomass to Liquid	Climate Change	Market Development	Security of Supply

Table 2: Drivers of Alternative Fuels

A global survey of the various alternative fuel reforms combined with a discussion of the drivers behind the individual technologies themselves yield a map of potential market opportunities for a wide variety of alternative fuel pathways. As the above tables suggest, the results do not inform the development of a most fit technology; there is no clear winner. Instead, the result of the co-evolution of alternative fuel policy with alternative fuel technology results in a highly balkanized market where a fuel that will flourish in one region might not in others. Further, in markets that might foster similar technologies, nuances in the regional landscape will affect the ultimate size and growth pattern of a technology pathway.

This landscape has important implications for refiners and fuel marketers. Although alternatives will play a substantial role in global fuel supply and demand, the overall impact of individual actors and individual technologies might yield an unexpected outcome. There does not appear to be any indication of convergence across technologies or policies in the near or even medium term. As a result, it is likely that the current fracturing of the transportation fuels markets from two clear pathways, gasoline and diesel, will continue to split and develop further. If the policies of the OECD regions are any indication, the relatively clear policies of developing nations will become more complicated as economic growth continues, national priorities change, and shifting global attitudes begin driving changes in national energy policies. The pattern of scatter shot reform leading to varied and potentially conflicting fuel pathways will become the norm, rather than the exception.

The Paul H. Nitze School of Advanced International Studies

1740 Massachusetts Ave, NW, Washington, DC 20036

FACULTY OPENING

Senior Faculty Position in Energy, Resources and Environment

Established as a division of The Johns Hopkins University in 1950, The Paul H. Nitze School of Advanced International Studies of the Johns Hopkins University (SAIS) has been educating global leaders for almost 60 years. As a highly selective graduate institution with a distinguished faculty, SAIS consistently ranks as one of the top schools of international relations in the world. SAIS was founded to provide a practical approach to training students in international leadership and foreign relations, and to provide mid-career educational opportunities for those already working in related fields. Today, SAIS offers the M.A., M.I.P.P., and Ph.D. degrees and enrolls 600 full-time students on the Washington, DC campus, 190 students at the SAIS Center in Bologna, Italy, and 140 students at the Hopkins Nanjing Center in Nanjing, China.

The Position

SAIS is seeking to fill a tenured position at the level of associate or full professor of international energy and environmental policy studies. The successful candidate will direct the Energy, Resources and Environment Program at SAIS. This position is in Washington, DC.

Qualifications

The ideal candidate will have a record of outstanding academic research and excellence in teaching, and a PhD or other equivalent degree in an appropriate field. Preference will be given to applicants with an interest in traditional and alternative energy technologies, the geopolitics of energy, or the environment.

Application

Applicants should submit their curriculum vitae to:

Dr. David M. Lampton
Paul H. Nitze School of Advanced International Studies
1740 Massachusetts Ave., N.W.
Washington DC 20036.

The application review period will begin on October 15, 2009 and will remain open until the position is filled.

Visit the SAIS website at www.sais-jhu.edu

Johns Hopkins University is an equal opportunity/affirmative action employer committed to recruiting, supporting and fostering a diverse community of outstanding faculty, staff and students. All applicants who share this goal are encouraged to apply.

JOHNS HOPKINS
UNIVERSITY

CONFERENCE OVERVIEW

Energy is a key driver of economic growth, something the world is desperately looking for in the current crisis. At the same time, traditional energy supply is reaching its limits. Many energy sources have to be developed to meet the 21st century environmental, social and economic challenges.

How can unconventional hydrocarbons (oil sands, shale gas and others) and carbon sequestration help bridge the gap between conventional oil, gas, coal and nuclear power and the most promising renewable energy sources – biomass, hydro, wind, geothermal, and solar? Furthermore, how can market reforms promote more energy efficiency?

This conference will bring together key players in the North American energy sector to address these questions and many others in plenary and concurrent sessions.

Those interested in organizing sessions should propose a topic and possible speakers to Pierre-Olivier Pineau, Concurrent Session Chair (p) +1 514-340-6922, (e) *pierre-olivier.pineau@hec.ca*

This conference will also provide networking opportunities through workshops, public outreach and student recruitment.

HOSTED BY: CAEE

WITH SUPPORT FROM: USAEE, IAEE, AMZEE

TOPICS TO BE ADDRESSED INCLUDE:

Conventional Oil and Gas Issues
- Reserves and access to reserves
- Production and drilling activity
- Fiscal issues: incentive taxation and royalty regimes
- Enhanced recovery with CO_2 injection
- Estimating and forecasting project costs

Unconventional Oil and Gas Issues
- Reserves, resources and possible recovery
- Oil sands production costs
- Heavy oil prospects
- Coalbed methane and shale gas production
- Environmental footprint

Infrastructure Investments
- New pipelines
- LNG terminals, import/export
- Refining and moving 21st century liquid fuels
- Financing after the credit crisis

Carbon Capture and Sequestration
- Experiences to date
- Links with enhanced oil & gas recovery
- Potential to limit GHG
- Cost and the role of subsidies in CCS

Electricity Generation
- Supply adequacy
- New nuclear developments
- State/provincial regulation and economic distortions
- Ownership and cost of hydropower

Electricity Networks
- Market integration and reforms
- Transmission upgrades and pricing
- Distributed generation
- Smart grids and smart metering innovations

Energy Efficiency
- Measurement and verification
- Link to energy pricing
- Information and other market failures

Climate Change
- GHG emission reduction targets and costs
- Impacts of a cap-and-trade system or a carbon tax
- Developments in carbon-mitigation technologies
- International agreements post-Kyoto
- Cost effectiveness: reduction, sequestration or adaptation

Biofuels
- Regulatory incentives
- Life-cycle energy and economic assessments
- Linkages and competition with the food chain

Renewables in Electricity
- Renewable Portfolio Standards and regulatory approaches
- Wind development: growth and challenges
- Hydropower contribution
- Solar and geothermal technology updates

Energy and Transportation
- Transportation policy and efficiency
- Impact of the automobile crisis on energy demand
- Fuel efficiency standards

Geopolitics
- North American energy inter-dependence
- The future of OPEC
- Natural gas politics
- Persian Gulf security
- Renewable energy and energy security

Energy Poverty
- Access to modern energy services
- Energy prospects for developing countries

Visit our conference website at: http://www.usaee.org/usaee2010/

CALL FOR PAPERS

We are pleased to announce the Call for Papers for the 29th USAEE/IAEE North American Conference to be held October 14-16, 2010 at the Hyatt Regency Calgary hotel, in Calgary, Alberta, Canada. The Deadline for receipt of abstracts is May 21, 2010.

Paper abstracts, giving a concise overview of the topic to be covered and the method of analysis, should be ***one to two pages***. Abstracts should include the following brief sections: (1) overview, (2) methods, (3) results, (4) conclusions, and (5) references.

Please visit http://www.usaee.org/usaee2010/ to download a sample abstract template. NOTE: All abstracts must conform to the format structure outlined in sample abstract template. 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 9, 2010 of their paper status.

Authors whose abstracts are accepted will have until September 3, 2010, 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.

Abstracts **must be submitted online** to http://usaee.org/USAEE2010/submissions.aspx Abstracts submitted by email will not be processed. Please use the online abstract submission form.

STUDENTS

Students may submit an abstract for the concurrent sessions. The deadline for abstracts is May 21, 2010. Also, you may submit a paper for consideration in the USAEE 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 8, 2010. Visit http://www.usaee.org/USAEE2010/paperawards.html for full details. Students may also inquire about our scholarships for conference attendance. Visit http://www.usaee.org/USAEE2010/students.html for full details.

TRAVEL DOCUMENTS

All international delegates to the 29th 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 Canada. 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.

Note: U.S. citizens attending the 29th USAEE/IAEE North American Conference will need to present a passport upon entry to Canada.

AAEE
Austrian Association for Energy Economics

The 10th IAEE European Conference

7-10 September 2009
Hofburg Congress Center
Vienna, Austria

at times of high energy prices

Energy, Policies and Technologies for Sustainable Economies

Energy services provide the basis for our lifestyle and entire economic system. Finding ways to provide these services in a sustainable manner will be critical to the future of mankind. This is the challenge facing nations around the globe today.

The conference will focus on new scientific developments of energy conversion technologies, the effects of energy policies and the more efficient use of different types of primary energy resources. Discussions will address new technologies and the role they will play in a future energy supply system consisting of both decentralised and central supply units (power plants, refineries, pipelines…). A further focus will be on the importance of demand-side efficiency and demand-side conservation strategies for households, industry, transport and commercial buildings.

We are looking forward to seeing you in Vienna!

Prof. Dr. Reinhard Haas
Programme Committee Chair

Dr. Hans Auer
General Conference Chair

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

Conference Themes and Topics

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

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

Confirmed Plenary Speakers (selection)

Eirik Amundsen
Fatih Birol
Pantelis Capros
Myrsini Christou
Georg Erdmann
Jean-Michel Glachant
Reinhard Haas
Gerhard Mangott
Nebojsa Nakicenovic
Karsten Neuhoff
David Newbery
Frits van Oostvoorn
Ignacio Perez-Arriaga
Christof Rühl
Lee Schipper
Aviel Verbruggen

Conference programme online at:
http://www.aaee.at/2009-IAEE/programme.php

Online registration at:
http://www.aaee.at/2009-IAEE/registration.php

Registration fees (EURO)

Speakers / Chairpersons	475
IAEE / AAEE members	550
Non-members	700
Students	275
Accompanying Persons	250

TU VIENNA Technische Universität Wien / Vienna University of Technology
IAEE www.iaee.org International Association for Energy Economics
EEG Energy Economics Group
Verbund

Strategic Developments In Renewable Energy In Nigeria

By Abubakar S. Sambo*

Introduction

Energy is the mainstay of Nigeria's economic growth and development. It plays a significant role in the nation's international diplomacy and it serves as a tradable commodity for earning the national income, which is used to support government development programmes. It also serves as an input into the production of goods and services in the nation's industry, transport, agriculture, health and education sectors, as well as an instrument for politics, security and diplomacy.

Energy, and in particular, oil and gas, has continued to contribute over 70% of Nigeria's Federal revenue. National developmental programmes, and security, depend largely on these revenue earnings. Energy, especially crude oil, has over the past five years contributed an average of about 25% to Nigeria's Gross Domestic Product (GDP), representing the highest contributor after crop production. The contribution of energy to GDP is expected to be higher when we take into account renewable energy utilization, which constitutes about 90% of the energy used by the rural population [1]. It should be noted that Nigeria which is located between longitude 3^{o} and 14^{o} East of Greenwich and latitude 4^{o} and 14^{o} north of equator has about 140 million people and a total land area of 923,768 km^2 .

The energy sub-sector, especially petroleum, continues to maintain its prominence as the single most important source of government revenue and foreign exchange earner. Petroleum contributed an average 25.24% to the GDP between 2002 and 2006. However, despite the fortunes of the oil sector, other sectors of the economy are declining. For example, consumption of electricity actually declined by 13.4% between 2002 and 2006 even though the overall or total electricity consumption showed a marginal increase of 1.8% from 5.63GWh in 2002 to 7.47GWh in 2006. Only about 40% of households in Nigeria are connected to the national grid. There is high-energy loss due to the physical deterioration of the transmission and distribution facilities, an inadequate metering system and an increase in the incidence of power theft through illegal connections. Other problems of the power sector include manpower constraints and inadequate support facilities, the high cost of electricity production, inadequate basic industries to service the power sector, poor billing systems, poor settlements of bills by consumers and low available capacity, about 40% out of the installed capacity of about 6,000MW. Inadequate funding prevented targeted growth in the sector. Production activities in the solid minerals sub-sector were generally on decline.

The situation in the rural areas of the country is that most end users depend on fuelwood. Fuelwood is used by over 60% of Nigerians living in the rural areas. Nigeria consumes over 50 million metric tonnes of fuel wood annually, a rate, which exceeds the replenishment rate through various afforestation programmes. Sourcing fuel wood for domestic and commercial uses is a major cause of desertification in the arid-zone states and erosion in the southern part of the country. The rate of deforestation is about 350,000 hectares per year, which is equivalent to 3.6% of the present area of forests and woodlands, whereas reforestation is only at about 10% of the deforestation rate. [2]

The rural areas, which are generally inaccessible due to absence of good road networks, have little access to conventional energy such as electricity and petroleum products. Petroleum products such as kerosene and gasoline are purchased in the rural areas at prices 150% in excess of their official pump prices. The daily needs of the rural populace for heat energy are, therefore, met almost entirely from fuelwood.

With the ongoing restructuring of the power sector and the imminent privatization of the electricity industry it is obvious that for logistic and economic reasons especially under the privatized power sector, rural areas which are remote from the grid and/or have low consumption or low power purchase potential will not be attractive to private power investors. Such areas may remain unserved for the distant future.

Meanwhile electricity is required for such basic developmental services as pipe borne water, health care, telecommunications and quality education. The poverty eradication and Universal Basic Education (UBE) programmes require energy for success. The absence of reliable energy supply has not only left the rural populace socially backward but has left their economic potentials untapped. Fortunately, Nigeria is blessed with abundant renewable energy resources such as solar, wind, biomass and small hydropower potentials. The logical solution is increased penetration of renewables into the energy supply mix. The rest of this article contains some of the modest progress made in the promotion of renewable energy technologies in Nigeria towards ensuring sustainable development.

* Abubakar S. Sambo is the Director General of the Energy Commission of Nigeria. He may be reached at: dg@energy.gov.ng OR assambo@yahoo.com

The Status of Biomass Energy in Nigeria

Biomass refers to energy derivable from sources of plant origin such as trees, grasses, agricultural crops and their derivatives, as well as animal wastes. As an energy resource, biomass may be used as solid fuel, or converted via a variety of technologies to liquid or gaseous forms for the generation of electric power, heat or fuel for motive power. Biomass resources are considered renewable as they are naturally occurring and when properly managed, may be harvested without significant depletion. Biomass resources available in the country include: fuelwood, agricultural waste and crop residue, sawdust and wood shavings, animal dung/poultry droppings, industrial effluents/municipal solid waste.

The availability of biomass resources follows the same pattern as the nation's vegetation. The rain forest in the south generates the highest quantity of woody biomass while the guinea savannah vegetation of the north central region generates more crop residues than the sudan and sahel savannah zones. Industrial effluent such as sugar cane molasses is located with the processes with which they are associated. Municipal wastes are generated in the high-density urban areas. Table 1 shows the estimated biomass resources in Nigeria.

Resource	Quantity (million tonnes)	Energy Value ('000 MJ)
Fuelwood	39.1	531.0
Agro-waste	11.244	147.7
Saw Dust	1.8	31.433
Municipal Solid Waste	4.075	-

Table 1: Biomass Resources and the Estimated Quantities in Nigeria.

Fuelwood

Over the period 1989-2000, fuelwood and charcoal constituted between 32 and 40% of total primary energy consumption [3]. In year 2000, national demand was estimated to be 39 million tonnes of fuelwood. About 95% of the total fuelwood consumption was used in households for cooking and for cottage industrial activities, such as for processing cassava and oil seeds, which are closely related to household activities. A smaller proportion of the fuelwood and charcoal consumed was used in the services sector.

About 350,000 hectares of forest and natural vegetation are lost annually due to various factors, by the beginning of the last decade, with a much lower afforestation rate of 50,000 hectares/yr. With the depleting natural wood reserves, women and children have to travel as far as six kilometres to collect wood, sometimes fresh trees are cut down and allowed to dry for harvest as fuelwood thus putting further pressure on the vegetation. Recent studies show that national demand for traditional energy (mostly fuelwood and charcoal) is 39 million tonnes per annum (about 37.4% of the total energy demand and the highest single share of all the energy forms). It is projected to increase to 91 million tons by 2030 [4]. The deforestation rate is expected to similarly increase if no special programme is put in place to discourage the use of fuelwood, promote the use of its alternatives and replenish through deliberate afforestation and fuelwood lots. This has grave implications on sustainable environment, food security and the health of the low income households who depend on fuelwood. The strategic development in this regard is a two-prong approach of reducing consumption rate through promotion of more efficient wood stoves and deployment of alternatives to fuelwood through policy instrument and pilot demonstration renewable projects.

Fuelwood lot is being established, while improved wood stoves of various configurations are being promoted. Under an integrated rural energy supply project, selected communities are assessed for renewable energy resources, energy requirement and available human resources, and an integrated energy supply system is then designed that utilizes the available renewable energy resources to supply the energy requirement. For sustainability, the local human resources are trained to maintain the system.

The three-stone stove commonly used in the households have efficiencies as low as 15%. Improved versions have been developed locally by the ECN through its energy research centers at the University of Nigeria, Nsukka and Usumanu Dan Fodiyo University in Sokoto. These stoves which could reduce fuelwood consumption for a particular process by 50 % are already being adopted. For instance the International Institute for Tropical Agriculture (IITA) cottage cassava industry at Moniya, Ibadan adopted these technologies. Indeed the improved wood-burning stoves are found in many local markets in the northwestern part of the country.

Agricultural Residue and Municipal Solid Waste

Residues associated with agriculture either as on-the-farm crop wastes such as cornstalks or as processing waste such as rice husk, corn shells, palm kernel shell, cassava peels, etc., are also good sources of fuels. They are currently burned directly as starter or supplement material in addition to fuelwood. There are potentials for further processing for higher energy contents. There is, however, other competing demand for crop residues for feeding livestock and roofing thatched houses in the villages. Animal

wastes (e.g., cow dung, poultry droppings and abattoir wastes) are also available at specific sites.

Biogas digester technology has been domesticated and a number of pilot biogas plants have been built. Considerable local capability exists for building both floating dome and fixed dome biodigesters using a variety of bioresources. Examples include a human waste biogas plant at the Zaria prison, cow dung based biogas plants at the Fodder farm of the National Animal Production Research Institute (NAPRI), Zaria and Mayflower Secondary School Ikenne, Ogun State; an 18m3 capacity pig waste biogas plant at the pigry farm of the Ojokoro/Ifelodun Cooperative Agricultural Multipurpose Society in Lagos State. A number of indigenous outfits are producing economically viable systems for converting municipal waste to energy.

Saw Dust

Sawdust and wood wastes are other important biomass resources associated with the lumber industry. Small particle biomass stoves already exist for burning sawdusts and wood shaving. Biomass utilization as energy resources is currently limited to thermal application as fuel for cooking, crop drying, tobacco curing, etc. Opportunities exist in power generation from biomass resources in the following: fuelwood lot, biogas generation/biofertilizer production, electricity generation from industrial effluents such as bagasse and ethanol production. There is no existing biomass fired power plant in Nigeria and so no local experience. However, there is considerable experience in biogas generation and utilization of fine particle biomass. Opportunities also exist for briquetting of saw dust and other fine particle biomass.

Small Hydropower (SHP) Development in Nigeria

Rural electrification is given high priority in government's efforts to increase the standard of living in rural areas, reduce rural-urban migration trends, and realize other development objectives. However, the three key challenges for rural electrification are:

a. how to provide sustainable energy (electricity) services to the poorest of the poor, who have no purchasing power to pay for the services?
b. how to offer the most cost-effective, clean and reliable electricity to those who are currently spending a significant share of their income on energy ?;
c. how to set up the commercial infrastructure to provide these services?

In Nigeria, where rivers, waterfalls and streams with high potentials for SHP development is abundant, harnessing of these hydro-resources leads to decentralized use and local implementation and management, thereby making sustainable rural development possible through self-reliance and the use of local natural resources. This can be the most affordable and accessible option to provide off-grid electricity services. Based on Nigeria's level of hydropower development, small hydropower station is defined as follows: Small = installed capacity of between 2 MW and 10 MW; Mini $\leq$ 2 MW ; Micro $\leq$100 kW . In recent studies carried out in twelve states and four (4) river basins, over 278 unexploited SHP sites with total potentials of 734.3 MW were identified. However, SHP potential sites exist in virtually all parts of Nigeria with an estimated capacity of 3,500 MW.

Recent initiatives by the ECN have focused on creating awareness among Nigerians on the huge SHP potentials of the country. Several workshops have been held. In November 2002, the ECN , in collaboration with the United Nations Industrial Development Organization (UNIDO) and other relevant government agencies and ministries organised a National Stakeholders Forum on Renewable Energy Technologies specifically for SHP for rural industrialization. The objective was to formulate strategies to provide access to clean and reliable energy services to the rural populace for promoting rural industrialization, which in turn will lead to employment generation and rural development. During the Forum, a Memorandum of Understanding (MOU) was signed between ECN and UNIDO – IC-SHP, Hangzhou, China, for further cooperation in tapping the currently identified potential of 734.2 MW of SHP through technical assistance, training and establishment of demonstration projects. Thus, the framework for training of trainers in SHP was put in place in 2003 in conjunction with IN-SHP and UNIDO.

Pre-feasibility studies and reports had already been prepared for 12 identified sites and are awaiting investments. Further to preliminary selection of the possible sites, socio-economic and load surveys were carried out in the beneficiary communities with assistance from ECN and the respective River Basin Development Authorities. A private company, the Nigerian Electricity Supply Company (NESCO) and the government have installed eight (8) SHP stations with aggregate capacity of 37.0 MW in Nigeria. Most of these stations are found around Jos, where a 2 MW station at Kwall Falls on the river Kaduna and an 8 MW station at Kurra Falls are located. These stations were developed more than 75 years ago.

The "Power Vision 2010" of the Federal Ministry of Power and Steel (2004) set the National Power

Target for 2010 at 10,000 MW with SHP contributing 10% or 1,000 MW, the development of which will be in phases. The financial implication of this target for SHP of 1,000 MW, when computed using a system cost of US$ 1,500.00/kW, and an exchange rate of US$ 1.0 = ₦150.00 gives ₦225 billion.

Nigeria receives assistance from international institutions for the development of its SHP resources, some of which include:

- The Chinese government through the Chinese Embassy in Nigeria offered to assist Nigeria in electro-mechanical equipment for a 30 kW capacity of SHP demonstration project at Anambra-Imo River Basin Development Authority in Abia State.
- In July 2003, UNIDO sponsored a Chinese Expert Mission for Feasibility Studies on SHP Pilot and Refurbishment projects in Nigeria.

Solar Energy

Nigeria lies within a high sunshine belt and thus has enormous solar energy potentials. The mean annual average of total solar radiation varies from about 3.5 kWhm–2day-1 in the coastal latitudes to about 7 kWhm–2day-1 along the semi arid areas in the far North. On the average, the country receives solar radiation at the level of about 19.8 MJm –2 day-1. Average sunshine hours are estimated at 6hrs per day. Solar radiation is fairly well distributed. The minimum average is about 3.55 kWhm–2day-1 in Katsina in January and 3.4 kWhm–2day-1 for Calabar in August and the maximum average is 8.0 kWhm–2day-1 for Nguru in May.

