Highlights from the 32nd IAEE International Conference

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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.

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

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