



AESIEAP

CEO Conference 2007

10-12, October 2007

AESIEAP CEO Conference Report

Executive Summary

The 4th AESIEAP CEO Conference held in Macau had an impressive 170 delegates from 17 countries.

The theme of this year's conference, hosted by CEM, was '*New Trends in the Power Sector – Solutions for the Quality of Life*'. During the conference senior executives examined issues that are not only pivotal to improving the quality of life but are also imperative for the long-term sustainable development of society.

Following the opening ceremony, the conference was organized around the central themes of reform, security of supply and the environment. The first morning saw three keynote presentations:

* *Electricity reform in APEC economies: the way ahead*

* *Security of supply – roles and responsibilities*

* *Generating technologies in a carbon constrained world*

The first afternoon session entitled '*Innovation impacts from deregulation*' picked up on the reform theme, with further presentations on the subject of reform followed by a panel discussion with panelists from Australia, New Zealand and The Philippines.

Day two followed a similar format. The first morning session – *Security of electricity supply* – featured a short synopsis of the previous day's keynote on the subject, followed by presentations on Malaysia and Macau. The three panelists then discussed key issues related to the challenges and role of utilities in securing supply to its customers.

The afternoon, in similar fashion to the morning, began with a brief synopsis of the previous day's presentation on '*Generating Technologies in a low carbon environment*'. There were then two presentations from utilities in Japan and Taiwan on how the issue of combating CO₂ emissions was being tackled.

In analyzing the issues affecting reform and the impacts, it was noted that because political, economic and industry conditions differ between countries, we should always be cautious about following another country's precedents. However, the main thing that investors look for is certainty in terms of policies and market framework.

Reform needs proper management and among other things, countries need to set clear objectives and lay out a strategic reform road map. But whatever the road map, it was pointed out that the electricity industry is not static which means that the management of the energy businesses must be continually adapted. For example, one of the biggest future challenges for CEOs will be how to factor the



AESIEAP

CEO Conference 2007

10-12, October 2007

price of carbon into fuel selection and investment decisions. The better a CEO understands the interplay between political, social and market forces, the more effective they will be in managing investment and trading risks.

Security of supply has often been cited as a concern among countries moving towards a liberalised electricity market. But any such concerns can be adequately addressed if the right steps are taken. The move from a monopoly market to an unbundled market calls for clearly defined roles and responsibilities of the different market participants. This can only be facilitated through quality legislation and coherent enforcement of legislation by the regulators. This will in turn create an attractive environment for investment. This is of paramount importance since security of supply is linked to both investments in generation and network capacities, and the operational rules to ensure proper running of the electrical systems. The other important aspect of security is realising that no single energy source should be relied on and all options should be kept open.

Keeping options open or, more to the point, using all available options was the key message in combating climate change. In a look at the US market, the world's largest emitter, along with China, an overview was given on the impact that various technologies could have. The key message was that although nuclear would play a major role, carbon capture for coal fired plant will have to be realized if the US is to cut CO₂ levels by 45 per cent by 2030.

Conference Report

The 2007 AESIEAP CEO Conference addressed the theme: '*New trends in the power sector – solutions for the quality of life*'. The Conference served as a prelude to the 17th Conference of the Electricity Supply Industry (CEPSI) to be held in Macau in October next year.

In the opening ceremony, an estimated 200-250 delegates and dignitaries were welcomed by Mr Arnaldo Santos, Director of the Office for the Development of the Energy Sector of Macau SAR Government, representing the Secretary for Transport and the Public Works.

With improvements in energy efficiency, future developments in power generation technologies are critical for a secure and sustainable electricity supply. Technologies providing low carbon power generation are of key importance, alongside improvements in thermal efficiency and the introduction of technologies to capture and store carbon dioxide.

New scenarios in deregulation and privatization combined with rising oil prices; increasing concerns over climate change and energy sustainability have brought new challenges. "How the power sector responds to all these challenges will determine the achievement of the aspirations for quality of life in the future," commented Mr Santos.

Mr Santos' speech was followed by a welcome from Vaz Marcelino, President of

AESIEAP and CEO of CEM. Marcelino noted that the conference would “help delegates exchange information, accumulate experience, communicate ideas and promote the prosperity of the power industry and world economy progressively.”