Given an average solar radiation level of about 5.5 kWhm–2day-1, and the prevailing efficiencies of commercial solar-electric generators, then if solar collectors or modules were used to cover 1% of Nigeria's land area of 923,773km2, it is possible to generate 1850x103 GWh of solar electricity per year. This is over one hundred times the current grid electricity consumption level in the country.

Solar thermal applications, for which technologies are already developed in Nigeria, include: solar cooking, solar water heating for industries, hospitals and households, solar evaporative cooling, solar crop drying, solar incubators and solar chick brooding.

Solar electricity may be used for power supply to remote villages and locations not connected to the national grid. It may also be used to generate power for feeding into the national grid. Other areas of application of solar electricity include low and medium power application such as: water pumping, village electrification, rural clinic and schools power supply, vaccine refrigeration, traffic lighting and lighting of road signs, etc. Several pilot projects, surveys and studies have been undertaken by the Sokoto Energy Research Center (SERC) and the National Center for Energy Research and Development (NCERD) under the supervision of the ECN. Several PV-water pumping, electrification, and solar-thermal installations have been put in place.

Wind Energy

Wind, which is an effect from the uneven heating of the earth's surface by the sun and its resultant pressure inequalities is available at annual average speeds of about 2.0 m/s at the coastal region and 4.0 m/s at the far northern region of the country. Assuming an air density of 1.1 kg/m^3, wind energy intensity, perpendicular to the wind direction, ranges between 4.4 W/ m^2 at the coastal areas and 35.2 W/ m^2 at the far northern region.

Wind energy conversion systems (wind turbines, wind generators, wind plants, wind machines, and wind dynamos) are devices which convert the kinetic energy of the moving air to rotary motion of a shaft, that is, mechanical energy. The technologies for harnessing this energy have, over the years been tried in the northern parts of the country, mainly for water pumping from open wells in many secondary schools of old Sokoto and Kano States as well as in Katsina, Bauchi and Plateau States. A 5 kW wind electricity conversion system for village electrification has been installed at Sayyan Gidan Gada, in Sokoto State. Other areas of potential application of wind energy conversion systems in Nigeria are in "green electricity" production for the rural community and for integration into the national grid system. It has been reported that an average annual wind speed of not less than 5 m/s at a height of 10m above ground level is the feasible speed for the exploitation of wind energy at today's cost. Tractors and Equipment (T & E), a Division of the United African Company (UAC), at one time, produced windmills in Nigeria. Promising attempts are being made in Sokoto Energy Research Centre (SERC) and Abubakar Tafawa Balewa University, Bauchi, to develop capability for the production of wind energy technologies.

Even though there is a reasonable level of use of the renewable energy in the country, a significantly higher level could be attained. Nigeria surely needs the technical assistance from pro-active countries especially from the industrializing developing nations in:

(a) The widespread establishment of renewable energy data recording stations.
(b) Acquisition of small scale solar cells producing plant
(c) Acquisition of a manufacturing plant for components of the small hydro turbines.
(d) Acquisition of a manufacturing plant for components of wind turbine and generators and
(e) Infrastructure for bottling biogas for cooking and it use for generation of electricity.

Conclusion

Renewable energy is considered a viable solution to the energy challenges of Nigeria especially in the rural areas of the country and to the restrictions posed by the rising cost of conventional or traditional energy. In this article, the role of renewable energy technologies in meeting the energy challenges is discussed. Also consideration has been given to the factors affecting developments in the renewable energy sector, and efforts made to ensure capacity building for renewable energy, stimulation of the private sector, developing the markets for renewable energy, obtaining the necessary finance for renewable energy projects and the assistance of multilateral institutions in advancing renewable energy technologies in the country.

References

1 National Planning Commission (1997), "National Rolling Plan (1997 – 1999).
2 Report of the Inter-Ministerial Committee on Combating Deforestation and Desertification, August 2000.
3. The Presidency (1992). "Report on the National Fuelwood Substitution Programme".
4. Energy Commission of Nigeria (1998). "World Solar Programme, 1996 – 2005", Projects of the Government of Nigeria: Project Documents", ECN Abuja.

Member Get A Member Campaign A Success

Yi-Ming Wei Wins Complimentary Registration at the San Francisco IAEE International Conference

IAEE's *Member Get a Member* campaign was a smashing success with 42 new members added in the March to May period.

Members had their membership expiration date advanced three months for each new member referred. Advancements ranged from three months to one year as 31 members referred new members.

Professor Yi-Ming Wei, Dean and Professor of the School of Management and Economics, Beijing Institute of Technology, China, referred the most new members – 4! He won complimentary registration to the San Francisco International Meeting. In the process, he was able to establish the Chinese Committee for Energy Economics (CCEE), one of IAEE's newest Affiliates.

The program was such a success the IAEE Council has decided to run it again in the near future. Stay tuned.

Entering Renewable Energy Sources in the Spanish Electricity Market: The Effects of Regulatory Reforms

By Aitor Ciarreta and Carlos Gutiérrez-Hita*

European Legal Framework on Renewable Energy Sources

The generation of electricity from renewable resources (RES) in a liberalized electricity market is an energy policy issue in debate. Liberalization of the electricity sector jointly with the reduction of the greenhouse gas emissions are two main targets of energy policy within the European Union (EU). Despite the first officially renewable energy policy programme started in 1974, the first steps to meet the targeted objectives for renewable energy in the EU were taken in 1994 at the Madrid Conference, where the RES-E White Paper *Energy for the future - renewable sources of energy* was formalised. According to the Kyoto Protocol and the agreements following it, the EU commited itself to reducing emissions of greenhouse gases by 8% during the period 2008-2012 in comparison with 1990 levels. Concerning the electricity sector, the RES-E White Paper states that electricity production from RES could grow from the present 14.3% to 23.5% by 2010.

Liberalization of the electricity sector is an ongoing progressive process in all EU member states since the Directive 96/92/EC on the common rules for the internal electricity market. With respect to renewable electricity, liberalization of the market implies both new opportunities and threats. First, in a competitive market, renewable electricity may be less competitive than conventional electricity due to the failure of prices to account for all the costs of the associated environmental impact. As a result, an inefficient use of resources may occur. Therefore, efficiency requires that environmental costs be reflected in energy pricing. Unfortunately, reaching this target is hindered by two serious difficulties: incomplete information on environmental costs, and limited experience in the application of internal regulation mechanisms. Second, liberalization brings the opportunity for new agents to enter the market as long as the system operator guarantees free and indiscriminate access to the grid to promote competition.

In Spain and other member states priority has been granted to pass electricity generated by RES through the grid, as it was specified in the European Directive 1996/92/EC. Later on, the Directive 2001/77/EC and its amendments encourage the promotion of electricity from within the internal electricity market. The Directive follows up the RES-E White Paper on renewable energy sources which set a target of 12% of gross energy consumption from renewables for the EU-15 by 2010, of which electricity would represent 22.1%. With the 2004 enlargement, the EU's overall objective became 21%. This Directive is also an essential part of the package to comply with the commitments made by the EU under the Kyoto Protocol on the reduction of green house emissions.[1] In addition, the member states must adopt and publish a report setting the indicated national targets for future RES-E consumption. The Directive also provides for a system concerning the guarantee of origin of RES-E in order to facilitate exchange and to increase transparency while facilitating consumer choice. The guarantees of origin indicate both the renewable energy source from which the electricity is produced and the date and place of production.

In what follows, we explore how the implementation of this EU regulatory regime has enhanced generation from RES within the ongoing liberalization process in the Spanish electricity sector.

Policy Mechanisms to Promote Renewable Sources in the EU

Regulation attempts to internalize environmental costs by means of indirect mechanisms aimed at mitigating market imperfections. Since under Directive 2001/77/EC each country is free to choose their preferred support mechanism, many ways to support renewable energy and a broad variety of methods have been implemented in the different member states.

The major categories of relevant policy mechanisms are financial instruments and fiscal incentives. Financial instruments are economic incentives that encourage technological transformation favouring activities with a smaller environmental impact. The most prominent ones are the schemes based on direct price support, investment aid or tax exemptions or reductions. Under direct price support schemes, generators from renewable energy sources receive financial support per kWh supplied. There are essentially two categories of direct price support mechanisms within the EU; quota-based systems, and fixed-price systems. Under quota-based system, producers are obliged by the government to produce a fixed share of renew-

* Aitor Ciarreta is with the Department of Economic Analysis II, University of the Basque Country, Bilbao, Spain'e-mail: aitor.ciarreta@ehu.es. Carlos Gutiérrez-Hita is with the Department of Economic and Financial Studies, Universitas Miguel Hernández, Elche, Spain. email: cgutierrez@umh.es.
See footnotes at end of text.

able energy, determined through a competition mechanism. Two different mechanisms operate at present: green certificates and tendering schemes. Fixed-price systems imply that no quota or maximum limit is set for renewable energy. Such a limit or quota is, however, created indirectly by the level at which the renewable energy price is set.

Fiscal incentives include a given level of subsidy or tax deduction to promote the technological development of some expensive technologies. Granting some form of investment subsidy is a simple way of promoting the technological development of expensive, renewable energy techniques. Some member states also support renewable electricity, directly or indirectly, through tax incentives.

RES Regulatory Policy in the Spanish Electricity Market

The Special regime establishes the framework to promote electricity generation from RES. It has been regulated in Spain since 1980 when Law 80/1980 on Energy Conservation came into force. It established energy efficiency improvement objectives for the industry and reductions in external dependence. As a result self-generation of electricity and hydroelectric production in small power stations was encouraged.

Later, within the process of liberalization of the electricity market started with the General Electric Law 54/1997, Spain made an effort to promote the generation of electricity by RES to cope with Kyoto's targets on emissions of CO_2. Competition was introduced in generation and end-supply whereas transmission and distribution remained regulated. The law aimed to reconcile the liberalization of the electricity system with the objective of guaranteeing supply of appropriate quality, at the lowest possible price and minimizing the environmental impact. Installations under the Special regime, may leave any surplus energy to the network, offer it on the market or establish physical bi-lateral contracts. The economic framework was developed by the RD 2818/1998 of 23rd December, on electric energy production by installations using renewable resources, waste and co-generation.

The White Paper of 1997 started a program to promote the use of renewable sources implementing different policy instruments. The most relevant one was the modified Aid for Electricity Generated from Renewable and Combined Heat and Power Sources, which provides incentives for new installed capacity of renewable energy sources, and requires evaluation of costs and impacts as RES gain in popularity and stringency.

The National Energy Plan 1991-2000 established an incentive scheme for production by co-generation and RES to meet 10% of national electricity production in 2000 (up from 4.5% in 1990). Within this period, Law 40/1994 consolidated the Special regime concept as such, and RD 2366/1994 defined the principles established there in. It was concerned with hydroelectric energy production, co-generation and other installations supplied by RES.

In 1999, and in conformity with EU directives, the government approved a Plan for the Promotion of Renewable Energies which included the necessary relevant strategies so that the growth of energy produced from RES covers at least 12% of primary energy consumption by the year 2010. To meet this target, it is necessary to double production of renewable energies, as the demand for energy rapidly grows. The core of the current contribution of these energies comes from hydroelectric generation and from biomass generation (95% together).

The Royal Decree 436/2004 went beyond the scope of the Special regime. Distributors were obliged to purchase all the electricity generated by RES at a fixed price. As the amount of energy generated became more important, a fraction of the total had to be traded through the pool at the system marginal price. The way the fixed price was set followed an estimation of the fixed cost of production by the regulatory board.

Currently, the regulation that sets the legal framework for the special regime is RD 661/2007 which repeals RD 436/2004. The latter maintains the basic principles with minor changes though. The targets of Directive 2001/77/CE by 2010 come into force under the new regulatory framework. At least 29.4% of total electricity consumption should come from renewable sources. There are two possibilities to sell electricity generated by RES:

- Generators can put electricity directly into the grid, without passing across the Day-ahead market, and obtain a single regulated tariff for each hour of the day. Sells are done through the market operator although offers are at zero prices in the Day-ahead market, unlike offers from other technologies.
- Generators can make offers of electricity at the price resulting from the uniform-price auction of the Day-ahead market or at the price set through bilateral contracting, with a subsidy to compensate for the higher cost of generation as compared to the market price.

The National Energy Commission settles the payment of the Special Regime and publishes a report on energy purchases which includes the most relevant information on the aforementioned activity. In December 1999, and in agreement with the EU, the government approved a Plan for the Promotion of Renewable Energies which included the necessary relevant strategies so that the growth of each of the areas of renewable energies may cover, all together, at least 12% of primary energy consumption by the year 2010.

Table 1 reports electricity supplied to the market by type of technology: We distinguish between electricity generated in thermal units and the rest, including hydroelectric and RES.

There is an average growth of 3.6% every year[2]. We observe an increasing share of electricity from RES; from 15% in 2002 to 23% 2008. When hydroelectric generation is included, the shares increase to 25% in 2002 to 31% in 2008. Thus, Spain is not far from reaching the target set by Directive 2001/77/CE.

Figure 1 plots total electricity generation, RES and thermal generation for the same period.

The trend is towards an increase in the share of RES from total electricity generation. We observe a smooth growth as compared to hydroelectric generation which relies on water availability and alternative uses. Therefore, this one is a significant result of active investment and regulatory policies towards promotion of renewables.

	Special Regime		Hydro	Inter-	----------Thermal----------				
Year	Distribution	Market	electric	national	Nuclear	Coal-burning	Combined cycle	Oil-fired	Total
2002	33130	553	21234	9413	60596	77372	4699	11398	218395
2003	32545	5062	36316	8115	59571	72285	11749	6217	231860
2004	35883	6500	28132	7814	61416	73232	21456	4779	239212
2005	25762	23243	15930	8676	55380	74676	45200	7844	256711
2006	6151	40198	16866	11708	54496	51410	42670	4394	227893
2007	0	57010	26752	9913	53120	69711	53956	4064	274526
2008	0	65574	20435	6799	57033	43519	82038	4393	279791

Table 1. Electricity by Technologies

Source: OMEL and own construction.

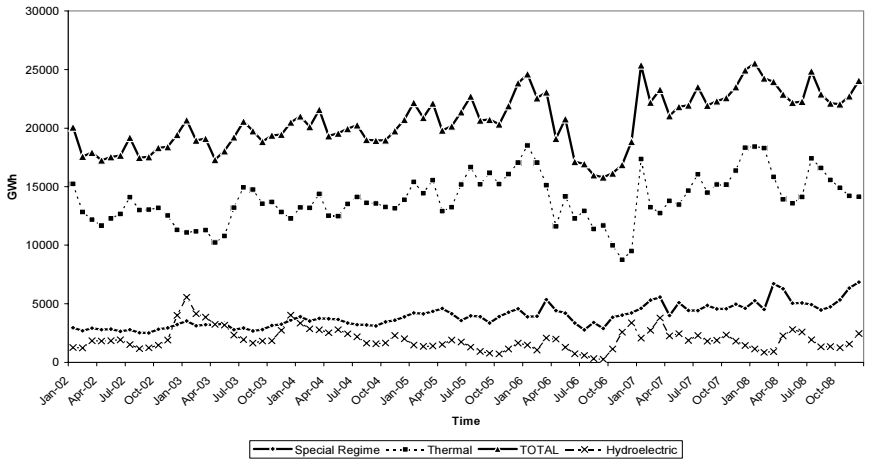


Figure 1. Energy by Tecnhology

Perspectives for the Future

Spain has made a significant effort to meet the EU targets on electricity consumption from renewable sources, as Table 1 and Figure 1 show. Technology is improving and, in the mid-term, it will be possible to further increase the presence of energy from renewable sources in the Spanish energy system, reduce system operational problems and limit the need for new conventionally generated power. But, in order to achieve this, it is essential to offer the agents efficient signs and a stable regulatory framework that allow them to adopt all these technological advances.

References:

1. Directive 1996/92/EC
2. Directive 2001/77/CE.
3. OMEL, Operador del Mercado Eléctrico, http://www.omel.es.
4. RD 436/2004 in Boletín Oficial del Estado 75, 27/03/2004.
5. RD 661/2007 in Boletín Oficial del Estado 178, 26/07/2007.
6. RES – E White Paper COM(97)599 final (26/11/1997).

Footnotes

[1] The definitions in Directive 1996/92/EC concerning common rules for the internal market in electricity are also applicable to this Directive.

[2] Note how in 2006 there was a significant drop of 11 percent in total consumption as compared to 2005. This is the result of Royal Decree 3/2006 that implied a significant decrease of total electricity through market.

Chinese Committee for Energy Economics of IAEE Founded in Beijing

The Chinese Committee for Energy Economics of IAEE (referred to herein as CCEE) was founded on May 16, 2009, at the Center for Energy and Environmental Policy Research (CEEP), Beijing Institute of Technology (BIT), China. There more than 100 experts, researchers, and Ph.D. candidates attended this meeting. They came from 30 organizations across China, including universities, energy companies, government department, such as Tsinghua University, Chinese Academy of Sciences, State Grid Corporation of China (SGCC), China National Petroleum Corporation (CNPC), Energy Research Institute of National Development and Reform Committee (ERI-NDRC), National Science Foundation of China, Chinese Academy of Social Sciences, State Information Center, Jiangsu University. The 1st China's Symposium on Energy Economics and Management was held at the same time.

Three special invited speakers, Professor Jiankun He (former executive vice president of Tsinghua University), Yunzhou Zhang (President of State Power Economic Research Institute of SGCC), Yande Dai (vice director of ERI-NDRC) respectively gave a keynote address at the meeting. And many other experts introduced their newest research on energy economics issues.

More than 60 individuals joined CCEE, most of them come from academies or universities, and many of them have published some influential papers about energy economics issues in international journals. The officials were elected at this meeting. Professor Yi-Ming Wei (Dean of School of Management and Economics of BIT, also the Director of CEEP-BIT) was elected as the president of CCEE. He also made a speech about the inter-discipline of energy economics, including its origin, emergence and development, the situation and challenge of China's energy economics research. Introduced and recommended by Prof. Wei, nearly 30 individuals from China have successfully applied for IAEE membership. And he was awarded the winner of IAEE's Member-Get-A-Member campaign for the March-May time period for referring the most IAEE new members to join IAEE.

China is the world's second largest energy supplier and consumer. On the other hand, as a developing country, its energy consumption per capita is far lower than the world average. During the latest 30 years, China has made great efforts on energy efficiency improvement, and its energy intensity has been reduced by +70%. More and more governors, experts, researchers and companies are interested in China's energy-economy issues. IAEE is the world largest non-profit, professional organization in the field of energy economics. The foundation of CCEE is helpful to widen the influence of IAEE, and also helpful to the communication and cooperation between China's and international professionals interested in the field of energy economics.

Hua Liao, hliao@yahoo.cn

Going to the ASSA Meetings in Atlanta, GA ???

Please remember to tick off the box on your registration form indicating that you are a member of IAEE. This helps IAEE establish presence at the meeting and builds our case for having more IAEE sessions on the program.

Many thanks!!!

Implications of the European Renewables Directive on RES-E Support Scheme Designs and its Impact on the Conventional Power Markets

By Marco Nicolosi and Michaela Fuersch*

Introduction

The desired increase in electricity from renewable energy sources (RES-E) was defined in the EU White Paper (1997) and is the political consensus. Its concrete embodiment, however, has been subject to political debate ever since. The EU parliament recently adopted very ambitious RES-E targets, which require a close look in terms of efficient policy implementation. In the past, the design of RES-E support schemes and their effects on resulting efficiency and effectiveness has been discussed widely. However, the implications on the conventional power market have been investigated mainly on a very abstract level, e.g., purely on the level of increasing RES-E quantities.

This article will show that the optimisation of the RES-E "submarket" does not necessarily lead to an overall efficient solution. Instead, the optimal mix of RES-E and conventional generation is highly sensitive to the long term planning of RES-E policies and targets.

The first part of this article will provide an overview of the recently decided RES policy of the European Union, and then a closer look will be taken on an efficient RES-E support scheme design needed to fulfil the European targets. It will be followed by a discussion on the RES-Es' impact on the conventional power market. The last part will summarise the aforementioned implications and their consequences on the RES-E support scheme design.

The European "Climate Package" and the Renewables Directive

The EU "climate package" was adopted by the EU Parliament on December 17th 2008 (EU Parliament, 2008). This package includes different directives, which define political targets of a 20% CO_2 reduction and 20% energy efficiency increase compared to 2005 and a 20% share of energy from renewable energy sources (RES) in gross final energy consumption by 2020. The renewables directive defines the RES targets for all individual Member States (MS), which can be seen in Table 1. These targets have been set by the EU commission with consideration of the 2005 RES share and two additional elements: First, a flatrate part, which is the same for all MS, and second, a GDP per capita part. Thereby, the effort sharing takes the economic situation of the individual MS into account. Through the possibility of statistical transfers of RES amounts, MS low target and resource rich countries can overshoot their targets and export the surplus to countries, which have a relative high target compared to their national RES potential. In addition to the statistical transfer, the new directive allows certain kinds of cooperation between MS. This cooperation can be project based or even a shared RES-E support scheme. Through this provision a step by step harmonisation is possible, not through an enforced top-down legislative decision, but through self-determined cooperation between MS as intended by the subsidiarity principle.

The allocation of renewable shares between the electricity, heating and cooling as well as transport sectors is the responsibility of the individual MS. By June 30th 2010, the MS need to provide national action plans to the EU commission (Article 4, European Parliament, 2008). While some countries have already defined RES-E targets for 2020 (e.g., Germany 30%), others still have no long term strategy. This article focuses solely on the effects on the electricity sector.

	1997 RES-E Actual	2006 RES-E Actual	2010 RES-E Target	2020 RES Target
Austria	67.5%	56.6%	78.1%	34%
Belgium	1.0	3.9	6.0	13
Bulgaria	7.0	11.2	11.0	16
Cyprus	0.0	0.0	6.0	13
Czech Republic	3.5	4.9	8.0	13
Denmark	8.8	25.9	29.0	30
Estonia	0.1	1.4	5.1	25
Finland	25.3	24.0	31.5	38
France	15.2	12.4	21.0	23
Germany	4.3	12.0	12.5	18
Greece	8.6	12.1	20.1	18
Hungary	0.6	3.7	3.6	13
Ireland	3.8	8.5	13.2	16
Italy	16.0	14.5	25.0	17
Latvia	46.7	37.7	49.3	40
Lithuania	2.6	3.6	7.0	23
Luxembourg	2.0	3.4	5.7	11
Malta	0.0	0.0	5.0	10
Netherlands	3.5	7.9	9.0	14
Poland	1.8	2.9	7.5	15
Portugal	38.3	29.4	39.0	31
Romania	30.5	31.4	33.0	24
Slovakia	14.5	16.6	31.0	14
Slovenia	26.9	24.4	33.6	25
Spain	19.7	17.3	29.4	20
Sweden	49.1	48.2	60.0	49
United Kingdom	1.9	4.6	10.0	15
EU-27	**13.1**	**14.5**	**21.0**	**20**

Table 1: RES-E share 1997, 2006; RES-E targets in 2010 and RES target in 2020.
Source: BMU, 2008; European Parliament, 2008.

What Happened So Far?

The last renewables directive was adopted in 2001 (2001/77/EC). Compared to the 2008 directive, the past directive directly defined RES-E targets for 2010 (see Table 1).

* Marco Nicolosi and Michaela Fuersch are with the Institute of Energy Economics, University of Cologne. Nicolosi may be reached at marco.nicolosi@uni-koeln.de

Although, the EU published the first RES-E directive in 2001, some countries had started during the 1990s with the RES-E support (e.g., Denmark, Germany, Spain). Bynow, the amount of RES-E generation has been growing constantly, as can be seen in Figure 1.

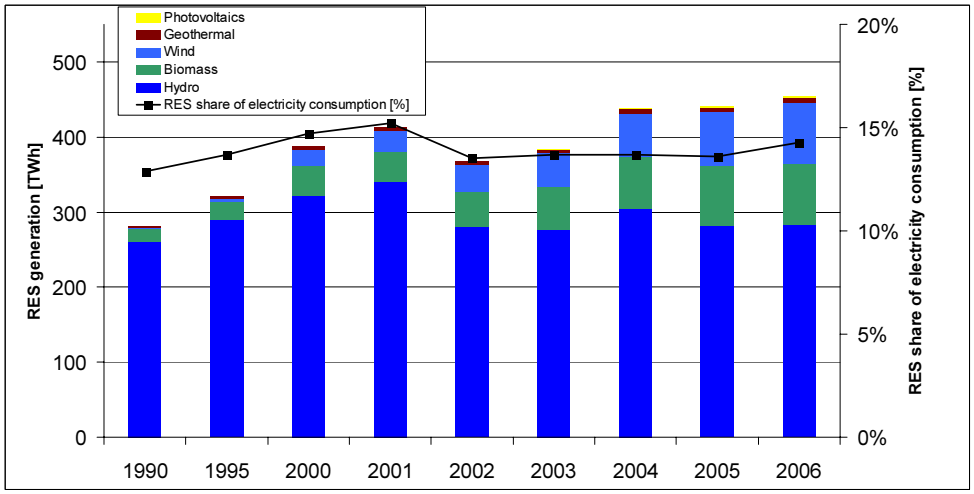


Figure 1: RES-E generation in the EU-25
Source: EWI, based on BMU (2008).

The main share of RES-E generation is based on large hydropower plants, which show a considerable volatility over the years. However, although the amount of the "new renewable technologies", such as wind power and biomass power show a significant increase, especially since 2000, it is striking that the RES-E share (black line) remains more or less at the same level. This is not surprising, considering the increasing electricity demand in some MS. This observation, amongst others, lead to the 20% energy efficiency improvement target of the EU until 2020.

As described above, the 2001 renewables directive has defined RES-E targets for all MS. The overall target for the EU-27 is 21% in 2010. As can be seen in Table 1, some countries are on track to meet their target, while others need to strengthen their effort in order to increase their RES-E share. In 2006, the European RES-E share was 14.5% (see Table 1). The EU Comissions' "Renewable Energy Road Map" (2007) assumes RES-E shares in different scenarios between 34.2 and 42.8 % in 2020.

Taking this target into account while considering the RES-E share of the last 15 years (which can be seen in Figure 1), at least three critical aspects need to be considered. First, the increase in electricity consumption needs to be lowered dramatically. Second, a strengthened effort of RES-E support is required and this needs to be accompanied with a clearer focus on efficiency. Third, since the issue of intermitting RES-E integration is already apparent in various countries (e.g., Germany and Denmark) with its current deployment, future impacts of significantly higher RES-E infeed requires a close look at the effects on the conventional power market. This article will analyse the latter two aspects.

Attributes of RES-E Support Schemes

The attributes of the different RES-E support schemes have been widely discussed in the past (see e.g., Lienert and Wissen, 2006; Sawin, 2004; Meneanteau et al., 2003; Lauber, 2003; Drillisch, 2001). Therefore, just a brief overview will be provided.

The first and main differentiation between FIT and quota systems is the price versus quantity based approach. While quantity based support schemes define a certain percentage of RES-E in the electricity mix which needs to be provided by the market actors, price based support schemes set a fixed price for an energy amount of RES-E (e.g., one MWh). Typically, quantity based support schemes should reach their defined target, but have an inherent uncertainty about the price. In general, quantity based support is accompanied by a tradable certificate system to increase the efficiency and to prove the renewable nature of the electricity. Price based systems, on the other hand, define a fixed price. The resulting amount of RES-E depends solely on political price setting.

The second typical attribute is technology specific versus technology neutral support. While the "typical" FIT scheme has technology specific tariffs to support infant technologies, quota systems are usually technology neutral. This means that every produced MWh RES-E has the same value. Therefore, quota systems should lead to a cost efficient deployment, since the construction starts with the cheapest and usually most mature technology at the best site. Technology specific support, on the other hand, is often justified by the value of a broader RES-E mix in the future. The main argument is that infant technologies should be supported in order to generate experience effects, which lead to cost reductions. However, these statements mirror only the typical designs. It is very well possible, and has happened in reality, that FIT can be designed technology neutral (e.g., the German Stromeinspeisegesetz 1991-2000, which lead to early wind power deployment). On the other hand, quota systems could very well design either band-

ings (sub quota for individual technologies) or a different value per MWh from a particular technology (e.g., one MWh from wave power plants receives two certificates in the Quota Obligation System, which starts in UK in April 2009).

The third attribute is the possibility of harmonisation. Harmonising support schemes means a shared system for more than one country. The rationale behind harmonisation is efficient geographical deployment, where RES-E generation costs are the lowest. As mentioned above, in the past the deployment has been solely dependent on the national support system. From a political economy point of view it is much easier to harmonise quota systems, by defining common rules and adding EU-wide targets (e.g., Norway and Sweden are discussing a shared quota system with the option for additional participating countries). Harmonising FIT systems requires bargaining about every technology specific tariff. This is already an effort on a national level, since the influence of interest groups plays an important role. In a harmonised system, different resource qualities in different regions would increase the difficulties of the political process.

Economic Criteria

In assessing support schemes, the economic criteria of efficiency and effectiveness should play a crucial role (Häder, 2006; Lienert and Wissen, 2006). The efficiency criterion needs to be subdivided into a static and a dynamic perspective. Static efficiency means that a certain amount of RES-E becomes generated at the lowest possible cost. Dynamic efficiency, on the other hand, also investigates future costs. It could be more efficient to invest in an infant and more expensive technology in order to have lower RES-E costs in the long run. Dynamic efficiency, of course, is very difficult to measure due to the high degree of uncertainty.

From a static efficiency perspective, the quota system has the lead against the FIT since the RES-E deployment is the cheapest possible deployment. When it comes to dynamic efficiency, there is a chance that the FIT system could trigger infant technologies, which become a cheap solution in the future, but there is an inherent uncertainty. It might very well be that the quota system finds the cheapest solution in the long run.

Effectiveness can be subdivided into stimulation and target achievement. Stimulation means the ability to trigger the RES-E deployment. This alone would not be a strong criterion since the more incentives are provided, the higher is the stimulus. The stronger criterion is the achievement of the target, since a target overshooting is as bad as a shortfall. Of course, some countries, such as Germany define minimum targets. However, the impact on consumer cost and the remaining market actors need to be considered here.

The quota system should reach the target per definition, otherwise penalties must be paid. Therefore, the stimulation criterion is reached as well. In theory, the quota system should have the lead. In reality, however, quota systems also fell short of their targets. Of course, this is very dependent on the particular design of the system and on the administrative surroundings (such as grid access) as well as on public acceptance. The stimulation effect of FIT systems also is very dependent on its design, especially in the setting of the tariffs. While some countries have only low deployment rates, others overshoot their targets. Germany, for instance in 2007 has already reached 14.2% RES-E while its 2010 minimum target is 12.5%. However, it is an inherent attribute of price based support that the quantity outcome is uncertain and strongly depends on the available information of the policy designers who set the tariffs.

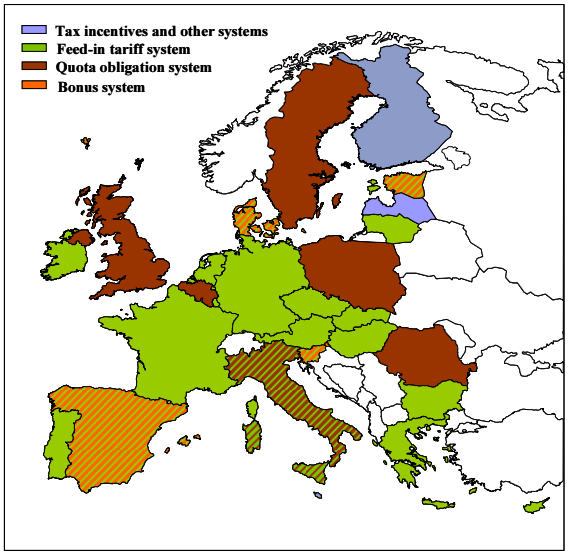


Figure 2: RES-E Support Schemes in the EU
Source: EWI

Current Status of the European RES-E Support Landscape

There are many different RES-E support scheme designs installed in the individual MS. Currently 18 countries have chosen a price based support, such as FIT or premium systems to support their RES-E deployment. Six countries use quantity based support, i.e., quota systems; and three countries have implemented a tax based support or other systems (see Figure 2).

These uncoordinated national activities have lead to an RES-E deployment which is not based on the quality of the natural potential of a region, but solely on the kind of support a certain technology receives

in a particular country. Figures 3a and 3b show the spread between the quality of the natural resources and the RES-E deployment.

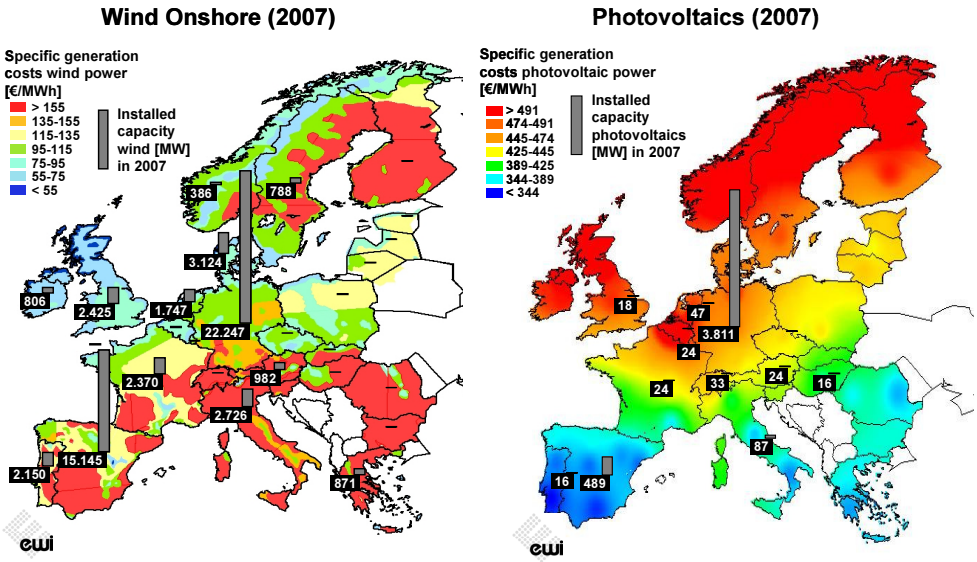


Figure 3a and 3b: Regional Potential Qualities and Deployment of Wind Power and Photovoltaics in 2007
Source: EWI

The colour coding shows the regional electricity generation costs. It can be seen, that the wind power deployment mainly took place in Germany, Spain, and Denmark. These countries have been early starters and chose FIT for their RES-E support. The statement of this picture becomes even more clear when it comes to photovoltaic (PV) support. As can be seen in figure 3b, the best resources are located in southern Europe. Although the generation costs between Spain and Germany differ by more than 100 €/MWh, the deployment in Germany exceeds the Spanish deployment considerably. This as well can be attributed to the technology specific FIT support in these countries.

It seems that the "typical support schemes" have inherent weaknesses, which lead to either inefficiencies and/or a failure when it comes to target achievement. In reality, one can observe that the FIT systems start to adopt also elements of quantity based support, such as capacity caps (e.g., Spain for PV) or afore planned technology deployment paths, which have feedback loops on the tariff setting (German PV tariffs receive a stronger reduction if predefined targets become overshoot). On the other hand, quota systems start with typical price based attributes, such as different values of the tradable certificates (e.g., UK with a higher tradable certificate value for immature technologies).

Taking the possibility of an EU wide harmonisation into account, the quota system should lead to the most static efficient deployment, since the cheapest potential becomes utilised in an ascending order throughout Europe.

Effects of RES-E Integration on Conventional Power Market Through Intermitting RES Technologies

Independent of the support scheme, the vast amount of planned RES-E increase in the near future is going to have an enormous impact on the conventional power system. By now, electricity from onshore wind power plants is one of the cheapest RES-E options. One particular attribute of wind power is that it is strongly dependent on the natural circumstances of the wind. Therefore, the RES-E generation is not guaranteed in the hours of peak demand. However, through regional distribution, it is also unlikely that still air is present at all regions. That means a certain amount of wind capacity can be counted as guaranteed. This guaranteed capacity, which is called capacity credit, is able to substitute for a certain amount of conventional capacity in the power plant mix. Compared to the RES-E infeed however, the share of substitutable capacity is relatively low. Dena (2005) has shown that a wind capacity of 14.5 MW in 2003 in Germany had a capacity credit of between 7 and 9%, meaning that it could substitute for between 1.0 and 1.3 GW of conventional capacity. One important implication is that an increasing penetration reduces the relative capacity credit. The above mentioned study also calculated that the planned 35.9 GW wind capacity in 2015 would have a capacity credit of only 5 to 6%. Figure 4 shows, which effects this attribute has on the conventional power mix. The upper right corner shows marginal cost curves with annuity capacity costs as starting point at the ordinate. It can be seen, that base load plants have relatively high investment cots and low variable costs (especially fuel costs). Peak load plants on the other hand have low investment costs and relatively high variable costs. The abscissa shows the annual utilisation time at which the plant types are efficient. Base load plants are economically feasible when a high utilisation time can be reached and peak load plants are only the efficient choice when the utilisation remains at a low level (see e.g., Stoft, 2002). In the lower right corner, two annual duration load curves are depicted. This means that the annual load hours are arranged in a subsequent order. The highest peak

load hour is arranged at the left end and the hour with the lowest demand at the right end. The upper curve is the total load and the lower curve is the residual load curve. The latter is the load curve less the electricity production, which is not part of the conventional power market or has no variable costs, such as some RES-E technologies. In other words, a part of the load is already covered by market exogenous generation. The shift of the shares of the different power plant types can be seen in the lower left corner. The result of high RES-E infeed with a relatively low capacity credit is an increase in peak load capacity and a decrease in base load capacities. Since the RES-E infeed already covers a certain share of the demand, the utilisation time of base load plants will be reduced. This effect will apply especially in hours with low load and high RES-E infeed.

Implications on the RES-E Support Schemes

The above mentioned impact on the conventional power plants indicates that the most efficient RES-E deployment with respect to the RES-E market alone might lead to heavy distortions in the requirement the conventional capacity mix has to fulfil. The corresponding costs could overcompensate the efficiency effects in the RES-E submarket.

The most efficient overall solution cannot be achieved with a mix of RES-E technologies alone, without consideration of a conventional technology mix. Meaning, the conventional power market needs to adapt to the additional requirements that the increasing RES-E share places on it. That is, as a consequence of a relatively cheap increase in wind power deployment, increasing investments need to be undertaken in flexible technologies, which do not require a high utilisation time to be profitable in the market. Additional flexibilities in the power market could be grid extensions, storage technologies and demand side management.

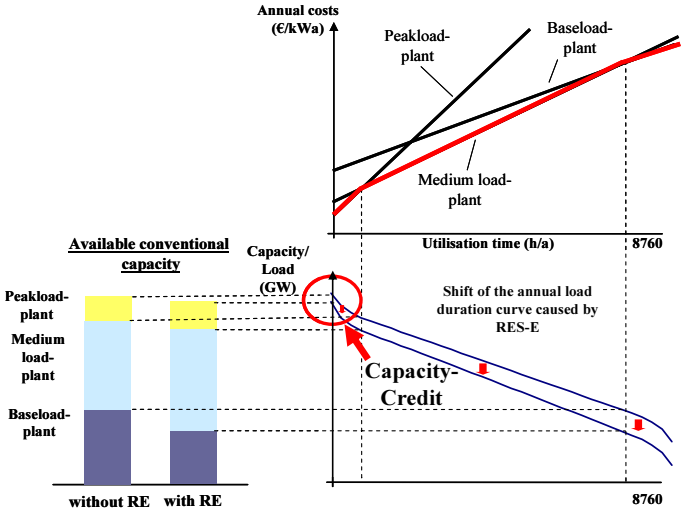


Figure 4: Effect of an Increasing RES-E Share on the Conventional Power Mix

Source: Wissen and Nicolosi, 2008.

One key figure in conventional investment planning is the desired share of RES-E in the power market. Since conventional capacities have long technical lifetimes of more than 30 years, sound financial planning requires an assessment of the utilisation time throughout the lifetime. This explains why the correct achievement of the predefined targets is a strong criterion. If the RES-E deployment overshoots the politically set targets, it has a strong negative influence on the financial plan of a conventional power plant investor. When there is no defined long term plan available, the investor seeks a higher return on the risk, which either increases the investment costs or lowers the available capacity in the market, which on the other hand is necessary to fulfil the requirements of security of supply with a high RES-E share.

In order to start one step earlier and reduce the impact on the conventional power market, a more balanced RES-E support is required. In order to increase the capacity credit without affecting the RES-E amount, a more diversified RES-E mix is desirable. A mix of different RES-E technologies assures a higher capacity credit through the portfolio effect. Thereby, the starting point of the residual load curve in Figure 4 could be lowered, which leads to a decrease in peak load capacity requirement.

Finding the optimal RES-E mix with its corresponding conventional capacity mix requires careful policy design between the European MS. Especially, when a market, such as the conventional power market is so heavily affected by political activities, early signalling of long term plans are required in order to find an efficient solution.

References

BMU (2008): Erneuerbare Energien in Zahlen – nationale und internationale Entwicklung, Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit, Berlin.

Dena (2005): Energiewirtschaftliche Planung für die Netzintegration von Windenergie in Deutschland an Land und Offshore bis zum Jahr 2020, Deutsche Energie-Agentur, Berlin.

Drillisch, J. (2001): Quotenmodell für regenerative Stromerzeugung – Ein umweltpolitisches Instrument auf liberalisierten Elektrizitätsmärkten, Schriften des Energiewirtschaftlichen Instituts, Oldenbourg Industrieverlag, Muenchen.

(continued on page 43)

Broaden Your Professional Horizons

Join the

International Association for Energy Economics

In today's economy you need to keep up-to-date on energy policy and developments. To be ahead of the others, you need timely, relevant material on current energy thought and comment, on data, trends and key policy issues. You need a network of professional individuals that specialize in the field of energy economics so that you may have access to their valuable ideas, opinions and services. Membership in the IAEE does just this, keeps you abreast of current energy related issues and broadens your professional outlook.

The IAEE currently meets the professional needs of over 3400 energy economists in many areas: private industry, non-profit and trade organizations, consulting, government and academe. Below is a listing of the publications and services the Association offers its membership.

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

Alternative Transportation Fuels	Hydrocarbons Issues
Conservation of Energy	International Energy Issues
Electricity and Coal	Markets for Crude Oil
Energy & Economic Development	Natural Gas Topics
Energy Management	Nuclear Power Issues
Energy Policy Issues	Renewable Energy Issues
Environmental Issues & Concerns	Forecasting Techniques

• **Newsletter:** The IAEE *Energy Forum*, published four times a year, contains articles dealing with applied energy economics throughout the world. The Newsletter also contains announcements of coming events, such as conferences and workshops; gives detail of IAEE international affiliate activities; and provides special reports and information of international interest.

• **Directory:** The Online Membership Directory lists members around the world, their affiliation, areas of specialization, address and telephone/fax numbers. A most valuable networking resource.

• **Conferences:** IAEE Conferences attract delegates who represent some of the most influential government, corporate and academic energy decision-making institutions. Conference programs address critical issues of vital concern and importance to governments and industry and provide a forum where policy issues can be presented, considered and discussed at both formal sessions and informal social functions. Major conferences held each year include the North American, European and Asian Conferences and the International Conference. IAEE members attend a reduced rates.

• **Proceedings**: IAEE Conferences generate valuable proceedings which are available to members at reduced rates.

To join the IAEE and avail yourself of our outstanding publications and services please clip and complete the application below and send it with your check, payable to the IAEE, in U.S. dollars, drawn on a U.S. bank to: International Association for Energy Economics, 28790 Chagrin Blvd., Suite 350, Cleveland, OH 44122. Phone: 216-464-5365.

- -

_____**Yes**, I wish to become a member of the International Association for Energy Economics. My check for $80.00 (U.S. members $100—includes USAEE membership) is enclosed to cover regular individual membership for twelve months from the end of the month in which my payment is received. I understand that I will receive all of the above publications and announcements to all IAEE sponsored meetings.

PLEASE TYPE or PRINT

Name: ______________________________

Position: ______________________________

Organization: ______________________________

Address: ______________________________

Address: ______________________________

City/State/Zip/Country: ______________________________

Email: ______________________________

Mail to: IAEE, 28790 Chagrin Blvd., Ste. 350, Cleveland, OH 44122 USA or
Join online at http://www.iaee.org/en/membership/

3/09News

The European Biofuels Policy and Sustainability

By Christine Rösch and Johannes Skarka*

Introduction

Various policy goals – reducing greenhouse gas emissions, boosting the decarbonisation of transport fuels, diversifying fuel supply sources and developing long-term replacements for fossil oil while increasing income and employment in rural areas – have motivated the European Union (EU) to promote the production and use of biofuels using both legislation and formal directives. However, EU biofuels production is impeded by its limited production area, yields and relatively high production costs. Therefore a large amount of biofuels has to be imported from developing countries in Latin America, Asia and Africa. Due to increasing concerns about the world-wide impacts of biofuels on food prices, rainforest destruction and social issues, the EU has proposed a directive to guarantee that biofuels produced in or imported into the EU are produced in a sustainable way (EU Commission 2008). This proposal will be critically analysed in this article. First, the targets for biofuels in the EU and other countries and the ecological and social impacts of biofuels production will be addressed.