Road to reform

In setting the tone of the opening session on *‘Electricity Reform in APEC Economies’* Robert Prichard noted: “Before we can plot a reliable way ahead in further reform, we should look back to see the enormous changes that have taken place and ask why they occurred.” His opening message was: before you can plan the future, you need to know the past. Reform of the electricity sector has been successfully implemented in many countries with the general goal of improving economic efficiency but it is a process that is nowhere near finished.

Robert Prichard is Managing Director of ResourcesLaw International based in Sydney, Australia and has acted as a lawyer and consultant on energy policy and energy strategy to governments and major corporations in the Asia-Pacific region.

Pritchard first looked at the “big picture issues” that have affected and are likely to have a future impact on the electricity industry e.g. globalization and economic liberalization; regional energy market integration; sustainable development; carbon markets and carbon prices. He then asked what these big picture issues mean for electricity sector reform.

Pritchard noted that while much has been achieved, there have been unexpected problems such as mistakes in market design, legal impediments and inadequate management of the reform process itself. Yet the main lesson is that there is no ‘one size fits all’. This applies especially in developing countries. Pritchard set out a flexible model for managing reform and explained that because political, economic and industry conditions differ between countries, “we should always be cautious about following another country’s precedents”.

Reform needs proper management; it does not just happen by itself. Pritchard suggested a number of guidelines that could help countries in their ongoing reform – the No.1 being the need to set clear objectives and lay out a strategic reform road map. He set out six guidelines on issues such as separating transmission; establishing an independent regulatory system; installing sufficient generating capacity to meet demand and preparing for a competitive future.

But whatever the road map, it was noted that the electricity industry is not static which means that the management of the energy businesses must be continually adapted. For example, one of the biggest future challenges for CEOs will be how to factor the price of carbon into fuel selection and investment decisions. The better a CEO understands the interplay between political, social and market forces, the more effective they will be in managing investment and trading risks.

The issue of adapting to change to better manage risks and sustain profitability was picked up in the afternoon session: *‘Innovation impacts from electricity deregulation’*. Danilo Sedilla, Vice President of Geothermal Generation at Philippines utility, National Power Company (NPC), said that since the Electric



AESIEAP

CEO Conference 2007

10-12, October 2007

Power Industry Reform Act (EPIRA) was signed and enforced six years ago, NPC has been implementing programmes that will help it “adapt and go through changes that are taking place in the power industry”.

The company’s prime objective is to sustain profitability while undergoing privatization. The first strategy in achieving this is maximizing and optimizing the use of government-owned generation facilities with least cost operation. “We have implemented rehabilitation and maintenance programmes to keep power plants running in top condition,” he said.

NPC has also adopted a strategy that sees less use of plants that use imported fuel oil, and greater use of plants that run on indigenous and renewable sources. Sedilla said that this has resulted in savings in fuel cost as well as reduced environmental impact and increased fuel efficiency. “We have also included the use of blending with biofuels for oil-fired plants,” he added.

Until recently, the Philippines has certainly had its challenges in terms of attracting investment, mainly due to its stop-start reform process but it is an experience not unique to the Philippines.

In his speech, Murray Jackson, Chief Executive of Genesis Energy, New Zealand commented: “Reform in some instances is scattered. Even in Australia there are different models and this makes investment difficult. New Zealand, meanwhile has a mixture of government and investor-owned companies.”

In addition to the old and in many instances ongoing challenges, deregulation brings a number of new challenges. He mentioned that there is also the challenge of managing fuel risk and he suggested taking an equity position [upstream] to protect your exposure to forward fuel supply. “Take or pay gas contracts are difficult to manage. We therefore have three oil fields in our portfolio. We take the attitude: if you can’t beat them, join them. Having a diversity in sources of oil and gas supply is also imperative,” he noted.

Jackson then spent considerable time pointing out that the biggest challenge utilities now face is environmental constraints and the associated risks. In addition to carbon dioxide he also referred to SO_x and NO_x as well as water shortages in power stations. He said that the global response to emissions from coal fired plant has largely been to build gas fired plant. It was an approach that he did not necessarily agree with and said more effort was needed to develop carbon capture and other technologies to reduce emissions from these plants.

He summed up by quickly looking at how individuals could contribute to carbon reduction through smart metering technology. He explained: “Genesis now runs a schools programme where we put solar panels in all the High Schools and integral read-outs in the Science laboratories where we can look at all their energy readings. This will help students understand the impacts of various generating technologies.”

Offering technologies such as smart metering was also a way of providing a better service for customers. This, he said, was important in a liberalized market.



AESIEAP

CEO Conference 2007

10-12, October 2007

In the panel session that followed, the first key question posed was: has deregulation been successful and what are the main lessons learned where it has not been a success? Pritchard responded by saying that markets that have been liberalized have operated with greater efficiency than those under state control. In terms of lessons learned, he remarked that market risk has been difficult for investors to handle. Therefore, the main things investors want are security and certainty.

Another question raised was how to align energy, economic and environmental policy. The panelists commented that clearly those policies conflicted with each other. Pritchard outlined the situation of Australia which, through export of coal, has become the third largest exporter of energy. The fact that the coal industry has benefited from economic policy runs in direct conflict to energy and environmental policies. “There is a lot of hypocrisy here and many issues for politicians to think through,” he remarked. Jackson added: “Trying to get policy alignment is like trying to stop the world spinning.”

Security is paramount

Security of supply has often been cited as a concern among countries moving towards a liberalised electricity market. But in his keynote speech, Mr. Inge Pierre, Head of European Affairs of Svensk Energi, Sweden and Chairman of the Eurelectric Working Group on Security of Supply, pointed out that any such concerns can be adequately addressed if the right steps are taken.

Drawing on the EU experience, Mr Pierre said: “Even if markets are liberalised, security of supply remains an essential issue for the industry. We are very committed and have an excellent track record in Europe in general. If you come to Europe, you will see that the lights are still on.”

The move from a monopoly market to an unbundled market calls for clearly defined roles and responsibilities of the different market participants. This can only be facilitated through quality legislation and coherent enforcement of legislation by the regulators. This will in turn create an attractive environment for investment.

“This is of paramount importance. Security of supply is linked to both investments in generation and network capacities, and the operational rules to ensure proper running of the electrical systems. Quality of legislation is more important than quantity,” explained Pierre.

The other important aspect of security is realising that no single energy source should be relied on and all options should be kept open. “No one single energy or technology solution can provide all the energy for Europe. A balanced mix of nuclear, thermal, hydro and other renewable sources is needed and we rely on the governments to keep the options open,” said Pierre.

The topic of security of supply was re-visited in the afternoon following a brief summary by Pierre. The session then saw two AESIEAP members give an overview of how their companies are securing electricity supply in their



AESIEAP

CEO Conference 2007

10-12, October 2007

respective countries. In addition to the emerging issue of a secure electricity supply system, the speakers focused on issues and approaches being undertaken for improving electricity transmission and distribution system performance, as well as risk management systems in place to anticipate and evaluate situations that might jeopardize the integrity of the system safety, security and reliability.

The first speaker was Datuk Md. Sidek Ahmad, Senior Vice President of Tenaga Nasional Berhad (TNB). TNB's transmission system spans the whole of peninsular Malaysia and also has interconnections (via HVAC and HVDC cables) with Thailand in the north, and Singapore in the south (via a submarine HVDC cable). "The Interconnection between Malaysia, Thailand and Singapore is the foundation for future system security and stability in this region," noted Sidek.

Unlike many other countries, Malaysia has not gone down the road of deregulation. Instead, it is guided by the three main objectives of its National Energy Policy i.e. the Supply Objective; the Utilisation Objective and the Environment Objective. He explained: "It is crucial that the business objective of TNB – to maintain 60 per cent of generating capacity – be maintained to ensure that the national supply security as set out under the National Energy Policy is not compromised."

Sidek then turned his attention to the importance of security of fuel supply in electricity supply security. Currently TNB relies on gas for almost 60 per cent of its power generation. Therefore any shortage of gas opens the power sector to a number of problems. In order to achieve the set objective, Malaysia has therefore adopted a five-fuel policy to mitigate fuel risk.

Sidek concluded by saying that the improvement of system reliability is always a balancing act between additional capital investment and returns on investment while meeting the growth demand and sophistication of customers' requirements. "This is an ongoing challenge especially where the environment of power system planning is moving from a monopolistic vertically integrated utility towards a more deregulated approach. System planners now have to re-examine the philosophy, the approach and even the tools and methodology of the trade," he said.