Biofuel Targets

The EU is aiming at replacing 5.75% of all transport fossil fuels (petrol and diesel) with biofuels by 2010 and 10% by 2020 (EU Commission 2007). Influenced by the concerns addressing the negative impacts of biofuels mentioned above, the EU has broadened the 10% biofuel target: apart from biofuels other renewable energy sources such as electricity or hydrogen may contribute as well. Besides the EU there are many other countries with ambitious biofuel targets (Table 1).

Impacts of Biofuels Production

The production of biofuels can lead to different ecological, economic and social impacts which can overweigh their advantages. The main concerns are related to the destruction of habitats and thus biodiversity, e.g., through deforestation, the acceleration of climate change by releasing high amounts of stored carbon, the competition with food production resulting in high prices for food, the availability of water and negative social impacts (e.g., child and forced labour).

Country	Biofuel Target	Main Energy Plant/resource at Present
Brazil[a]	25% bioethanol since 2003 5% biodiesel by 2013	sugar cane soybean, palm oil, castor oil
China	10% bioethanol in five provinces (biodiesel without significance)	maize, wheat, cassava, sweet sorghum, waste oil, jatropha,
EU[b]	5.75% biofuels by 2010 and 10% biofuels by 2020	wheat, sugar beet, canola, sunflower, soybean
India	10% bioethanol by 2008 5% biodiesel by 2012	molasses, sugar cane jatropha, palm oil (import)
Indonesia	10% biofuels by 2010	sugar cane, cassava, palm oil, jatropha
Canada	5% bioethanol by 2010, 2% biodiesel by 2012	maize, wheat, straw, animal fats, vegetable oil
Malaysia	5% biodiesel in public transportation	palm oil
Thailand	10% bioethanol by 2011 10% biodiesel by 2012	molasses, sugar cane, cassava palm oil, waste oil
USA	136 Mio. m^3 bioethanol by 2022 (approx. 12%) 3.78 Mio. m^3 biodiesel by 2012 (approx. 2%)	maize soybean and other oleiferous fruits

[a] The shares will be exceeded due to economically competitive bioethanol production costs of 30 $/barrel.
[b] The shares are under discussion and will probably be dropped.

Table 1: Biofuel Targets (share of all transport fossil fuels) of Selected Countries (according to LfL 2007)

Conservation of Biodiversity

The increasing demand for biofuels will result in changes in land use which can negatively affect the goal to conserve biodiversity. A significant change in land use derives from the intended abolishment of the EU obligation of set-side land in 2009 (EU Commission 2009). Also in other parts of the world set-aside land which contributes to the conservation of biodiversity is cultivated again due to an increase in the demand for biofuels (and food), e.g. in the CIS countries, South America and Asia. Moreover, rainforests are cleared to plant oil palms and pastures rich in biodiversity are used more intensively or even converted to arable land. A further

* Christine Rösch and Johannes Skarka are with the Research Centre Karlsruhe at the Institute for Technology Assessment and System Analysis in Germany. Christine Rösch may be reached at christine.roesch@itas.fzk.de
See footnotes at end of text.

negative impact on biodiversity results from constraints to the expansion of organic farming which has positive impacts on biodiversity. These effects can counteract the EU targets of Gothenburg to stop the decline of biodiversity in Europe by 2010 (EU Rat 2001) and the targets of the Convention on Biological Diversity, an international treaty that was adopted by the United Nations in Rio de Janeiro in June 1992.

Protection of the Climate

Direct and indirect land use changes and direct and indirect emissions of greenhouse gases (GHG) during plant production can induce high GHG emissions leading to increased net GHG emissions rather than savings from substituting fossil fuels by biofuels (RFA 2008). Accordingly, converting peatland rainforests in Indonesia and Malaysia incur a very long "carbon payback time" of over 400 years (Fargione et al. 2008). Moreover, the use of nitrogen fertilizers in biofuels production can lead to N_2O emissions with a global warming potential which is 300 times higher than that of CO_2. Due to these N_2O emissions, the replacement of fossil fuels by biofuels may not bring the intended climate cooling (Crutzen et al 2008).

Water Supply

Water is a major prerequisite of biomass production. Irrigation of agricultural land claims for 70% of the pumped water. Lundqvist et al. (2007) assumes that the global consumption of water will double until 2045 if the EU and the U.S. adhere to their biofuel development plans and their ambitious biofuel targets. In regions with scarce water resources the start-up or extension of biofuels production can lead to problems concerning drinking water abstraction and the conservation of biodiversity (Berndes 2002, De Fraiture et al. 2008). However, looking at the implications of biofuels production on the water balance, it has to be considered that "green" water has not been adequately included in the calculation so far. The usage of "green" water which is bound in the soil and plants has no implications on the availability of drinking water (Falkenmark et al. 1998). Only the "blue" water of aquifers, lakes and rivers used for the irrigation of biofuel plants is relevant for the water balance. Besides, water quality can be affected by using fertilizers and pesticides to grow biofuel plants if these substances end up in surface or ground water. The National Research Council (2007) assumes that increased wheat production for biofuels in the US could damage the water supplies as well as water quality.

Food Supply

The extension of biofuels production can arouse conflicts with the production of food, because first generation biofuels are based on the same edible plants. The OECD (2007) and FAO (2007) declared that the growing demand for biofuels accounts for increased food prices and biofuels production leads to deferrals on the world markets for commodities. However, as only 1.9% of the global arable land is used for biofuels production, the growing demand for biofuels cannot be the only driving force for high food prices. Other influencing factors may be higher production costs and a growing demand for high value food products such as meat and milk. Moreover, the development of the trade volume in future markets presumes that speculative transactions and new financial instruments are the main reasons for the dramatic increase in food prices. Because of these high food prices one of the millennium goals of the United Nations may not be reached, namely to halve the proportion of people suffering from hunger by 2015 (UN 2008). On the other hand, today enough food is produced to satisfy the needs of the world population (Baumann 2008). In spite of a rising demand for food and biofuels, there will be enough land available for sufficient food production even in 2020 (RFA 2008).

Social Aspects

In developing countries biofuels production can contribute considerably to value creation. For instance, in Brazil the sugar and ethanol industry is the economic sector that shows the highest number of employees (Brazilian embassy 2007). However, forced labour and degrading working conditions can be observed. According to the World Bank an industrial and export-oriented agriculture should be the main strategy to fight poverty and hunger in rural areas of developing countries (World Bank 2007). But for this purpose large-scale farming is required. That may conflict with a diversified agriculture and small farming operation. One of the worries of the IAASTD[1] (2008) is that strong investors will concentrate the ownership of agricultural resources and suppress smallholders and peasant communities. This could lead to negative impacts on employment and income in rural areas as well as to environmental problems. Thus, regulations concerning the production of biofuels in developing countries are necessary to avoid

problems similar to those of cash crop growing (Fritsche et al. 2005).

The EU Proposal for a Sustainable Biofuels Production

Due to these various issues the European Commission made a proposal for a directive on the promotion of the use of energy from renewable sources in January 2008. Amongst others this directive should assure a sustainable production of biofuels (EU Commission 2008). The proposal was already discussed by the Council of the European Union and the Committees of the EU Parliament. This article refers to the outcome of the first reading in December 2008 (EU Council 2009). In particular the mentioned directive aims at preventing an expansion of the area needed for the production of biofuels at the expense of biodiversity. The proposed rules apply to biofuels produced in the EU as well as to imported biofuels and other bioliquids[2]. A certification system is planned to ensure compliance with the sustainability criteria. Thus, only biofuels shall be taken into account for the national biofuel targets if

- the required production areas have not been forests undisturbed by significant human activity, protected areas, species-rich grassland or land with high carbon stock (wetlands, continuously forested areas) in January 2008;
- the GHG emission saving from their use is at least 35% and at least 50% from 2017 and to 60% for new installations from 2017.

The proposal could meet the challenges concerning biodiversity and climate change coming along with the production of biofuels. However, a closer look reveals some deficiencies, which are discussed below.

Leakage Effects

A major weak point of the EU proposal is that leakage effects[3] cannot be averted. On the one hand only biofuels produced for use in the EU are certified. Thus, exporting countries like Brazil or Malaysia can use land which does not comply with the proposed EU directive for the production of biofuels to satisfy their own needs or the demand of importing non-EU countries. On the other hand the proposal does not envisage instruments to prevent impacts caused by indirect land use change, since land used for food production may be occupied for the production of biofuels. Food production, for which the sustainability criteria of the proposal are not valid, then has to be moved to other areas. Eickhout et al. (2008) found similar results. To avoid these indirect effects, broadening the criteria to the production of food and feed was arrogated (BMU 2008). At least the EU proposal recommends concluding agreements addressing the indirect effects with third countries. However, even if the prevention of undesired land use change was achieved, an enlargement of the production of biofuels could affect biodiversity, since a considerable part of biodiversity can be found outside of protected areas (Haber 2008).

Concerning the production of biodiesel from palm oil, leakage effects are even exacerbated under certain circumstances by defining default values for GHG emission savings in the EU proposal. According to these values, biodiesel from palm oil and hydrotreated palm oil[4] cannot achieve the threshold for GHG emission savings because of methane gas emissions resulting from open storage of oil mill residues and effluents (figure 2). Against this, the GHG emission threshold can be reached by using the residues and effluents to produce biogas in a fermenter plant. Instead of using the default values, the EU proposal alternatively permits the calculation of GHG emission savings according to the calculation method defined in the proposal. In doing so, it is allowed to take into account carbon stock changes in biomass and soil which are due to land use changes. For example, by converting food or feed cropland (medium carbon stock) into an oil palm plantation (high carbon stock), the resulting GHG emission savings are above 140% (figure 1)[5].

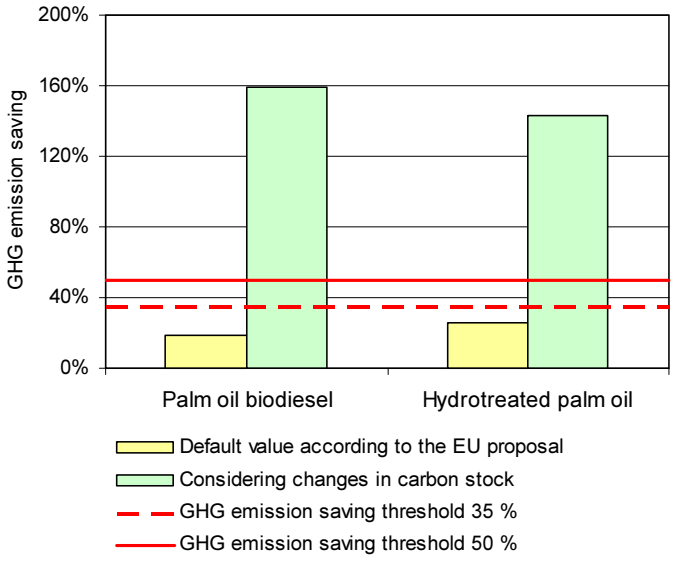


Figure 1. GHG emission savings due to biofuels production from palm oil, with and without converting agricultural land to an oil palm plantation. Values for carbon stock and yields following EU Commission (2008), all other values and the calculation method used are according to EU Council (2009).

Thus, the conventional palm oil production (without the co-production of biogas) could be certified, which would promote the conversion of cropland into oil palm plantations and hence the leakage effect.

Further Review of the EU Proposal

The stepwise increase of the threshold for GHG emission savings from 35 to 50% from 2017 (and to 60% for new installations from 2017) will indeed induce technical progress. However, first generation biofuels will only make a minor contribution to the total EU GHG emission savings: a target of a 10% share of biofuels in the transport sector by 2020 would lead to only 1% savings of total EU emissions[6]. An earlier and further augmentation of the savings threshold should be aspired.

Only two sustainability criteria are operationalised for the certification according to the EU proposal, namely biodiversity and climate protection. Following a holistic view (see Kopfmüller et al. 2001) this is not sufficient to assure a sustainable production of biofuels. The implementation of other criteria concerning the environment like soil and water protection would be desirable. If latter should have to be implemented, shall be decided by 2012. Food security and social aspects are addressed in the EU proposal, but only reporting and monitoring of food and commodity prices as well as other social aspects in the European community and important exporting countries are considered. Moreover, the reports shall state whether important exporting countries have ratified and implemented certain conventions of the International Labour Organisation (e.g., concerning forced or child labour). If an unfavourable development is identified, the commission shall propose corrective actions. Since possible consequences are not described, it is not clear whether this part of the regulation will become effective.

A more comprehensive approach for a global sustainability standard for the biofuels production has been proposed by the Roundtable on Sustainable Biofuels (RSB 2008). Besides regulations to reduce GHG emissions and the loss of biodiversity, also regulations to protect water, soil and air as well as to ensure food security, human and labour rights are included. However, another question is whether it will be possible to effectively implement appropriate legislation and regulation and control the compliance with the criteria in important developing countries. Furthermore, the fast-rising demand for biofuels is a hurdle for the implementation of environmental, social and human rights standards for biofuels production.

Conclusion

The EU proposal is a step forward towards a sustainable production of biofuels. However, only two ecological criteria, i. e., climate protection and biodiversity, are implemented in the certification system; social criteria are not included. Thus, a sustainable biofuels production is not assured from a holistic point of view. In addition, considerable leakage effects are to be expected if third countries expand the production of biofuels for their own needs or for export to other countries than the community at the expense of areas which are not appropriate production sites in terms of the proposed sustainability criteria.

Because of the shortcomings of the EU proposal the biofuel targets have already been reviewed by the EU and several member states. Adjusting the targets to the availability of suitable land and the feasibility of a socially acceptable biofuels production would be desirable. Furthermore a global strategy for sustainable biofuels production would be reasonable to coordinate measures to enhance efficiency and environmental compatibility within the framework of an international panel. Efforts in research and development for innovative biofuels production technologies should be part of this strategy as well as the development and implementation of social standards. Despite the occurring sustainability issues, great opportunities for biofuels and a more righteous use of the available resources seem to be possible by introducing technical and regulatory measures.

Footnotes

[1] International Assessment of Agricultural Science and Technology for Development.

[2] Such as the combustion of palm oil in a combined heat and power unit.

[3] Spatial dislocation of issues that cannot be avoided by a certification system. See also Lewandowski and Faaij (2006: 91).

[4] Palm oil thermochemically treated with hydrogen which then has a greater lower heating value than biodiesel from palm oil.

[5] Figures are calculated based on the default values for carbon stock of several land use types from a former version of the proposal (EU Commission 2008a). These default values are not part of the proposal anymore and a methodology for the calculation of land carbon stocks shall be developed by 31 December 2009 based on the 2006 IPCC Guidelines for National Greenhouse Gas Inventories – volume 4. Nevertheless, basically the described

mechanism might still be valid irrespective of the calculation method.

[6] The share of the transport sector in GHG emissions is about 21% in the EU (EEA 2007).

References

Baumann, M. 2008. Rising food prices - The lethal bussines of hunger. Alliance sud news, 56: 1–3. http://www.alliancesud.ch/english/files/D_PnAs56.pdf (accessed 12.01.2009).

Berndes, G. 2002. Bioenergy and water – The implications of large-scale bioenergy production for water use and supply. Global Environmental Change 12/4: 253–271.

BMU (Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit). 2007. Entwurf einer Biomasse-Nachhaltigkeitsverordnung. www.bmu.de/files/pdfs/allgemein/application/pdf/bionachv_entwurf.pdf (accessed 08.05.2008).

Brazilian embassy. 2007. Biofuels. http://www.brasilemb.org/index.php?option= com_content&task=view&id=62&Itemid=108 (accessed 11.02.2009).

Crutzen, P., A. Mosier, K. Smith, W. Winiwarter. 2008. N_2O release from agro-biofuel production negates global warming reduction by replacing fossil fuels. Atmospheric Chemistry and Physics 8/2: 389–395.

De Fraiture, C., M. Giordano, Y. Liao. 2008. Biofuels and implications for agricultural water use: Blue impacts of green energy. Water Policy 10 Supplement 1: 67–81.

EEA (European Environment Agency). 2007. Annual European Community greenhouse gas inventory 1990–2005 and inventory report 2007. EEA Technical report 7/2007. Kopenhagen: EEA.

Eickhout, B. et al. 2008. Local and global consequences of the EU renewable directive for biofuels. Testing the sustainability criteria. MNP report 500143001/2008. Bilthoven, NL: Netherlands Environmental Assessment Agency.

EU Commission. 2007. Renewable Energy Road Map – Renewable energies in the 21st century: building a more sustainable future. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2006:0848:fin:en:pdf (accessed 12.01.2009).

EU Commission. 2008. Proposal for a directive of the European Parliament and of the Council on the promotion of the use of energy from renewable sources. http://ec.europa.eu/energy/climate_actions/doc/2008_res_directive_en.pdf (accessed 12.01.2009).

EU Council. 2001. Presidency conclusions. Göteborg European Council 15 and 16 June 2001. http://www.consilium.europa.eu/ueDocs/cms_Data/docs/pressdata/en/ec/00200-r1.en1.pdf (accessed 15.01.2009).

EU Council. 2009. Proposal for a Directive of the European Parliament and of the Council on the promotion of the use of energy from renewable sources – Outcome of the European Parliament's first reading (Strasbourg, 15 to 18 December 2008). http://register.consilium.europa.eu/pdf/en/08/st17/st17143.en08.pdf (accessed 15.02.2009).

Falkenmark, M., J. Lundquist, C. Widstrand. 1998. Macro-scale water scarcity requires micro-scale approaches: Aspects of vulnerability in semi-arid development. Natural Resources Forum 13/4: 258–267.

Fargione, J., J. Hill, D. Tilman, S. Polasky, P. Hawthorne. 2008. Land clearing and the biofuel carbon debt. Science, 319/5867: 1235–1238.

Fritsche, U.R., K. Hünecke, K. Wiegmann. 2005. Kriterien zur Bewertung des Pflanzenanbaus zur Gewinnung von Biokraftstoffen in Entwicklungsländern unter ökologischen, sozialen und wirtschaftlichen Gesichtspunkten. Freiburg: Öko-Institut. www.oeko.de/oekodoc/232/2004-023-de.pdf?PHPSESSID=5h0u3ct2ccthqg1kqs3e50spo5 (accessed 31.10.2008).

Haber, W. 2008. Biological Diversity – A concept going astray? GAIA 17/Supplement 1: 91–96.

IAASTD (International Assessment of Agricultural Knowledge, Science and Technology for Development). 2008. Executive summary of the synthesis report. http://www.agassessment.org/docs/SR_Exec_Sum_280508_English.pdf (accessed 31.10.2008).

Kopfmüller, J. et al. 2001. Nachhaltige Entwicklung integrativ betrachtet. Konstitutive Elemente, Regeln, Indikatoren. Berlin: Edition Sigma.

Lewandowski, I., A. Faaij. 2006. Steps towards the development of a certification system for sustainable bioenergy trade. Biomass and Bioenergy 30/2: 83–104.

LfL Ernährungswirtschaft. 2007. Agrarmärkte. Jahresheft 2007. Teilauszug Nachwachsende Rohstoffe. Schriftenreihe der Bayerischen Landesanstalt für Landwirtschaft.

Lundqvist, J. et al. 2007. Water pressures and increases in food & bioenergy demand implications of economic growth and options for decoupling. In: Scenarios on economic growth and resource demand. Background report. Swedish Environmental Advisory Council. 55–152.

National Research Council. 2007. Water implications of biofuels production in the United States. The National Academies. Report in Brief. http://dels.nas.edu/dels/rpt_briefs/biofuels_brief_final.pdf (accessed 31.10.2008).

OECD (Organisation for Economic Co-operation and Development, FAO (Food and Agriculture Organization). 2007. OECD-FAO agricultural outlook 2007–2016. www.oecd.org/dataoecd/6/10/38893266.pdf (accessed 08.05.2008).

RFA (Renewable Fuels Agency). 2008. The Gallagher review of the indirect effects of biofu-els production. www.dft.gov.uk/rfa/_db/_documents/Report_of_the_Gallagher_review.pdf (accessed 31.10.2008).

RSB (Roundtable on Sustainable Biofuels). 2008. Global principles and criteria for sustainable biofuel production. Version Zero. http://www.bioenergywiki.net/images/f/f2/Version_zero.pdf (accessed 31.10.2008).

UN (United Nations). 2008. The Millennium Developments Goals Report 2008. http://mdgs.un.org/unsd/mdg/Resources/Static/Products/Progress2008/MDG_Report_2008_En.pdf#page=12 (accessed 12.01.2009).

World Bank. 2007. *World Development Report 2008*. Washington, D.C.: World Bank.

FIRST ANNOUNCEMENT AND CALL FOR PAPERS

Dramatic events of last few years: very fast energy demand growth in developing countries, artificially stimulated economics in developed countries and related with that banking crisis, the largest energy price shock in modern history and following global recession, growing evidence of global warming and looming difficulties in production of primary energy resources presents a unique environment for activities and businesses of energy economists and policy makers. All of that creates a vast medium of thoughts for researchers active in energy economics and great challenges for politicians responsible for energy policies.

The 11th IAEE European Conference "Energy Economy, Policies and Supply Security: Surviving the Global Economic Crisis" will provide excellent opportunity to present and discuss the results of newest studies preformed in such exceptional circumstances. The conference will bring together wide spectrum of scientists, policy makers, professionals from all energy sectors, governmental and public institutions. This conference for the first time will take place in Vilnius - the capital of Lithuania, at the year when Lithuania will celebrate 20th anniversary of regained independence.

That opens good opportunity for participants of the conference to learn more about the specifics and problems of energy sector's development in the Baltic States and the wider region around them. The problems of the integration of that region to the future PanEuropean energy market should be one of most important topics of Vilnius conference.

We are looking forward seeing you in Vilnius.

Prof. Jurgis Vilemas
General Conference Chair

Conference topics

- ☐ Energy supply security (political, economical and technical)
- ☐ Sustainability of energy systems, mitigation of global warming
- ☐ Role of renewable energy sources and biofules
- ☐ Energy demand forecasting
- ☐ Energy sector analysis and modeling
- ☐ Energy policy
- ☐ Geopolitics of energy supply (gas, oil, nuclear and etc.). Price of security
- ☐ Road map for energy efficiency
- ☐ Market integration and liberalization
- ☐ Energy sector risk analysis
- ☐ Specific energy sector problems of CEE countries
- ☐ Nuclear energy: hopes and realities
- ☐ Environment

Call for Papers

Abstract Submission Deadline: 9 April 2010

We are pleased to announce the Call for Papers for the 11th IAEE European Conference to be held on 25-28 August 2010. You are cordially invited to submit proposals for presentations at the concurrent sessions on a range of topics highlighted but not limit to above.

Please submit abstracts of maximum two pages in length, comprising: overview, methods, results, conclusions. Please attach a short CV. The lead author submitting the abstract must provide complete contact details: mailing address, phone, fax, e-mail etc. Accepted abstracts will be published in the printed abstract volume. At least one author for each accepted paper must pay a registration fee and attend the conference.

Authors will be notified by 9 May 2010 of their paper status. Authors, whose abstracts are accepted, will have to submit their full-length papers (up to 10-12 pages limit suggested) by 9 July 2010 for publication in CDROM conference proceedings. While multiple submissions by individual or groups of authors are welcome, the abstract selection process will seek to ensure as broad participation as possible: each speaker delivers only one presentation in the conference. If multiple submissions are accepted, then a different co-author will be required to pay the speaker registration fee and present the paper.

Abstracts must be submitted electronically as a text document (doc; NO pdf) via the following link:

http://www.iaee2010.org

Conference Venue

Vilnius is the capital of Lithuania since 1323. About 554 000 people of various nationalities and different religions are living there. Despite wars, occupations and destruction, the architectural ensemble of Vilnius remains unique. It is the largest Baroque city in North-East Europe. Nearly all styles of European architecture from Gothic to Classicism are present in Vilnius. Contemporary Vilnius is a modern, forward looking and dynamic city, which attracts people and charms them.

For long ages the picturesque Old Town and National Museum of Lithuania could tell a lot about honorable past of this city and the whole country, which in 2009 celebrates solid 1000 years anniversary of being for the first time mentioned in historical annals. Because of its unique and openness the Old Tow of Vilnius is enrolled into the list of UNESCO World's Cultural Heritage.

The conference venue is Reval Hotel Lietuva, Konstitucijos av. 20, located at the administrative center of the city within walking distance to Old Town, major museums, other cultural sights, restaurants and many hotels.

Registration fees

Participants	Early registration, EUR	Late registration, EUR
Speakers/Chairpersons	450	475
IAEE members	500	550
Non-members	650	700
Students	250	275
Accompanying persons	225	250

Cancellation/Refund policy: A refund (less 100 EUR administration fee) is available until 19 July 2010. From 19 July, there will be no refund given, but a delegate from the same organisation may be substituted.

Organizing by:

IAEE WWW.IAEE.ORG INTERNATIONAL ASSOCIATION for ENERGY ECONOMICS

www.aee.lt Energetikos Ekonomikos Asociacija Association for Energy Economics

AIEE Celebrates 20 years

AIEE – the Italian Association of Energy Economists, and the second largest affiliate of the IAEE – celebrated on April 27 2009 its twentieth anniversary, with the presence of IAEE President, Georg Erdmann.

The President of AIEE, Edgardo Curcio, reconstructed for the audience the history of the Association, starting from the seminal event of a meeting he had with Prof. Peter Odell during an international event of IAEE. Back to Rome, his idea of creating an Association of energy economics in Italy met with positive reactions and some support. In the following months, he went to London to discuss this idea with Jane Carter, the Vice President of BIEE, the British affiliate of IAEE, and had from her a bunch of detailed information and some good practical advice on how to create a new affiliate.

In the meantime, a more accurate investigation discovered that ENEA (the Italian Agency for Energy and Environment) had actually already established six years earlier (since May 16, 1983) an Affiliate indicated as "Italian Section of IAEE". Founding members included Vittorio Silvestrini, Nicola Merzagora, Andrea Pecchio, Luigi Cuozzo and Andrea Ketoff. However, this association had not operated in practice and had essentially remained on paper.

l to r Ernesto Nathan, Georg Erdmann and Edgardo Curcio at the AIEE 20th Anniversary Celebration.

After taking stock of its statute and regulations, Edgardo Curcio, together with a group of supporters, decided to re-found the Italian Affiliate of IAEE, calling it "Associazione Italiana degli Economisti dell'Energia - AIEE" (Italian Association of Energy Economists), and giving it, with a new constitutional act, a different statute that would better reflect the "non-profit" nature of an organisation devoted to discuss and diffuse the energy issues in Italy.

On January 20, 1989, the Italian Association thus saw the light, with the founding members making up the first Board of Administration: Edgardo Curcio (then Vice President), Nicola Merzagora (President), Andrea Ricci (Secretary), Ernesto Nathan (Treasurer), Giuseppe Carta, Vittorio D'Ermo and Alberto Clô (Counsellors).

Edgardo Curcio recalled the twenty years of activity of the Association, from the first steps taken at the beginning of the 1990's, when AIEE was hosted in the offices of ISIS (Istituto di Studi per l'Integrazione dei Sistemi- Study Institute for System Integration), going through the organisation of the first IAEE International Conference in Rome in 1995 – entitled "Energy Strategy for Europe" – until today.

Following the great success of the Conference in 1995, AIEE broadened its bases and its structures, and the number of its members grew correspondingly. Other important conferences were organised, with the support of the European Commission, on "Energy Efficiency in Household Appliances," in 1997 in Florence and in 2000 in Naples.

The President of AIEE took part in all international conferences of IAEE, and in 1997 entered the Board of IAEE as Vice President for Finance for the period 1997-1998.

In 1999 AIEE organized in Rome the XXII International IAEE Conference entitled "New Equilibria in the Energy Markets: the role of new regions and areas." The conference headquarters was the Hotel Parco dei Principi, and the events took place in famous historical places: the Vatican, St. Saba, the Palatine. This event had a wide international success, increasing the prestige of the Italian association in Europe and among the IAEE affiliates.

AIEE got the reputation of one of the most efficient and well organized IAEE affiliates, often taken as a model by all new entrant affiliates. The number of members grew and exceeded 230, and all activities increased correspondingly.

In 2007 the AIEE organized the 9th IAEE European Conference in Florence entitled "Energy Markets in a Larger Europe" which had a considerable success with over 450 participants, many events and prestigious awards organized in historical places such as Palazzo Pitti, Palazzo Vecchio etc.

After being for some time in the Board of IAEE as a member and as Vice President for Development, in 2008 Andrea Bollino – Vice President of the Italian affiliate, became President of IAEE. He thus also contributed to making AIEE known throughout the world, participating in conferences and helping to create new affiliates in Africa and Asia.

Today AIEE has 280 individual members, 37 institutional members (all the major associations and many energy companies), 50 student members and, after the American affiliate, it is the largest national organization of IAEE.

AIEE started publishing in 1998 its own book collection, which now has issued the 12th volume and each year is enriched with new publications. It also publishes a Newsletter "Energy and Economics", whose director is Prof. G.B. Zorzoli.

It participates in many activities with scientific research organizations, universities, institutions and bodies and carries out consultancy for a number of important institutions like the Ministry of Economic Development, the Authority for Energy, GSE and other. It prepares studies and services for its members and also organizes seminars and conferences of mutual interest.

It also participates in European projects and international studies - EMIL (1997), White & Green (2004), EUSUSTEL (2006), ENERIS (2007) - alone or together with other European organizations.

In 1996 AIEE decided to enter the sector of post-graduate education and organized with the Luiss Management University the first post-graduate course on "Economics and Management of Energy Sources" which was followed by three other editions in 1997, 1998 and 1999. In 2000 the AIEE left the Luiss Management University and organized with the Faculty of Engineering of Rome University "La Sapienza", the first post-graduate course "MEA -Management of Energy and the Environment" which became a 2nd level Master course and reached in 2009 its eighth edition having a high success in terms of participation and post-course placement.

In 2004 AIEE organized, together with the University of Rome, "La Sapienza" an International Master on Energy and Environment in China at the South-Eastern University of Nanjing (in English and Chinese). Essentially the same course was repeated in 2006-2007.

Starting with this year, AIEE has also organised in Rome an international MBA (in English) with Link-Campus University of Malta, on "Energy and Sustainable Development", mostly for non-Italian students. Georg Erdmann, President of IAEE, and Gurkan Kumbaroglu, President of the Turkish IAEE Affiliate, are part of the Faculty. The course is supported by the Euro-Mediterranean initiative through EMUNI, the European-Mediterranean University of Portoroz, Slovenia, where the students are spending three weeks..

In 2006, AIEE founded the Energy Foundation, a new instrument, a non-profit structure, with an ethical mission and the objectives of an open foundation ready to give birth to projects of public interest, in the energy and environmental sector.

The Foundation has a large specialized library, and is involved in important projects. Under the leadership of its Scientific Director, Federico Santi, it is engaged in studies and research work using the Times-Markal economic models.

In 2007-2008 AIEE became a Sustainable Energy Partner in the European campaign to raise awareness and change the landscape of energy: "Sustainable Energy Europe" and is preparing to implement this year a series of seminars and conferences on these issues. The Italian participation in this campaign is coordinated by the Ministry of Environment and Protection of Land and Sea.

After the short presentation of the AIEE story the President presented awards to: Giuseppe Carta, Vittorio D'Ermo, Andrea Ketoff, Andrea Ricci, Ernesto Nathan, Carlo Andrea Bollino, Carlo Di Primio, Ugo Farinelli, Francesco Ferrari, Federico Santi and GB Zorzoli for their precious support given to the creation and activity of the Association.

At the end of the ceremony the President of AIEE thanked Georg Erdmann, Professor of Energy Systems at the University of Berlin and President of the IAEE, for his participation in the ceremony and in the workshop on "Sustainable Mobility and hybrid cars" which was held just before the celebration and gave him as a souvenir of his visit in Rome a silver coin from the period of the Roman Empire (240 AD).

Highlights from the 32nd IAEE International Conference

Editor's note: This summary first appeared in the USAEE Dialogue and is reprinted with thanks to USAEE and Nihan Karali.

This year's conference was held in San Francisco, California. The three-day conference attracted more than 350 attendees and highlighted renewable energy as one of the most popular topics of the conference. But oil & gas industry issues such as oil price, LNG trade and unconventional resources, prospects of the nuclear industry and environmental challenges were not ignored. Following are observations from some of the plenary sessions.

The conference started with a welcome and opening talk of **Joseph Dukert**, General Conference Chair and President of the United States Association for Energy Economics. He gave a brief thanks to conference committee members and conference sponsors. **Georg Erdmann**, President of the International Association for Energy Economics (IAEE), outlined main conference topics, setting the context by referring to the effects of financial and economic crisis on energy sectors, primarily on the oil and gas industry, and the effects of economic recession on GHG emissions and upcoming climate talks on following the Kyoto treaty.

During the keynote speech, **Gary G. Mar, Q.C**., representative of the Government of Alberta discussed the state Alberta's economy, its place in energy field, and its actions on climate change. Mr. Mar referred to climate change as a global problem that needed a global solution. He said "Looking at the national and international level, both Canada and the United States are moving forward with new climate change legislation and the world will be gathering in December to replace the Kyoto Protocol." With respect to GHG regulatory framework, Mr. Mar mentioned the importance of finding balance and harmony among energy production, environmental responsibility and economic growth. Alberta has the world's second largest proven oil reserves and produces around 1.7 million barrels of oil per day with three-quarters of that production coming from the oil sands. It is the largest exporter of oil to the U.S. and also provides almost 50% of U.S natural gas imports, which is equal to 8% of total U.S. consumption.

The plenary session on climate change policies was chaired by **James Sweeney**, Director of the Precourt Institution for Energy Efficiency, Stanford University. **John Weyant** from Stanford University talked about their latest research on domestic and international climate change policy scenarios. For international study they mainly run 10 different models with 10 different scenarios and for domestic study there were 6 different models with 3 different scenarios. International scenarios are combinations of three concentration goals based on Kyoto gases, two means of achieving concentration goals, and two international policy regimes. The ten models, Mr. Weyant listed, are ETSAP-TIAM (Canada), FUND (E.U.), GTEM (Australia), IMAGE (E.U.), MERGE (U.S.), MESSAGE (E.U.), MiniCAM (U.S.), POLES (E.U.), SGM (U.S.), and WITCH (E.U.). Emission reductions and economic cost of scenarios varied from model to model. For domestic study 3 different Cap & Trade scenarios were applied by using 6 different models. All models showed reductions in emission through 2050. MiniCam model was the one which led to highest reduction. When the carbon prices were compared MiniCam gave the lowest price. When it comes to sectoral comparison, electricity generation and transportation sector had the greatest reduction with each model type. Moreover, each scenario and each model reflected energy consumption loss through 2050.

Mr. Kennedy from California Air Resources Board gave a presentation titled "Climate Change in California". His presentation mainly focused on energy efficiency as a great tool for emission reduction. He looked for answers of the questions; "What would be achieved by consuming energy more efficiently? How to make California's economy much more energy efficient?" Transportation sector was responsible for 40% of emissions in California mainly due to improvements in gasoline quality, supplying low carbon fuels, supporting alternative fuel vehicles such as biofuels, electric, and hydrogen. His main focus was keeping the pressure on the efficiency topic and making it publicly known as well as emphasizing its impact on energy prices.

Brian P. Flannery, manager of Science Strategy and Programs, Exxon Mobil Corporation, gave an interesting talk on Climate Change Policy by comparing Cap & Trade with Carbon Tax. He started his talk with the phrase of "Climate policy requires a risk management framework and brings uncertainty. Stabilization requires global participation including both developed and developing countries." He listed

- Agreeing on "fair" national caps through international negotiation
- National capacity to implement and enforce economy-wide caps
- Wealth transfers
- Assuring international compliance

- Linking national and regional trading schemes
- Credibility and integrity of a common carbon/GHG currency
- Transitions as system evolves

as the challenges on initiating a global GHG-Carbon Market. The primary challenge is to set a uniform and predictable cost of GHG emission reduction. Those kinds of market prices drive the solutions by promoting global participation. However, the price volatility

- Undermines long-term planning and investment
- Creates economic inefficiency
- Enhances wealth transfer to trading from actions to reduce emissions

He said that there was a need for a common CO_2 price for a long term mitigation objectives.

In the special session, **Mark Finley**, General Manager, Global Energy Markets of BP, talked about "Volatility and Structural Change", starting with a general discussion of the world economy; the decline trends in both GDP and world trade growth. Then, he analyzed the energy prices; recession in oil, coal, and gas prices from the beginning of 2008. At the beginning of 2008, the oil production growth decreased by almost -1,5 million barrel/d. However, there was a significant growth of gas production in Gulf of Mexico between 1999 and 2008. Coal consumption also showed dramatic decrease all over the world, except India and China. Wind and solar energy capacities were increased; 30% growth in worldwide wind capacity and 70% growth in worldwide solar capacity.

The plenary on "The future of renewable" was governed by **Gary Stern**, Southern California Edison. **Robert M. Margolis**, National Renewable Energy Laboratory, mainly covered three issues: implementing renewable electricity, using energy efficiently in various sectors, and finding substitutes for fossil fuels. He also discussed technological challenges to renewable energies such as their integration into the existing grid. **Todd P. Strauss**, Pacific Gas & Electric Company, pointed out the importance of implementing long-standing state policies to encourage the use of energy efficient technologies and renewable resources. A discussion of various legislations and deadlines imposed by the government of California underlined the challenge to companies such as PG&E. Finally, **Ryan Pletka**, Black & Veatch Corporation, summarized his observations on U.S. renewable energy trends. About 3% of 2008 electricity generation came from renewable sources, 1.3% of which was from wind and 1.4% of which was from biomass. A comparison of costs of renewable energies with those of conventional resources, and tax and subsidy policies was very informative.

The plenary on "Drivers of oil price and the outlook for the future" was chaired by **Samuel A. Van Vactor**. **Robert McCullough's**, in his talk titled "Pickens' Peak Redux: Fundamentals, Speculation or Market structure", focused on the relationship between the price of oil and few critical variables. Comparing the OECD inventory data with the price movements (an increase of 45% in 2008 and a drop of 80% in 2009); he concluded that there was a disconnect between market fundamentals (demand & supply) and the price. In a linear regression analysis, he also investigated the role Dow Jones, Euro, and non-commercial acquisitions among others. Some of the results were interesting; for example, there was no clear relationship between Euro and European oil demand as some might have claimed. Picking up on the same theme, **Jeffrey H. Harris**, Chief Economist at the Commodity Futures Trading Commission, focused on crude oil, pointing out the price changes of recent times: +66.8% between January '07 and February '08 versus -62.8% between February '08 and February '09. He briefly talked about trading behavior and hedge funds stabilizing before going into the use of econometric techniques such as ARCH, GARCH and Granger causality test in analyzing the price movements and their reasons. He voiced a question that is in everyone's mind: do commodity index traders' investments increase prices? CFTC's recent interest in establishing federal limits on speculative positions for finite commodities like oil probably answers that question.

The second day of the conference started with the dual plenary sessions. The first plenary, "Energy Market Developments in the Pacific Basin," was directed by Mr. **Kenichi Matsui**, Institute of Energy Economics. **Micheal Lynch**, Strategic Energy & Economic Research, started his talk by pointing out energy security problem and difficulty of accessing the resources. Japan, Korea, and China have the most significant strategic reserves. All of these countries need large imports of oil and natural gas. The global natural gas market continues to evolve and present various risks in supply but probably more so in demand, partly because of lacking market price signals. As such, pricing of long-term contracts indexed to oil or products, be it pipeline or LNG, becomes risky with long-term impact. **David Fridley** from Lawrence Berkeley National Laboratory focused on the role of coal in China, which is the largest coal based economy in the world. Local coal consumption in the country showed a drastic growth from

1980 to 2005. The industrial sector accounts for 75% of total consumption. Moreover, 80% of China's electricity generation is coal based and it is expected that coal based CO_2 emission of China will exceed the total emission of the U.S. in 2010. **Makoto Takada**, Institute of Energy Economics, talked about nuclear applications in Asia. There is a long history of nuclear power in several countries. The lack of emissions also renders nuclear a good option under a scenario of increased GHG regulation. But there are problems facing the expansion of nuclear capacity in Asia, including grid integration, training of staff (especially for safety) and proliferation risks. Working with small and medium sized reactors could overcome some of these concerns.

The dual plenary session "Unconventional Resources: Impacts and Issues" was chaired by **Andre Plourde**, University of Alberta. **John Wimer**, U.S. DOE, National Energy Technology Laboratory, focused on affordable, low-carbon diesel fuel from domestic coal and biomass. In a world of increasing demand for energy, especially from the emerging economies, the role of oil will remain essential as more people become mobile. Looking for alternative fuels for the transportation sector that is also cleaner burning is a main challenge for NETL. Coal resources, as in many countries, are large in the U.S.; the ability to derive low-carbon diesel fuels from coal as well as biomass via gasification and liquefaction could go a long way towards increasing energy security and reducing emissions, assuming carbon capture and sequestration. **Frits Euderink** from Shell E&P Company discussed unconventional resources such as heavy oil/oil sands, oil shale, and gas-to-liquids, and biofuels that have been recognized as important ways of meeting growing global energy demand of the world. In the U.S. resource base can be as large as 1.5 trillion barrels. But recovery of such resources faces many challenges: high costs, land reclamation, water management, emissions and regulatory and permitting processes. Carbon capture and sequestration again becomes a necessary but not sufficient condition for garnering support around the development of these resources. **Gordon Pickering**, Navigant Consulting talked about "The Dynamics of Abundance of North American Domestic Natural Gas Supply." U.S. gas production increased due to a decade of increased unconventional production. Production in gas shale had the most dramatic increase. Major Shale Basins in North America showed a remarkable growth. Mr. Pickering believes that EIA continues to underestimate potential growth in gas supply: there is 15 bcfd difference between EIA and NCI forecasts for 2020. One way to use this difference is GTL, which could meet 75% of diesel needs in 2020.

Before a remarkable reception in Exploratorium, the afternoon dual plenary sessions were held. "Energy Market Integration - Developments in LNG" session was chaired by **Glen E. Sweetnam** from the DOE/EIA. **Fisoye Delano** from Poten & Partners discussed recent LNG market trends. For years, LNG meat Japan but new major markets have been growing 17% per year versus 3% per year growth in traditional major markets. The LNG market is also much more diverisiefed and flexible with seasonal contracts and destination clauses. Power generation will drive the need for LNG. The current overhang over LNG supply will dissipate after 2013, pending clarity on LNG project costs and timely FIDs to bring on new supplies when they will be needed. **Christian von Hirschhausen**, Technische Universitat Dresden, talked about competition, contracts and cartel in the world natural gas industry. Europe, Japan, China, India, Indonesia and South Korea are the major LNG importing countries and their import capacities are growing year by year. Contract duration is positively correlated with project specific investment. Mr. Hirschhausen, then, introduced WGM, World Gas Model, as a simulation model of the global natural gas market. WGM is a partial market equilibrium model with optimization problems for individual players. Model results indicate that the risk of a gas cartel or Russian dominance is manageable and that the increased shale gas production in the U.S. may impact LNG trade expectations.

William J. Pepper from ICF International introduced International Natural Gas Model. This model

- Simulates production, processing, transport, transformation, and demand for natural gas globally
- Models activities for 60 nodes with 16 regions
- Demand information comes from EIA WEPS+ and NGTDM model
- But modified for higher electricity demand in the U.S.
- Used to develop reference scenario through 2030 and sensitivities looking at oil prices and shale oil resources

Base case scenario results of the model showed that

- Global demand for natural gas is growing by sector and by region: As a region Middle East share and as a sector power generation share are the largest in 2030.
- Global production by type: conventional onshore stays almost same until 2030 while tight/shale grows.

- Global production by region: Russia and Middle East shares grow.
- Tight/shale production by region: China has the highest volume.

Kenneth B. Medlock, Rice University, chaired the dual plenary session "Energy Market Integration - Developments around the Globe." **Mark K. Jaccard**, Simon Fraser University focused on climate policy in Canada and what we learned from past policy failures. Differences between resource rich provinces such as Alberta and Saskatchewan, fear of losing export competitiveness due to higher cost of production and inability and/or unwillingness of politicians and major interest groups to recognize that "non-compulsory policies" have negligible effects. Mark also demonstrated that international offsets, especially if they are cheap and can be used to meet large chunks of emission reduction obligations undermine local emission reductions. **Carlo Andrea Bollino**, GSE talked about road to Copenhagen in Europe. EU climate action and renewable energy package has a goal of limiting global average temperature to an increase no more than 2°C above preindustrial levels. EU wants to achieve this goal by leading the clean technology development sphere as it tries to balance energy security, economic competitiveness and environmental sustainability.

Conference Chair, **Fereidoon P. Sioshansi** directed the plenary session on "International Trends in Nuclear Power." Perhaps not surprisingly, there was strong French presence. **Ana Palacio** of Areva presented nuclear energy as one of the solutions to climate change problem. There is increasing demand for nuclear technology around the world with many countries wanting to build their first plants. Technology is advancing to increase safety. High capital costs remain a challenge. A list of other issues also impact nuclear decisions: regulated v deregulated markets, existence and severity of carbon regulation, size and financial capability of utilities, electricity demand growth rate and availability of alternative fuels such as coal and natural gas. **Jean-Pierre Benque** from EDF Development presented along the same lines as Ms. Palacio, emphasizing low-carbon benefits of nuclear energy. An important point is that standardization of fleet as is the case for EDF in France. **Chris Larsen**: Mr. Larsen who is a Nuclear Power and Chief Nuclear Officer from Electric Power Research Institute, EPRI, talked about today's nuclear power options and mentioned mission of EPRI: to perform research to sector and society.

The concurrent sessions of this year's conference covered, as usual, a wide range of topics with many good papers, salient presentations, high attendance and lively Q&A sessions. Conference participants also enjoyed the social program of the conference. Overall, it was an enjoyable, informative and productive conference.

Nihan Karali
University of Texas at Austin and
Bogazici University

Implications of the European Renewables Directive (continued from page 29)

European Commission (1997): White Paper for Renewable Energy: Targets for Electricity and Transport, COM(97)599, Brussels.

European Commission (2007): Renewable Energy Road Map Renewable energies in the 21st century: building a more sustainable future, SEC(2006)1719, Brussels.

European Commission (2008): Impact Assessment – Document accompanying the Package of Implementation measures for the EU's objectives on climate change and renewable energy for 2020, SEC(2008) 85/3, Brussels.

European Parliament (2008): Promotion of the use of energy from renewable sources, text adopted at the sitting of Wednesday 17 December 2008, P6_TA-PROV(2008)0609, Brussels.

European Renewables Directive (2001): Directive (2001/77/EC) of the European Parliament and of the Council on the promotion of electricity produced from renewable energy sources in the internal electricity market, Brussels.

Lauber (2004): REFIT and RPS: options for a harmonised Community framework, Energy Policy 32, pp. 1405–1414.

Lienert und Wissen (2006): Bewertung von Fördersystemen für erneuerbare Energien: Eine kritische Analyse der aktuell geführten Diskussion, Zeitschrift für Energiewirtschaft 30/2, pp. 133–140.

Menanteau P., Finon, D. and Lamy, M. (2003): Prices versus quantities: choosing policies for promoting the development of renewable energy, Energy Policy 31, pp. 799–812.

Sawin (2004): National Policy Instruments - Policy Lessons for the Advancement & Diffusion of Renewable Energy Technologies Around the World, Thematic Background Paper, Renewables Conference 2004, Bonn.

Stoft (2002): Power System Economics, Wiley & Sons, New York.

Wissen and Nicolosi (2008): Ist der Merit-Order-Effekt der erneuerbaren Energien richtig bewertet?, Energiewirtschaftliche Tagesfragen, (58) 1/2, pp. 110-115.

Welcome New Members!

The following individuals joined IAEE from 4/1/09 to 6/30/09

Mohammed Abdulijabbar
Saudi Aramco
Saudi Arabia

Olawunmi E Abraham
Eastwind Laboratories
Nigeria

Olaniji Adedapo-Asida
Negris
Nigeria

Adeniyi J Adedokun
University of Ibadan
Nigeria

Abosede P Adeusi
University of Ibadan
Nigeria

Yinka Adeyemi
University of Ibadan
Nigeria

Anna Aeloiza
Mi Swaco
USA

Udoma J Afangideh
University of Uyo
Nigeria

Vineet Aggarwal
Chevron
USA

Bolajoko A Ajidagba
University of Ibadan
Nigeria

Hans Akesson
Svenska Gasforeningen
Sweden

Olwabukola Akinsola
University of Surrey
United Kingdom

Fawaz Hamd Al Fawaz
Al-Khabeer Merchant Finance Co
Saudi Arabia

Sammy Al Mehaid
Saudi Arabia

Mohammad Al Sabban
Ministry of Petroleum
Saudi Arabia

Ahmed Al Wadi'i
Saudi ARAMCO
Saudi Arabia

Adeeb AlAama
Saudi Aramco
Saudi Arabia

Badar Al-Abri
Cranfield University
United Kingdom

Stefano Alaimo
Gestore del Mercato Elettrico Spa
Italy

Nader AlArfaj
Saudi Aramco
Saudi Arabia

Khalid Al-Dabbagh
Saudi Aramco
Saudi Arabia

Fahad Al-Dhubaib
Saudi Arabia

Saud Al-Fattah
Saudi Aramco
Saudi Arabia

Fahad Al-Gannas
Saudi Aramco
Saudi Arabia

Valeria Algeier
Ilmenau University of Technology
Germany

Mohammed Al-Ghamdi
Saudi Aramco
Saudi Arabia

Abdulrahman Al-Gilani
Saudi Aramco
Saudi Arabia

Naif Alhammad
Saudi Arabia

Mishal Al-Harbi
KAPSARC
Saudi Arabia

Fahad Al-Helal
Saudi Aramco
Saudi Arabia

Fahad Alhumaidah
Saudi Arabian Monetary Agency
Saudi Arabia

Adama A Aliyu
Energy Commission of Nigeria
Nigeria

Fareed Aljohar
Saudi Aramco
Saudi Arabia

Turki Aljoufi
Saudi Arabia

Colin Allcard
Channoil Consulting Ltd
United Kingdom

Saleh Almulhim
Saudi Aramco
Saudi Arabia

Sami Al-Neaim
Saudi Aramco
Saudi Arabia

Ahmed Alrajhi
Kind Saud University
Saudi Arabia

Mohammed Al Sadiq
Saudi Aramco
Saudi Arabia

Abdulaziz Bin Salman Al-Saud
Ministry of Petrol and Min Res
Saudi Arabia

Ayman Al-Sayari
Saudi Arabian Monetary Agency
Saudi Arabia

Tariq Alsuqair
Trace Data International
Saudi Arabia

Muhammad Al-Tayyeb
Saudi Aramco
Saudi Arabia

Nourah Alyousef
King Saud University
Saudi Arabia

Abdullah Al-Zahrani
Saudi Arabian Oil Co
Saudi Arabia

Juan Manuel Alzate
Universidad de los Andes
Colombia

Gregory Anderson
Southern California Gas Company
USA

Bo Andersson
Swedbank AB
Sweden

Bosse Andersson
Vattenfall AB
Sweden

Flordeliza Andres
UNFCCC
Germany

Samson O Animashaun
University of Ibadan
Nigeria

Sirigiri Anusha
Birla Inst of Tech and Science
India

Nkolika Anyaoku
Nigeria

Claudia Aravena
Queens University Belfast
United Kingdom

Bamidele Ashaolu
University of Ibadan
Nigeria

Curt Astrom
Umea Energi AB
Sweden

Otegbulu C Austin
University of Lagos
Nigeria

Esian Ayaowei
University of Ibadan
Nigeria

Kennth B Ayi
NNPC
Nigeria

Ebeneezer Baiden
University of Surrey
United Kingdom

Charles Baisden
University of the West Indies
Trinidad and Tobago

Edward Balistreri
Colorado School of Mines
USA

Kristin Barbato
USA

Galen Barbose
Lawrence Berkeley National Lab
USA

Dieter Beike
Independent Consultant
USA

Hadiza Bello Kebbe
NNPC
Nigeria

Ahmad Binobaid
King Said University
Saudi Arabia

Markus Bliem
Inst for Advanced Studies Carinthia
Austria

Benjamin Boakye
United Kingdom

Dirk Boehm
University of Hohenheim
Germany

Sergio Botero
Universidad Nactional e Colombia
Colombia

Julian Bouchard
EDF
France

Charles Breeden
PA Consulting Group
USA

Rafael Campo
Consultant
USA

Bjorn Carlen
Expertgruppen for Miljostudier
Sweden

Michael Castillo
BP
USA

Ana Cecilia Escudero
Universidad Pontificia Bolivariano
Colombia

Navin Chaddha
Mayfield Fund
USA

Ujjayant Chakravorty
University of Alberta
Canada

Jonathan Chanis
New Tide Asset Mgt LLC
USA

Emile Chappin
Delft University of Technology
Netherlands

Alexandros Chatzidimitriou
Lawyer
Greece

Edward Christie
Austria

Ebuzoeme Chukwu
United Kingdom

Burcu Cigerli
Rice University
USA

Whitney Colella
Sandia National Laboratories
USA

Aidan Coville
South Africa

Joel Crane
Deutsche Bank
USA

Anna Creti
Italy

Eric Cutter
Energy & Envir Economics Inc
USA

Ney da Cunha
Agencia National do Petroleo
Brazil

Roy Dahl
University of Stavanger
Norway

J R DeShazo
UCLA
USA

Dario Di Santo
FIRE
Italy

Delavane Diaz
Electric Power Research Institute
USA

Mary Dickerson
USA

Lars Dittmar
Technical University of Berlin
Germany

Joel Dogue
EDF Development Inc
USA

Yergali Dosmagambet
RAKURS Center for Economic Analysis
Kazakhstan

Diepriye Douglas
CEPMLP
United Kingdom

Bogumil Druciarek
Warsaw School of Economics
Poland

Christof Duthaler
ETH Switzerland
Switzerland

Obinna A Ebinaso
NNPC
Nigeria

David Ehrhardt
Castalia LLC
USA

Bengt Ekenstierna
E ON Gas Sverige AB
Sweden

Priscillia A Ekpe
University of Abuja Nigeria
Nigeria

Abdullah El-Kuwais
KSA-Riyadh
Saudi Arabia

Francis Eniekezimene
University of Ibadan
Nigeria

Richard Agbor Enow
EurOil Limited
Cameroon

Edgar Escobar
University de los Andes
Colombia

Oleg Eysmont
Institute for Systems Análisis
Russia

Daniela Floro
Italy

Nicole Forbes
Texas State University
USA

RoseAnne Franco
PFC Energy
USA

Julia Frayer
London Economics International LLC
USA

Peter Frykblom
Starsradsberedningen
Sweden

Jacob T Garba Paiko
University of Jos
Nigeria

David Gaskin
USA

Florence Geny
Statoil Hydro
United Kingdom

Benjamin George-Amadin
United Kingdom

Carl Gerogsson
AB Svenska Shell
Sweden

Martin Grimaldo Watson
Germany

Jordon Grimm
US Department of Energy
USA

Marc Gronwalk
IFO Institute for Economic Research
Germany

Johan Gyllenhoff
Vattenfall Treasury AB
Sweden

Gregory Hamm
NERA
USA

Klaus Hammes
Swedish Energy Agency
Sweden

Matthew Hansen
National Energy Board
Canada

Petteri Haveri
Finnish Energy Industries
Finland

Therese Hindman Persson
Econ Poyry AB
Sweden

Daniel Huppmann
Austria

Gahyeong Hur
National Assembly Budget Office
South Korea

Olanrewaju Richard Igandan
NNPC NAPIMS
Nigeria

Stanley T Ikidi
University of Ibadan
Nigeria

Omotomilola T Ikotun
Nigerian Electricity Reg Comm
Nigeria

Masoud Imani Kalesar
Jawaharlal Nehru University
India

Georgios Imanidis
Univ of Applied Sciences
Switzerland

Don Irby
Irby Strategic Services
USA

Livinus Ishaya
Nigerian Elec Reg Comm
Nigeria

Oluseun Ishola
University of Ibadan
Nigeria

Gwendolyn Jacobs
USA

Umar Jada
Nig Saoiome & Principe JDA
Nigeria

Nils Janson
Castalia LLC
USA

Jan Johansson
SCA Svenska Cellusola AB
Sweden

Fredrich Kahrl
University of Calivornia Berkeley
USA

Wincenty Kaminski
Rice University
USA

Hanna-Liisa Kangas
Finnish Forest Research Institute
Finland

Erkan Karakaya
Schlumberger
United Kingdom

Anthony Karembu
CEPMLP Univ of Dundee
United Kingdom

Francis Kayada
United Kingdom

Olamilekan Paul Kayode
Energy Resources Management Ltd
Nigeria

Kolawole B Kazeem
University of Ibadan
Nigeria

Mustafa Khan
USA

Rashid Kidwai
Saudi Aramco
Saudi Arabia

Manoah Kiletty
Castalia LLC
USA

Jihyo Kim
South Korea

Maximillian Kloess
Vienna University of Technology
Austria

Andrew Knox
Booz Allen Hamilton
USA

Nikolaos Kokkinos
Trojas
Greece

Christos Kolokathis
Energy Resch Ctr of the Netherlands
Netherlands

Thomas Korsfeldt
Sweden

Vanessa Kritlow
USA

Pietro Lanzini
Italy

Jessica Laws
Jess Internatonal
USA

Yannick Le Gourieres
Credit Agricole
United Kingdom

Marc Le Page
Consulate General of Canada
USA

Yannick Le Pen
IEMN University of Nantes
France

Ja-Chin Audrey Lee
US Department of Energy
USA

Sigfrid Leijonhufvud
Sweden

Sebastian Lepaul
EDF R&D OSIRIS
France

Billy Leung
Regional Economic Models Inc
USA

Francois Leveque
Mines Paris Tech
France

Carl Liggio
Pharos Enterprise Intelligence LLC
USA

Carleton Lindgren
PA Consulting
USA

Jussi Lintunen
Finnish Forest Research Institute
Finland

Chiara Lo Prete
Johns Hopkins University
USA

Moritz Loock
Switzerland

Goran Lundgren
Vattenfall AB
Sweden

Robert Lundmark
Lulea University of Technology
Sweden

Amber Mahone
Energy & Envir Economics Inc
USA

Marta Makovetskaya
Russia

Roberto Malaman
Autorita per L'Energia Elettrica
Italy

David Manowitz
University of Maryland
USA

Hari Mantripragada
Carnegie Mellon University
USA

Eduardo Marcos
SENDECO2
Portugal

George Mayer
Canada

Urs Meister
Avenir Suisse
Switzerland

Elbia Melo
CCEE Brazil
Brazil

Roland Menges
University of Tech Clausthal
Germany

Hong Mi
The Zhejiang University
China

Erik Mielke
USA

Wolfgang Moehler
USA

Benedicta A Momodu
NNPC
Nigeria

Boris Monov
GDF Suez NA Gas and LNG
USA

Sergio Jose Moraes
CCEE Electrical Energy Comm Chamb
Brazil

Andres Muld
Statens Energimyndighet
Sweden

Giuseppe Muliere
University of Pavia
Italy

Jamila Musa
United Kingdom

Roxana Muzzammel
Integ Enterprise Consulting Inc
USA

Yuichi Nagano
Tokyo Electric Power Company
USA

Aristolis Naniopoulos
Aristotle University
Greece

Iman Nasseri
Univ of Hawaii
USA

Gibson Nemi
University of Abuja
Nigeria

Marco Niccolosi
University of Cologne
Germany

Sebastian Nilsson
Shattuck St Marys School
USA

Tommy Nordin
Sweden

Guych Nuriyev
Queens University Belfast
United Kingdom

Damian C Nwosu
University of Ibadan
Nigeria

Carl-Erik Nyquist
Sweden

Eugene Oakes
United Kingdom

Awele B Obichie
Nigerian Agip Oil Co Ltd
Nigeria

Jennifer A Obiora
Geometric Power Limited
Nigeria

Edward Obokoh
Power Holding Coy of Nigeria
Nigeria

Kenta Ofuji
Univ of Aizu
Japan

Stanley Ogueri
United Kingdom

Akintunde B Ogunsanya
CEPMLP Univ of Dundee
United Kingdom

Kenneth Okhemuokho
TOTAL E&P Nigeria
Nigeria

Pauline Okino
PPPRA
Nigeria

Dayo B Olanipekun
Univeristy of Ibadan
Nigeria

Monisola Olaniyan
University of Ibadan Nigeria
Nigeria

Jeremiah Olatinwo
Nigeria

Sanyaolu J Olayode
University of Ibadan
Nigeria

Sola O Oloruntimilehin
University of Ibadan
Nigeria

Afolabi Olowookere
Univeristy of Ibadan
Nigeria

Amy O'Mahoney
Ireland

Peter K Oniemola
University of Ibadan
Nigeria

Godwin Onwubolu
Nigerian Agip Oil Co Ltd
Nigeria

Isaac Onwuka
University of Abuja
Nigeria

Jose Ordonez
LCG Consulting
USA

Yaw Adofo Osei
University of Surrey
United Kingdom

Babatunde Osho
Korea National Oil Corp
Nigeria

Olumide B Owoeye
University of Ibadan
Nigeria

Bolaji O Oyewole
University of Ibadan
Nigeria

Edward B Oyinbo
PPPRA Maitama Abuja
Nigeria

Adedayo Oyinlola
PPPRA
Nigeria

Jukka Paatero
Helsinki University of Technology
Finland

Daniel J Packey
Curtin University of Technology
Australia

Anthony Papavasiliou
UC Berkeley
USA

Samuel Papendick
Colorado State University
USA

Clara Ines Pardo Martinez
Germany

Chul Park
Commodity Futures Trading Comm
USA

Deborah Peppers
NRGx2
USA

Agneta Persson
Fyrfotan
Sweden

Carla Peterman
Lawrence Berkeley National Lab
USA

Gordon Pickering
Navigant Consulting Inc
USA

Matthaus Pietz
TUM Business School
Germany

Alberto Pinto
Portugal

Debra Pyle
James A Baker Inst for Public Polic
USA

Hanqi Qiu
Canada

Lucelia Raad
UFRJ
Brazil

Rodrigo Raad
FGV Brazil
Brazil

Eyitayo Raboth
Nigeria

New Members (continued)

Aleksandr Rakintsev
Austria
Felipe Fernando F Rau
Ecuador
Birgitta Resvik
Svenskt Naringsliv
Sweden
Kevin Richards
Castalia LLC
USA
Ike Richardson de Magalhaes
University of Plymouth
United Kingdom
Manuel Rincon
USA
Nicolas Riviere
France
Sean Robinett
San Jose State University
USA
Per Rosenqvist
Statkraft Financial Energy AB
Sweden
Sebastian Rothe
University of Hamburg
Germany
Daniele Russolillo
Fondazione per l'Ambiente
Italy
Robert Ryan
US Dept of Energy EIA
USA
Thore Sahlin
Goteborg Energi AB
Sweden
Balkisu Saidu
Keio University
Japan
Susan Sakmar
Univ of San Francisco
USA
Ahmad Sanusi
Zenith Bank Plc Murtala
Nigeria
Ima Schoonbeek
BP
Singapore
Jan Niklas Schulte
Point Carbon
Norway
Rolf Seifried
Germany
Gary F Serio
Entergy Corporation
USA
John Sfakianakis
The Saudi British Bank SAAB
Saudi Arabia
Shree Raj Shakya
Asian Institute of Technology
Thailand
Stephanie Shipp
Science and Tech Policy Institute
USA
Jaswant Sihra
BP plc
USA
Ashutosh Singh
USA
Mazen I Snobar
Saudi Aramco
Saudi Arabia
Leonardo Sobreira
Instituto de Economia UFRJ
Brazil
Michael Stadler
Lawrence Berkeley National Lab
USA
Jevgenijs Steinbuks
University of Cambridge
United Kingdom
Jeb Stenhouse
Environmental Protection Agency
USA
Lauran Sturm
The Stites & Harbison
USA
Mingshan Su
Tsinghua University
China
Samir Succar
NRDC
USA
Zesheng Sun
Zhejiang University of Sci & Tech
China
Tye Sundlee
US Fulbright Dept
Ukraine
Aline Sutter
EDF R&D
France
Marcel Sutter
BKW FMB Energie AG
Switzerland
Lars Synnes
Nordic Investment Bank
Finland
Aiman Tashkandi
Saudi Aramco
Saudi Arabia
Ted Temzelides
Rice University
USA
Owanemi Theophilus
NNPC
Nigeria
Bob Tippee
Oil & Gas Journal
USA
Thure Traber
DIW Berlin
Germany
Rakkan Trabulsi
Saudi Aramco
Saudi Arabia
Rakkan Trabulsi
Saudi Aramco
Saudi Arabia
Stefan Traub
University of Bremen
Germany
Stein Trotman
Trinidad and Tobago
Chi-Chung Tsao
Univeristy of California
USA
Cleve Tyler
LECG
USA
Leen Vandezande
K U Leuven
Belgium
Bruno Vibert
Fair Links
France
Gavithiri Vishwanathan
Erasmus University Rotterdam
Netherlands
Gabriel Vizcaino
Universidad de los Andes
Colombia
Niels von Zweigberk
Tricorona AB
Sweden
James Watson
Pearson Watson Millican and Company
USA
Joerg Wild
Elektriziaetstwerk Altdorf AG
Switzerland
John Wimer
Nat'l Energy Technology Laboratory
USA
Matt Wittenstein
London Economics International
USA
Lawrence Wolf
USA
Norman Wong
Nexant Limited
United Kingdom
Azeezat Yusuf-Adebola
Univ of Ibadan Nigeria
Nigeria
Bahjat Zayed
Saudi Aramco
Saudi Arabia
Rose Zdybel
USA
Salvatore Zecchini
GME Gestore del Mercato Elettrico
Italy
Zhengmao Zhan
Inst for Science Comm of China
China
Xiaoli Zhao
USA
Markus Zimmer
University of Munich
Germany
Byron Zimmermann
BP
USA
Tobias Zimmermann
RWE
Germany
Ferdinando Zullo
Gestore del Mercato Elettrico SpA
Italy

!!! Congratulations 2009 IAEE Award Winners !!!

Awards committee chair Andrea Bollino and his committee members Mary Barcella, Ugo Farinelli, Dale Jorgenson and David Knapp are pleased to announce the following 2009 IAEE Award winners:

Outstanding Contribution to the IAEE Award
Given to: **Paul Tempest**
Windsor Energy Group

For his considerable support and many contributions to the IAEE and the BIEE Affiliate since their inception.

Journalism Award
Given to: **Bob Tippee**
Oil and Gas Journal

For his excellence in written journalism on topics relating to international energy economics.

Outstanding Contribution to the Profession
Given to: **James L. Sweeney**
Stanford University

For his outstanding contributions to the field of energy economics and its literature.

The Campbell Watkins ***Energy Journal*** Best Paper Award
Given to: **Stephen P. A. Brown** and **Mine K. Yucel**
Federal Reserve Bank of Dallas

For their article designated as the most outstanding paper published in The Energy Journal in 2008.

The above award recipients received their awards and recognition at the 32nd IAEE International Conference of the IAEE, June 21-24, in San Francisco, California, USA.

Biomasse Italia

By Guido Castelluccio*

Biomasse Italia's main mission is to produce clean energy from the recycling of vegetal wastes and other renewable sources. The company is recognized as among the largest European companies producing energy from renewable sources (solid biomass) while fully respecting the environment.

The Company shareholdership is represented by Api Nova Energia and Bioenergie. Api Nova Energia belongs to the Api Group, one of Italy's leading oil companies. Api Nova Energia's mission is to manage and clearly improve the electricity and gas business of the Api Group. The Bioenergie Group, based in Milan, is one of the largest Italian producers of biomass energy. The Group also owns San Marco Bioenergie SpA, a 20 megawatt electrical power biomass station, located in Bando d'Argenta (FE).

Raw Materials

The Company started its activity using almost exclusively wood chips; this biomass type now represents only 60% of total consumption. During recent years the Company has invested in production processes and plant technology enabling it to use wood residuals of lower quality. These include saw mill residuals, public green and agricultural waste, biomass types that would otherwise be left in rubbish dumps.

Today, wood biomass consumption totals some 500,000 tons per year, while non-wood biomass, including olive residues and peanuts residues, account for about 50.000 tons/year.

Initially the Company imported its biomass from abroad. Early on, however, the Company encouraged and supported private forest companies in the local Calabria region with the result that local biomass availability has doubled over the last three years, dramatically reducing EU imports. Imports, however, continue at a low level as the local market cannot satisfy the whole of Biomasse Italia's demand. The Company has enjoyed a progressive decrease in the average cost of its main raw materials; that and production optimization have resulted in a cost reduction for the ash disposal.

Production

Biomasse Italia produces its energy at two sites, one located in Crotone and the other in Strongoli, with one 20 Mw power station and one 40Mw power station, respectively, for total production of about 450 GWh/year. The power plants use two different technologies which assures the acquisition of wide technical know-how, now absolutely strategic to making new technological choices for the future. Table 1 shows plant performance over the 2005 to 2007 period.

	2005	2006	2007
Operation hours (h)	7 200	7 700	7 100
Plant availability (%)	82%	88%	81%
Power capacity (MW)	58	59	58
Production efficiency (%)	96%	98%	97%
GSE (GWh) electricity	420	450	410
Biomass specific consumption (thermal efficiency) (Gcal/MWh)	3.7	3.7	3.8
Non-wood fuel incidence (%)	19%	19%	26%
Ash (%)	5%	4%	5%

Table 1 – General Indicators

Fuel Mix

The raw material mix is influenced both by the availability of local biomass and by the technological problems arising when the non-wood biomass rate increases. The development of a Biomass Knowledge Studying System has made it possible to establish a set of correlations between biomass characteristics and plant performance. For example:

- Each 1% of biomass moisture variation (around its 45% standard value for wood biomass) will result in a 0.5%-2.0% variation in profit margin, depending on the technology applied.
- Even a 1% ash variation has a 1% to 2% influence on gross profit margins, again, depending on the technology employed.
- Similarly, depending on technology, a 1% variation of specific consumption can influence the gross profit margin of 1%-4%.
- Finally, each 1% of wood and non-wood biomass mix variation can alter 0.1% of the gross profit margin; nevertheless the contribution to the profit margin may be canceled or become negative if certain percentages are exceeded (influenced by the technology chosen).

Waste Disposal

The production process residual is mostly ash from biomass combustion. Thanks to the quality of the biomass purchased and the efficiency of the combus-

* Guido Castelluccio is General Manager of Biomasse Italia. He may be reached at daraint-erserv@biomasseitalia.it

tion process, the ash amount is small (5% of biomass, depending also on the fuel mix) and is high quality, so that it can be recycled and not dumped in landfill sites. The Company production system uses biomass residuals, even if the quality does not comply with technological specifics. Biomasse Italia can filter and convert the small particles into "pellets" for industrial use. This method allows use of environmentally safe residuals instead of using fossil fuels only.

Air Emissions

The direct and indirect greenhouse gas emissions, NO_x and SO_x, and the quantity of special waste have always been below the limits of the law (see Table 2); and in the future the Company will install a new flue gas outlet cleaning and conditioning system.

Biomasse Italia has never received any penalty for violation of environmental standards during its activity and has never experienced any non-compliance with regulations and voluntary codes.

	Line 1 KR	Line 2 KR	Line 1 STR	Line 2 STR	Legal allowance
NO_x	151	167	119	137	200
SO_x	25	10	1	6	50

Table 2 - mg/Nm3, emissions, 2007 yearly average

Intangible Results

There have been some intangible results in the company's short period of growth; namely:

- inputs have decreased compared to the energy quantity produced, thanks to the investment made on plants and processes.
- Ash-waste production has fallen thanks to the integration of suppliers for a better biomass quality.
- Air emissions have decreased as the process improved.
- The staff's average age has fallen as many young people have been employed. Also local partners achieved more professional skills thanks to the cooperation with international consultants provided by the Company.
- The economic-financial relationships with the local economic system (suppliers, banks) have increased.
- A policy of territorial integration has contributed to an institutional awareness of the competitive advantage reached by Crotone Province in the field of renewable energy.

The Company Role and its Local Activities

Biomasse Italia has developed a communication plan for informing and communicating with all its stakeholders. The Sustainability Report, the Company newsletter "Energia qui" and the website are the most incisive corporate communication instruments.

The Company spends tens of millions euro for goods and services supplied by small local companies, gives support for the development of dock activities and infrastructures and encourages the investments of suppliers in the biomass supply chain.

The success of Biomasse Italia's operations resulted in it receiving the Environmental Enterprise Award in 2007.

2009 IAEE Survey – Drawing Winner

Thank you to all who completed the 2009 IAEE Survey. It was a great success and we will be reviewing these responses and implementing changes where possible. Of all the responses that were received, the name drawn to receive a free conference registration to either the IAEE International Conference in San Francisco or the IAEE European Conference in Vienna was Marianne Sjolund of Statnett SF. Congratulations!

Biofuels and the Fungibility of Motor Fuels

By F. W. Rusco and W. D. Walls*

Introduction

Interest in biofuels surged in the late 1970s and early 1980s in response to high oil prices but waned by the mid 1980s as oil prices plummeted and remained relatively low for almost 25 years. However, a coincidence of several factors has caused a recent resurgence in interest and growing global production of ethanol and biodiesel. These factors include increasing fossil fuel prices, a growing consensus among policy makers that human carbon emissions should be reduced, and successful lobbying by pro-agricultural interests for biofuel subsidies.

The recent growth in biofuel production has been impressive although biofuels still make up a small percentage of the world's liquid transportation fuels. The United States and Brazil produce the bulk of global ethanol; 6.5 and 5 billion gallons in 2007, a 33 percent and 11 percent increase over the previous year, respectively. European countries have been the leaders in producing biodiesel, in total, producing 4.9 million tonnes in 2007, up by more than 50 percent from the previous year. As of 2007, global ethanol production made up only a small percentage of liquid transportation fuels by volume and less by energy content because of the lower energy density of ethanol compared to gasoline derived from crude oil. Similarly, global biodiesel production is only a small fraction of total global distillate production by volume but has been growing rapidly—global biodiesel production grew at an annual rate of 40 percent from 2002—2006 (Ren21, 2008). Europe has been the largest producer of biodiesel in recent years—85 percent of global production in 2005—but many other countries are expanding their acreage devoted to biodiesel feedstocks and some potentially large consumers—including China and India—are experimenting with biofuels. In addition, many other countries, including the United States, as well as most individual states have either mandated use of biofuels or provided tax or other incentives to encourage production and use of these fuels. To date, there has been little coordination among these governments with respect to setting uniform standards for producing or blending of ethanol and biodiesel with gasoline or diesel produced from crude oil.

As a result of this lack of coordination there is a wide range of ethanol blending standards that have been either mandated or proposed as well as a number of different biodiesel standards. For example, according to the Pew Center on Global Climate Change, 37 U.S. states provide tax exemptions, credits, and/or grants to encourage the production and use of ethanol and or biodiesel. Nine of these states have also imposed renewable fuel standards that mandate varying degrees of use of biofuels. Specifically, the mandated blends of ethanol vary between 2 percent to 85 percent ethanol with different dates associated with state implementation goals. Table 2 shows biofuels standards in some individual U.S. states.

Country	2004	2005	2006
Brazil	3,989	4,227	4,491
U.S.	3,535	4,264	4,855
China	964	1,004	1,017
India	462	449	502
France	219	240	251
Russia	198	198	171
South Africa	110	103	102
U.K.	106	92	74
Saudi Arabia	79	32	52
Spain	79	93	122
Thailand	74	79	93
Germany	71	114	202
Ukraine	66	65	71
Canada	61	61	153
Poland	53	58	66
Indonesia	44	45	45
Argentina	42	44	45
Italy	40	40	43
Australia	33	33	39
Japan	31	30	30
Pakistan	26	24	24
Sweden	26	29	30
Philippines	22	22	22
South Korea	22	17	16
Guatemala	17	17	21
Cuba	16	12	12
Ecuador	12	14	12
Mexico	9	12	13
Nicaragua	8	7	8
Mauritius	6	3	2
Zimbabwe	6	5	7
Kenya	3	4	5
Swaziland	3	3	5

Table 1: Ethanol Production in Various Countries
Millions of Gallons
Source: Renewable Fuels Association.

A similar proliferation of biofuel blends and standards is beginning to emerge in Europe and other regions, in which countries with suitable lands and agriculture sectors to produce biodiesel are tending to mandate greater proportions of blending of biodiesel than other countries not so endowed. An additional issue exists with biodiesel in that, unlike ethanol—which is generally fungible regardless of how it is produced or from which bio-feedstock—different biodiesel production processes and feedstocks lead to biodiesels having different performance and other properties. Table 3 shows biofuels standards in various other countries.

Many unintended but significant problems must be addressed if biofuels are to become an increasingly important part of the liquid fuel mix. Among these are the competing uses of land and water, the effects of placing more land under commercial use on biodiversity and traditional or indigenous populations, concerns about the net carbon impacts of some biofuel production processes, and the effects on engine performance and fuel efficiency. Each one of these issues is currently receiving a great deal of interest from researchers and policy makers (*c.f.,* de Gorter and Just, 2007 and 2008). This paper explores the effect of differing biofuel production and blending standards on the liquid fuels supply infrastructure.

* F. W. Rusco is with the U.S. Government Accountability Office and W. D. Walls is with the Department of Economics, University of Calgary, Alberta, Canada.The views expressed in this paper are solely those of the authors and are not to be attributed to the authors' employers.

Petroleum Refining and Biofuels

When ethanol is blended with gasoline, it affects both the energy content, as well as the octane and emissions characteristics of the resulting fuel. Specifically, ethanol is less energy dense than petroleum based gasoline. As a result, cars using gasoline blended with ethanol generally will suffer a reduction in their rated fuel economy. In addition, ethanol is an octane booster. When ethanol is added to gasoline, refiners must remove some lighter-end gasoline components that also boost octane in order to meet vehicle octane specifications. Finally, ethanol has a very high Reid Vapor Pressure, meaning it evaporates at very low temperatures. This means that gasoline blended with ethanol has greater evaporative emissions of volatile organic compounds. This requires further changes to the gasoline blendstocks to mitigate these emissions.

State	Fuel Standard
Hawaii	85% of gasoline to contain 10% ethanol by April 2006
Iowa	25% of motor fuel from renewables (E10, E85, biodiesel by 2020)
Louisiana	All gasoline to contain 2% ethanol; 2% of all diesel to be biodiesel
Minnesota	All gasoline to contain 20% ethanol by 2013; 2% of all diesel to be biodiesel
Missouri	All gasoline except premium grade gasoline to contain 10% ethanol by 2008
Montana	All gasoline except 91 octane to contain 10% ethanol
Washington	All gasoline to contain 2% ethanol by 2008; 2% of all diesel to be biodiesel by 2008

Table 2: Biofuel Standards Mandated by Individual U.S. States
Source: PEW Center on Global Climate Change.
http://www.pewclimate.org/node/5859

Gasoline blendstocks will eventually have to be alterred to maintain automobile performance and emissions requirements as biofuels come into increasing use. This will have two main effects on the refining sector and thus on the gasoline market. First, adding ethanol reduces total gasoline refining capacity because some of the lighter components that are produced during refining must be taken out of the gasoline to accommodate the high octane and evaporative qualities of ethanol. These lighter products may be used elsewhere, for example, as feedstocks for petrochemical products or in other refining regions, which do not have high blends of ethanol and can therefore accommodate more of the light-end products; and some can be stored during the summer and reintroduced into the gasoline stream in the winter when colder temperatures reduce evaporative emissions. Regardless, the end result is an increase in the average cost of producing gasoline, either because light-end components are not going to their highest valued use, or because of additional shipping and storage costs.

Country	Fuel Standard
Brazil	5% ethanol in gasoline and 2% biodiesel by 2008; 25% ethanol in gasoline by 2013
Canada	10% ethanol in gasoline by 2010; 5% ethanol in Ontario gasoline by 2007
China	10% ethanol in five provinces
Colombia	10 % ethanol in gasoline in cities with population > 500,000
India	5% ethanol in gasoline
Philippines	5% ethanol in gasoline, 2% biodiesel by 2007
Thailand	10% ethanol in gasoline by 2010

Table 3: Biofuel Standards Mandated by Individual Countries
Source: PEW Center on Global Climate Change.
http://www.pewclimate.org

The second effect is on the wholesale market for liquid fuels. With different states and countries mandating different blending levels of ethanol with petroleum-based gasoline, refineries serving those states and regions will make unique gasoline blendstocks. A similar "Balkanization" of liquid fuels occurred with the proliferation of gasoline blends that followed Clean Air Act requirements. A number of areas that were out of compliance with air quality standards chose to use a cleaner burning gasoline blend to improve air quality. Refiners serving these areas invested billions of dollars in new equipment to make these fuels. The result was a less fungible gasoline market in which relatively fewer refiners regularly serve areas with special gasoline blends compared to areas using conventional gasoline. While it is too early to try to measure the effects of further Balkanization of the refining sector that will occur without coordination on ethanol blending standards, it is likely that, to the extent that differing blending standards lead to smaller numbers of refiners serving specific states or regions, that this could increase the response time to address refinery outages among any group of refiners serving a specific market. This could have the effect of increasing the amplitude and length of price spikes associated with such outages.

Biodiesel is more complicated than ethanol because the properties of biodiesel produced from different feedstocks and processes differ considerably in terms of energy content, impacts on engine performance and wear, usability at low temperatures, and other characteristics (DOE, 2006; National Biodiesel Board, 2008, Knothe and Steidley, 2005). Currently there are at least three biodiesel standards in the United States and Canada and one in Europe (National Biodiesel Board, 2008b; DieselNet, 2008). In addition, the same issues with respect to the wholesale market could also exist with biodiesel.

Biofuels and the Supply Chain

Ethanol produced from agricultural feedstocks will generally be produced in smaller refineries near the sources of the feedstocks because moving the finished ethanol is much cheaper than moving the

much larger volumes of feedstocks required for its production. This means that much of the ethanol produced will not be near existing demand or existing suitable pipeline infrastructure. In addition, currently, most petroleum product pipelines cannot ship high concentrations of ethanol because of the corrosive nature of ethanol that destroys certain seals and other parts in the pipelines as well as ethanol's capacity to absorb water. Nonetheless, it is likely that ethanol will eventually be shipped by pipeline because that is by far the cheapest mode of liquid fuel transport for most regions. In order to achieve this, collecting pipelines will likely be built to connect smaller refineries scattered around agricultural areas to larger trunk lines used to serve major fuel demand areas. This, along with adjustments to existing pipelines that will be required to handle ethanol will amount to billions of dollars of investments in supply infrastructure and will require a long time to get permits and negotiate placement of the pipelines. In addition, ethanol will likely be blended with gasoline before it goes into major existing pipelines to reduce the corrosive and water absorption effects on these older and less suitable lines. Finally, if different regions require different blends, this will reduce shipping and storage capacity, similar to what happened with the proliferation of boutique gasoline blends in response to the Clean Air Act. Specifically, just as different gasoline blends must be kept segregated during shipping and storage, so will different ethanol blends. This will require that large tanks that were built to handle a more fungible liquid fuel supply will be handling smaller batches of more types of fuel and this reduces total storage capacity. Similarly, batches going through the pipelines may also be smaller as a result of more different fuel types having to be segregated. This will reduce the capacity of the existing pipeline infrastructure because sending smaller batches through the system requires greater precision in placing and removing these fuels from the pipelines and this is generally achieved at the cost of a slower rate of pipeline flow.

Biodiesel can already be shipped by pipeline, generally without any modifications to the infrastructure. However, biodiesel made from different feedstocks has different properties in terms of the fuels "cloud point," which refers to the temperature at which the biodiesel begins to gel. The variation in cloud point could have impacts on the ability to ship biodiesels in pipelines in different climates. With these exceptions, the other problems associated with incorporating different blends of ethanol apply. Specifically, the biodiesel refineries will generally not be located on or near existing pipeline infrastructure so new feeder pipelines will have to be built or more expensive truck and rail transport will have to be used. Similarly, to the extent that different biofeedstocks are used and that this creates biodiesels with varying qualities, these fuels may have to be segregated during transport and storage, further adding constraints to the existing infrastructure.

Whatever the magnitude of air quality improvements attributable to biofuels, it should be clear that these benefits come at a cost. While there has been no definitive study of the precise price effects of the proliferation of special gasoline blends, there is a consensus among industry experts and government agency analysts that prices are higher and/or more volatile as a result of the increased use of special blends. Studies by the U.S. Environmental Protection Agency (EPA, 2001), the Department of Energy's Energy Information Administration (EIA, 2002), the U.S. Government Accountancy Office (GAO, 2005), and a number of private and academic sector analyses (Muehlegger, 2005; Hirshfeld and Kolb, 1997; NACS, 2003; Walls and Rusco, 2007) have concluded that areas that isolate themselves from a large and fungible gasoline market by adopting a rare or more costly to produce gasoline blend pay for this isolation through higher gasoline prices and greater price volatility. This is especially true in the event of local supply disruptions, because it takes longer to bring in replacement supplies. It is likely that the increased use of biofuels with idiosyncratic standards leading to a further balkanization of the liquid fuel slate will exacerbate the price effects already associated with special fuel use.

Concluding Remarks

There may well be benefits to the expansion of biofuel use in terms of diversifying liquid transportation fuel supplies, adding production capacity to a supply-constrained market with growing demand, and potentially reducing carbon emissions. However, the introduction of these fuels could further divide the motor fuels market into islands of smaller and more local markets for blends of motor fuels that are typically not interchangeable. This transformation of the motor fuels market may further complicate the supply infrastructure, increase production and delivery costs, and reduce the availability of motor fuels in some cases. These and other effects of increasing production and use of biofuels must also be considered, including the effects on land and water use, species diversity, food prices, and other related issues, and policy makers should consider coordinating biofuels standards to avoid unintended effects of further balkanization of the liquid fuels markets.

References

de Gorter, Harry, and David R. Just. The Law of Unintended Consequences: How the U.S. Biofuel Tax Credit with a Mandate Subsidizes Oil Consumption and Has No Impact on Ethanol Consumption. Department of Applied Economics and Management Working Paper # 2007-20, Cornell University, 2007. Available online at URL: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1024525.

de Gorter, Harry, and David R. Just. The Economics of a Blend Mandate for Biofuels. Under review at American Journal of Agricultural Economics, 2008.

DieselNet. *Technical Biodiesel Fuel Standards.* Available online at URL: www.dieselnet.com/tech/fuel_biodiesel_std.html. Accessed June 30th, 2008.

DOE, *Biodiesel Handling and Use Guidelines*, DOE/GO-102006-2358, Third Edition (Washington, D.C.: September 2006).

EIA, *Gasoline Type Proliferation and Price Volatility*, Department of Energy, Energy Information Administration (Washington, D.C.: October 7, 2002).

EPA, *Study of Unique Gasoline Fuel Blends ("Boutique Fuels"), Effects of Fuel Supply and Distribution and Potential Improvements*, EPA420-P-01-004 (Washington, D.C.: October, 2001).

GAO, *Gasoline Markets: Special Gasoline Blends Reduce Emissions and Improve Air Quality, but Complicate Supply and Contribute to Higher Prices, G*AO-05-421 (Washington, D.C.: June 17, 2005).

Hirshfield, David, and Jeffrey Kolb, *The Economics of Gasoline Formulation: Refining Economics, Emissions Standards, and the Complex Model*, MathPro-AM-97-28 (Bethesda, MD: March 16, 1997).

Knothe, Gerhard and Kevin R. Steidley. Lubricity of components of biodiesel and petrodiesel. The origin of biodiesel lubricity. *Energy & fuels,* vol. 19, pp. 1192-1200, 2005.

Muehlegger, E. The role of content regulation on pricing and market power in regional retail and wholesale gasoline. Working paper 008, MIT Centre for Energy Economics and Policy Research, 2005.

NACS, *Motor Fuels Supply Fugibility and Market Volatility Analysis*, Hart Downstream Energy Services (Potomac MD: 2003).

National Biodiesel Board. *Lubricity Benefits.* Available online at the following URL: http://www.biodiesel.org/pdf_files/fuelfactsheets/Lubricity.PDF. Accessed June 30, 2008a.

National Biodiesel Board. *Big Win for Biodiesel: ASTM Approves New Biodiesel Blend Specifications.* Announced June 20th, 2008. Available online at the following URL: http://nbb.grassroots.com/08Releases/ASTM_final/. Accessed June 30, 2008b.

Ren21. *Renewables 2007: Global Status Report*. Renewable Energy Policy Network for the 21st Century, (Paris: REN21 Secretariat and Washington, DC:Worldwatch Institute, 2008).

Stikkers, David. *A Retrospective Study of Reformulated Gasoline Use in Chicago*, Environmental Informatics Archives, vol.1, p. 282-294, 2003

Walls, W. D. and F. W. Rusco. Price effects of boutique motor fuels. *The Energy Journal*, 23(3):145-163, July 2007.

Announcement

12th Annual IAEE/USAEE Session at ASSA Meeting

Atlanta, Georgia – January 3, 2010

Meeting Room and Time TBA

"Energy Security for Renewables and Non-renewables"

Presiding: **Mine Yucel**, Federal Reserve Bank of Dallas

Gail Cohen, US Congress Joint Economic Committee, Frederick Joutz, George Washington University, and Prakash Loungani, International Monetary Fund – *The Determinants of Energy Vulnerability and Security: An Empirical Analysis*

Stephen P.A. Brown, Resources for the Future and Hillard G. Huntington, Energy Modeling Forum, Stanford University – *Reassessing the Oil Security Premium*

Christian Winzer, Karsten Neuhoff, and Daniel Ralph, University of Cambridge – *Measuring Security of Supply*

Kevin F. Forbes, Catholic University of American, Marco Stampini, African Development Bank, and Ernest M. Zampelli, Catholic University of America – *Do Higher Wind Power Penetration Levels Pose a Challenge to Electric Power Security?: Evidence from the ERCOT Power Grid in Texas*

Discussants:
Andre Plourde, University of Alberta
Ken Medlock, Rice University
Xiaoyi Mu, University of Dundee
Wumi Iledare, Louisiana State University

Abstracts are posted at http://www.iaee.org/documents/2010/assa_cfp.pdf

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

For complete program information please visit http://www.vanderbilt.edu/AEA/Annual_Meeting/index.htm

Also, please watch for the IAEE/USAEE Cocktail Party.

Renewable Energy Sources – The Italian Scenario: Opportunities and Limits

By Daniela Sica and Ornella Malandrino*

The dynamic processes involving the energy sector are characterized by the need to identify adequate ways of dealing with the challenges resulting from increased dependency on imports, concerns over supplies of fossil fuels worldwide and clearly discernable climate change.

For some years now, numerous community and national programmes have been underway, favoured by the process of liberalization and transformation of energy markets, supporting - by means of technological innovations, the evolution of the energy generation system, in particular electricity – an effective transition from the current energy model to a different scheme that envisages the widespread use of renewable energy sources (res).

Renewable energy sources or (res) could effectively claim a central role in reducing both greenhouse gas emissions as well as European Union (EU) dependence on imports of fossil fuels (in particular oil and gas).

Renewable energy, however, remains on the fringe of the European energy mix; it still costs more than conventional energy – despite the fact that costs have been falling steadily for the last 20 years – owing to the investment required and the fact that negative consequences, particularly the long-term impact on health or the environment - have not been fully taken into account.

To promote the use of renewable energy sources, the EU has devised a Renewable Energy Roadmap, setting an objective of increasing the proportion of renewable energy in its energy mix to 20% by 2020.

This ambitious plan will make it possible to cut CO_2 emissions by 600-900 million tonnes per year, thus generating savings of between 150 and 200 billion Euros, if the price of CO_2 rises to 25 €/tonne.

To reach this target, advances need to be made in the three main sectors where renewable energies are used: electricity (increasing the production of electricity from renewable sources and consenting the sustainable production of electricity from fossil fuels, principally by means of CO_2 capture and storage systems), bio-fuels, estimated at 10% of vehicle fuels by 2020 and finally, heating and cooling systems.

The Road Map provides for Member States to set mandatory targets and put in place Action Plans in line with their potential capacity. The Map also specifies measures to be implemented on a national scale and relevant objectives for each of the three sectors, at the same time ensuring a flexible approach which leaves Member States sufficient room for manoeuvre.

However, the direction energy policy is taking – delineated at the European level – has been the object of wide debate in terms of the difficultis in achieving the targets, not only in the renewable energy sector, but also in those sectors affected by greenhouse gas emissions and to increasing energy efficiency. The aims specified in the recent energy-climate Package, approved in December 2008, confirm the European Union's sustainable energy policy commitment and consolidates its leadership in the context of international negotiations for a post Kyoto[1] agreement.

In particular, with this Package there are binding commitments both for reducing greenhouse gas emissions and for increasing the role of renewable energy sources in satisfying energy demand in Europe, the so-called 20-20 by 2020. Even the renewable sources for transport, much criticized in the recent past in terms of their potential impact on agricultural markets and on the prices of foodstuffs, have been maintained at the level proposed initially by the European Commission, i.e., 10%.

The measure imposes new and binding commitments on Italy which imply the need to reinforce a national strategy of renewable energy source development, by means of a coordinated regulatory framework that envisages a range of initiatives for promoting more energy produced from renewable sources. This will enable the target to be reached in terms of gross domestic consumption of energy from renewable sources equal to 17%, and to produce about 30% of electricity from res.

There is no doubt that this is an extremely difficult goal to achieve, given the scarce diversification of energy sources available. Recognizing the progressive transition from oil to natural gas over the last few decades as well as the deep rooted and systematic dependence of the Italian energy system on imports, both of primary sources and of electricity, its structural peculiarity and rigidity may not allow, in the short term (2020) the essential reforms envisaged.

From an analysis of the data set out in Table 1, it is clearly seen that the res contribution to satisfying national energy comsumption has increased from slightly more than 8 Mtoe (1990) to over 14 Mtoe (2007), covering about 7% of Italian energy demand, an increase of 75% in two decades. This increase, in the

* Daniela Sica is a Research Fellow on the Faculty of Economics, University of Salerno, Italy. and Ornella Malandrino is an Associate Professor on the Faculty of Economics, University of Salerno.

See footnote at end of text.

face of a growth in energy consumption of 18% in the same period, albeit significant, still has far to go to reach an effective "take off" of res in Italy.

	1990	1995	2000	2005	2007	Δ% 1990-2007
Solid fuels	15.8	12.5	12.8	17.0	17.2	8.9
Natural gas	39.1	44.8	58.4	71.2	70.0	79
Net electricity imports	7.6	8.2	9.8	10.8	10.2	34.2
Oil	92.5	95.7	91.5	85.2	82.5	-18.8
Renewable sources	8.4	10.4	12.9	13.6	14.3	70.2
Total	**163.4**	**171.7**	**185.2**	**197.8**	**194.2**	**14.1**

Table 1 – National Trends in Energy Consumption (millions of Toe)

In particular in the electricity sector, despite the fact that over the last few decades the quantity of electricity obtained from renewable sources has increased slightly - from 48 TWh in 1960 to 49 TWh in 2007 - its contribution to meeting domestic demand has diminished significantly, declining from over 80% in 1960 to nearly 16% in 2007, above all by virtue of the progressive reduction in the contribution from hydro-electric sources and of the predominant role of fossil fuel (Table 2).

The reasons for this are to be found in the growing demand for electricity stimulated in the first place, by progressive industrialisation and later by the increased demand in the service sectors, including areas with scarce water supplies, which necessitates the extensive use of fossil fuels.

As regards renewable sources, hydro-electric energy plays a predominant role (70%), followed by energy produced by biomass (13%), geothermic (11%) and wind (6%).

	1960	1965	1970	1975	1980	1985	1990	1995	2000	2007
Thermoelectrics	8,030	33,874	70,222	98,474	133,350	131,440	178,590	196,123	220,455	265,764
Renewable (Hydro.,Geothermal, Wind and Photovoltaic)	48,210	45,584	44,025	45,059	50,183	47,276	35,038	41,618	51,380	48,124
Nuclear	-	3,510	3,176	3,800	2,208	7,024	-	-	-	-
Total	**56,240**	**82,968**	**117,423**	**147,333**	**185,741**	**185,740**	**213,628**	**237,741**	**271,835**	**313,888**

Table 2 – Production of Electricity in Italy (GWh)

However, over the last fifteen years, an increase has been recorded mainly for wind but above all, for sources linked to biomass and waste (Table 3).

It should be noted, however, that the contribution of res to domestic electricity production has certainly been stimulated by the many different initiatives in support of "renewable source generation of electricity" introduced over the last few decades in Italy. In particular, fiscal, investment and R&D funding measures have been devised. Furthermore, 'sector' measures have been introduced – in other words, a system of incentives to promote the use of specific technologies by building micro generation plants - mini-hydroelectric, photo-voltaic and solar – to promote favourable and stable conditions for investment. Special forms of recognition have been devised for energy produced from res, such as the Guarantee of Origin (GO) and the Renewable Energy Certificate System (RECS) based on specific objective, transparent and non-discriminating criteria, to promote both the capacity for generating and consumption of green energy.

	1990	1995	2000	2007	Δ% 1990-2007
Hydro	**31,626**	**37,781**	**44,200**	**32,815**	**4**
MW					
0→1	1,088	1,411	1,553	1,416	30
1→10	4,855	6,029	6,577	5,684	17
>10	25,683	30,341	36,070	25,715	0.1
Geothermal	**3,222**	**3,436**	**4,705**	**5,569**	**73**
Wind	**-**	**10**	**563**	**4,034**	**40,240***
Photovoltaic	**-**	**4**	**6**	**39**	**875***
Biomass and waste	**190**	**387**	**1,906**	**6,954**	**3,560**
- Solid	190	284	1,340	5,507	2,798
- Biogas		103	566	1,447	1,305
Total	**35,038**	**41,618**	**51,380**	**49,411**	**49**

Table 3: Gross Maximum Capacity of Renewable Electric Power Plants in Italy (GWh) [7]
*These values have been calculated for the period 1995-2006

The schemes do not envisage the attribution of direct economic incentives, but can be used as marketing tools on the part of producers – whose strategic decision making is aimed at creating "environmental value" – so as to offer options to users showing greater awareness of environmental issues.

However, the introduction of the White Certificates Scheme constitutes the tool which has radically changed strategies in terms of incentives for meeting the demands of a liberalised energy market.

On the basis of this scheme, regulated by the Legislative Decree 79/99 together with the subsequent applied regulations (Ministerial Decrees dated: 11th November 1999; 18th March 2002 and 24th Oc-

tober 2005), starting from 2001, producers and importers of electricity from conventional sources are obliged to have a quota of electricity from res. Producers can decide to invest in plants utilizating res or purchase green certificates (GC) on the organized market.

Green Certificates, the value of which is 1MWh, can be traded freely, separately from the corresponding "green electricity", in favour of plants utilizing renewable sources.

Recently the Green Certificate incentives scheme has undergone extensive change to eliminate the uncertainties that have always characterized the renewables sector and, consequently, to insure the generation of renewable energy is headed in the right direction.

Despite the launching of the GC system and the many measures undertaken on a national scale for promoting the development of renewable resources, results are not satisfactory. This is especially so if the Italian results are compared with those of other European countries such as Germany, Spain and Denmark.

Simply implementing Green Certificates and other schemes will not be sufficient in the short term to increase the demand for renewable energy and consequently to increase its supply.

To satisfactorily increase production of energy from renewable sources and to develop the domestic market, the synergic integration of the various support tools are needed.

Conclusion

More initiatives are needed to increase renewables use in Italian production and throughout the country, however, the effective "take off" of renewable energy sources necessitates not only support incentives, but also policies and industrial strategies that go beyond financial factors.

There is a need to deal with the critical elements of the res scheme in order to promote its use. These critical elements include factors that hinder investments such as authorization procedures, inertia in the administrative processes, slow bureaucratic performance, hostile attitudes of local communities and the difficulties of dealing with multiple levels of government. Also such factors as the instability of res generation and the low density level of energy produced per plant area, need to be considered.

The issues which have up to now limited the development of renewable sources, if not timely and adequately resolved, will impede Italy from achieving her - albeit not binding - goals established by the new European Union environment and energy policy for 2020. The achievement of these goals is a challenge of management, organization and technology, requiring credible and realistic policies and realistic incentives.

Footnote

[1] The legislative package envisages a multiplicity of proposals in Directives on issues of Energy and environmental policy; they range from modifying the EU Emission trading system (EU-ETS) to the capture and storage of CO_2 (Carbon Capture and Storage - CCS) and from the environmental quality of the fuels, to renewable energy sources.

Referencess

1 Commission of the European Communities, 2009, Boosting growth and jobs by meeting our climate change commitments, IP/08/80, Brussels, 23 January 2008, consulted on website http://europa.eu/index_en.htm

2 Gestore dei servizi elettrici, 2007, Rapporto delle attività del Gestore dei Servizi Elettrici, published on website http://www.gse.it. .

3 Gestore dei servizi elettrici, Statistiche sulle fonti rinnovabili, for various years, consulted on website http://www.gse.it.

4 Malandrino O., Sica D., 2008, Certificati Verdi, un meccanismo ancora "arrugginito", in Nuova Energia, 5, 90-95.

5 Malandrino O., Sica D., 2006,"Le politiche di sviluppo delle fer in Italia e i relativi strumenti di sostegno. Un contributo alla tutela degli utenti/consumatori", Proceeding of XXII National Commodity Congress - La qualità dei prodotti per la competitività delle imprese e la tutela dei consumatori, Rome, 2-4 marzo.

6 Ministero dello Sviluppo Economico, Statistiche dell'Energia, for various years see consulted on website http://dgerm.sviluppoeconomico.gov.it/dgerm/

7 Terna, Dati Statistici sul settore elettrico, for various years, published on website http://www.terna.it

Scenes from the 32nd IAEE International Conference

June 21–24, 2009 — San Francisco, California, US

Energy, Economy, Environment: The Global View

Proceedings of the 32nd IAEE International Conference, San Francisco CA, June 21 to 24, 2009

Single Volume $130 - members; $180 - non-members
This CD-ROM includes articles on the following topics:

Climate Change Policy
Drivers of Oil Price and the Outlook
The Future of Renewables
Renewable Energy Technologies
Renewables, a California Perspective
Energy Market Developments in the Pacific Basin
Nuclear Applications in Asia
The Oil and Gas Market in Asia
The Role of Coal in China
Affordable, Low-Carbon Diesel Fuel
Unconventional Resources: Potential and Challenges
Dynamics of Abundance of North American Gas Supply
Climate Policy Design Challenges in North America
Energy Market and Policy in Europe
When Geopolitics and Macro economics Begin to Collide
Developments in LNG
Natural Gas and CO_2 Infrastructure
EDF's Development Strategy
Nuclear Power Option

Payment must be made in U.S. dollars with checks drawn on U.S. banks. Complete the form below and mail together with your check to:

Order Department
USAEE
28790 Chagrin Blvd., Suite 350
Cleveland, OH 44122, USA

Name _____
Address _____
City, State _____
Mail Code and Country _____

Please send me_____copies @ $130 each (member rate) $180 each (nonmember rate).
Total Enclosed $_____Check must be in U.S. dollars and drawn on a U.S. bank, payable to USAEE.

Careers, Energy Education and Scholarships Online Databases

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

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

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

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

We look forward to your participation in these new initiatives.

IAEE Institutional Membership

IAEE is very grateful for the support and involvement of our Institutional Members listed below. Institutional membership carries with it many special benefits. For a full listing of benefits and services please visit http://www.iaee.org/en/membership/institutional.aspx

Aramco Services Co., USA
BKW FMB Energie AG
BP Plc., UK
CityPlan spol. S.r.o., Czech Republic
CRA International, USA
Curtin Business School, Perth, Australia
GSE S.p.A., Italy
Institut Francais Du Petrole, France
Institute of Energy Economics, Tokyo
National Energy Board, Alberta, Canada
Platts, USA
Rice University, Baker Institute, USA
Shell International, Ltd., The Netherlands
University of Alberta, Canada
University of Auckland, New Zealand
University of Perugia, Italy
University of Stavanger, Norway

Publications

The Oxford Handbook of Economic Inequality. Wiemer Salverda, Brian Nolan and Timothy M. Smeeding, Eds. (2009). 848 pages. Price: US$120.00. Contact: Order Dept., Oxford University Press, 2001 Evans Road, Cary, NC 27513, USA. Phone: 800-451-7556. Fax: 919-677-1303. URL: www.oup.com/us

The Great Warming: Climate Change and the Rise and Fall of Civilizations. Dr. Brian Fagan (2009). Contact: Julie Mancini, Lyceum Agency, 433 NW Fourth Avenue, Portland, OR 97209, USA. Phone: 503-313-2862. Email: Julie@lyceumagency.com URL: www.lyceumagency.com

Peak Everything. Richard Heinberg (2009). Contact: Julie Mancini, Lyceum Agency, 433 NW Fourth Avenue, Portland, OR 97209, USA. Phone: 503-313-2862. Email: Julie@lyceumagency.com URL: www.lyceumagency.com

Big Coal: The Dirty Secret Behind America's Energy Future. Jeff Goodell (2009). Contact: Julie Mancini, Lyceum Agency, 433 NW Fourth Avenue, Portland, OR 97209, USA. Phone: 503-313-2862. Email: Julie@lyceumagency.com URL: www.lyceumagency.com

International Review of Applied Economics. Malcolm Sawyer, Managing Editor (2009). Price: US$406.00. Contact: Routledge Customer Services, Taylor & Francis Inc., 325 Chestnut Street, 8th Floor, Philadelphia, PA 19106, USA. Phone: 1-800-354-1420. Fax: 1-215-625-2940. Email: customerservice@taylorandfrancis.com URL: www.tandf.co.uk/journals

Annual Review of Economics, Volume 1. Kenneth J. Arrow, Editor (2009). Price: US$54.60. Contact: Annual Reviews, 4139 El Camino Way, PO Box 10139, Palo Alto, CA 94303-0139, USA. Phone: 800-523-8635. Email: service@annualreviews.org URL: www.annualreviews.org

Global Energy Transformation – Four Necessary Steps to Make Clean Energy the Next Success Story. Mats Larsson (2009). Price: £25.00 Contact: Abbie Todd, Pallgrave MacMillan. Phone: 01256 303561. Email: a.todd@palgrave.com

Calendar

7-10 September 2009, 10th IAEE European Conference: Energy, Policies and Technologies for Sustainable Economies at Vienna, Austria. Contact: IAEE Conference Secretariat, IAEE, 28790 Chagrin Blvd Ste 350, Cleveland, OH, 44122, USA. Phone: 216-464-5365. Fax: 216-464-2737 Email: iaee@iaee.org URL: www.iaee.org

8-10 September 2009, Cleantech Forum XXIII, Boston at Boston Convention & Exhibition Center, Westin Boston Waterfront Hotel, Boston, Massachusetts. Contact: Cleantech Group, USA. Phone: +1 (810) 224-4310 Email: info@cleantech.com URL: http://cleantech.com/bostonforum

21-21 September 2009, Sustainable Energy: The Next Crisis? at BIS Conference Centre, London. Contact: BIEE Admin Office, British Institute of Energy Economics, United Kingdom. Phone: 01296747916 Email: admin@biee.org URL: www.biee.org

6-6 October 2009, Brussels Carbon Caputre and Storage Summit 2009 - Getting it Right for Copenhagen at Hotel Sofitel Brussels Europe. Contact: James Wilmott, Managing Director, Forum Europe, La Bibliotheque Solvay, Parc Leopold, rue Belliard 137, Brussels, 1040, Belgium. Phone: 44-0-2920-783-028 Email: james.wilmott@forum-europe.com URL: www.ccsconference.eu

8-9 October 2009, 29th Annual Bonbright Center Electric & Natural Gas Conference at Buckhead, Georgia. Contact: Wendy Richardson, Marketing Manager, Terry College of Business, 110 E Clayton St Ste 602, Athens, GA, 30602, USA. Phone: 706-425-3058. Fax: 706-369-6078 Email: wendyr@terry.uga.edu URL: http://www.terry.uga.edu/exec_ed/bonbright/

22-22 October 2009, Energy Economics: Making Energy Transition Feasible at Expo -and congrescentre Erasmus University Rotterdam. Contact: G. Vishwanathan, Erasmus University Rotterdam, Postbus 1738, Rotterdam, Zuid-Holland, 3000 DR. Phone: +31 665326705 Email: vishwanathan@ese.eur.nl URL: http://www.eur.nl/ese/english/expertise/ese_conferences/energy_economics/

18-19 November 2009, Nano Petroleum, Gas and Petro-Chemical Industries Conference: "Providing Nano-Powered Solutions" at Cairo, Egypt. Contact: Neveen Samy, Assistant, Sabry-Corp Ltd. for Science and Development, 4 Al-Sabbagh Str., El Korba, Cairo, Egypt. Phone: +20 2 2414 6493. Fax: +20 2 2415 0992 Email: neveen.samy@sabrycorp.com URL: www.npg.sabrycorp.com

22-22 November 2009, Energy Economics: Making Energy Transition Feasible at Expo -and congrescentre Erasmus University Rotterdam. Contact: rhuisman@ese.eur.nl, Rotterdam, Zuid-Holland, 3000 DR, Netherlands Email: rhuisman@ese.eur.nl, vishwanathan@ese.eur.nl URL: http://www.eur.nl/ese/english/expertise/ese_conferences/energy_economics/

November 30, 2009 - December 2, 2009, Canadian Renewable Fuels Summit at Vancouver, British Columbia, CANADA. Contact: Deborah Elson, Director Member Relations and Industry Promotions, Canadian Renewable Fuels Association, Suite 1005, 350 Sparks Street, Ottawa, ON, K1R 7S8. Phone: 613-594-5528. Fax: 613-594-3076 Email: d.elson@greenfuels.org URL: www.greenfuels.org

5-6 December 2009, Nanotech Business Summit at Cairo, Egypt. Contact: Neveen Samy, Admin Assistant, SabryCorp Ltd. for Science and Development., 4 Al-Sabbagh St., 11757, El Korba, Cairo, Egypt, Cairo, Egypt. Phone: +20 2 2414 6493. Fax: +20 2 2415 0992 Email: neveen.samy@sabrycorp.com URL: http://www.nanobus.sabrycorp.com

23-25 February 2010, 11th Mediteranean Petroleum Conference and Exhibition at Tripoli, Libya. Contact: Dr. M.A.Muntasser, President, International Energy Foundation, P.O.Box 83617, -, Tripoli, -, -, Libyan Arab Jamahiriya. Phone: 218 21 3331832/3/4. Fax: 218 21 3331831 Email: training@ief.ly URL: www.ief.ly

29-30 March 2010, Water Resources and Renewable Energy Development in Asia at Sarawak, Malaysia. Contact: Mrs. Margaret Bourke, Conference Project Manager, Aqua-Media International Ltd., PO Box 285, Wallington, Surrey, SM6 6AN, United Kingdom. Phone: 44-20-8773-7244. Fax: 44-20-8773-7255 Email: mb@hydropower-dams.com URL: www.hydropower-dams.com

6-9 June 2010, 33rd IAEE International Conference: The Future of Energy: Global Challenges, Diverse Solutions at Rio de Janeiro, Brazil. Contact: IAEE Conference Secretariat, IAEE, 28790 Chagrin Blvd Ste 350, Cleveland, OH, 44122, USA. Phone: 216-464-5365. Fax: 216-464-2737 Email: iaee@iaee.org URL: www.iaee.org

26-27 August 2010, 11th IAEE European Conference: Energy Economy, Policies and Supply Security: Surviving the Global Economic Crisis at Vilnius, Lithuania. Contact: David Williams, Executive Director, IAEE, 28790 Chagrin Blvd., Ste. 350, Cleveland, OH, 44122, USA. Phone: 216-464-5365. Fax: 216-464-2737 Email: iaee@iaee.org URL: www.iaee.org

INTERNATIONAL ASSOCIATION for ENERGY ECONOMICS
WWW.IAEE.ORG

IAEE ENERGY FORUM

Volume 18, Third Quarter, 2009

The IAEE *Energy Forum* is published quarterly in February, May, August and November, by the Energy Economics Education Foundation for the IAEE membership. Items for publication and editorial inquiries should be addressed to the Editor at 28790 Chagrin Boulevard, Suite 350, Cleveland, OH 44122 USA. Phone: 216-464-5365; Fax: 216-464-2737. Deadline for copy is the 1st of March, June, September and December. The Association assumes no responsibility for the content of articles contained herein. Articles represent the views of authors and not necessarily those of the Association.

Advertisements: The IAEE *Energy Forum*, which is received quarterly by over 3400 energy practitioners, accepts advertisements. For information regarding rates, design and deadlines, contact the IAEE Headquarters at the address below.

Membership and Subscription Matters: Contact the International Association for Energy Economics, 28790 Chagrin Boulevard, Suite 350, Cleveland, OH 44122, USA. Telephone: 216-464-5365; Fax: 216-464-2737; e-mail: IAEE@IAEE.org; Homepage: http://www.iaee@iaee.org

IAEE *Energy Forum*
Energy Economics Education Foundation, Inc.
28790 Chagrin Boulevard, Suite 350
Cleveland, OH 44122 USA

PRSRT STD
U.S. POSTAGE
PAID
Richfield, OH
Permit No. 82