Mr. Daniel Bettembourg, Executive Director of Companhia de Electricidade de Macau (CEM), then gave an insight into Macau's electricity supply system. Electricity demand in Macau has been increasing rapidly in recent times and is expected to continue to do so until 2015. Demand is predicted to grow from just over 400 MW in 2005, to 1000 MW in 2010 before leveling off to just less than 1200 MW in 2015. The building of new casinos and hotels is driving most of the new demand. In fact, the newly built Venetian, accounts for almost 50 MW or nearly 10 per cent of current installed capacity.

Geographically, Macau was described as a "load pocket", having to rely on interconnections for power imports from China in addition to its own generating capacity, which currently comes from four power plants. Two connections with China were added in 2006, each with a capacity of 125 MVA and there are plans



AESIEAP

CEO Conference 2007

10-12, October 2007

to increase import capacity to 1050 MVA by around 2009. In addition, a new system configuration will be introduced in 2010, which will see a 220 kV network being adopted as the system supply voltage as opposed to the present 110 kV.

But security on the supply side is only one part of the problem. CEM also has the duty to deliver to the end customer and has the challenge of having to adapt old networks to new expectations of customers. “Most customers now live above the 10th floor. If there is an interruption, the exercise would be healthy but it could also be quite tiring,” mused Bettembourg.

Like TNB, as a government-owned utility the responsibility of securing supply falls squarely on the shoulders of CEM. Bettembourg noted: “Under the 25-year Concession contract signed in 1985, there are laws which have to satisfy all the stakeholders. Reliability targets have been set.”

The government has also put in place a policy with performance indicators that call for high levels of system reliability and security. From next year customers will be entitled to a rebate if tough targets on the number and length of interruptions are not met.

Despite the challenge Bettembourg remained confident: “CEM is trying to keep pace with the increasing power demands and expectations in reliability. So far we have been successful.”

Waging war on CO₂

The hot topic of the conference was CO₂ and its impact on the electricity industry. In the first speech dedicated to this issue at the conference, Tuan Nguyen, Executive Director Asia, EPRI based in the USA gave his views in a presentation entitled: *‘Generation Technologies in Carbon Constrained World’*.

Nguyen conceded that the US is the largest emitter of carbon in the world, accounting for one quarter of global CO₂ emissions. “[The US is the biggest emitter]. Therefore we have to do something,” he admitted.

Nguyen started by analysing how quickly the US could cut CO₂ emissions if it was able to set an aggressive deployment schedule of all the available technologies. He presented a table that showed which technologies could be installed and what could reasonably be achieved in terms of target efficiencies.

The first technology was energy efficiency i.e. better lighting, building construction, better refrigerators, improved heating and cooling. He calculated that this could reduce baseload by 9 per cent with a corresponding reduction in carbon emissions. Distributed energy would produce some further small reductions. Renewable, he said, would provide an even greater reduction.

“If we build 50 new nuclear plants in the US, we see the emissions curve start to plateau out,” he said. But even with these technologies, the US would still not start to see a reduction. The biggest impact would come from carbon capture and



AESIEAP

CEO Conference 2007

10-12, October 2007

storage since 80 per cent of emissions for the US electricity sector comes from coal fired plants. Nguyen concluded that if the whole portfolio of technologies was applied by 2030, the US could reduce carbon emissions by 45 per cent.

But while the level of CO₂ reduction is feasible from the technology viewpoint, as a policymaker the question remains: what will be the impact in terms on the economy and to the consumer? This was the same question touched on at the end of the debate '*Innovation impacts from deregulation*' – and one that looks like it will remain unanswered for some time to come.

The session: '*Generation technologies for a low carbon economy*' followed a recap of the previous day's address by EPRI's Tuan Nguyen.

Shuzo Katayama, Executive Vice President, Kyushu Electric Power Co. gave delegates an overview of the Japanese utility's efforts to reduce CO₂ in electricity supply. "We consider it our social responsibility to heighten our environmental conservation awareness in all of our business activities," he opened.

Kyushu has an installed generating capacity of 19 417 MW. Notably 11 180 MW comes from thermal sources.

In 2006, the company produced 31.6 million t of CO₂. By 2012 it hopes to reduce its CO₂ emissions by 20 per cent of 1990 levels. According to Katayama, there was an optimal combination of power sources that could achieve energy security, economic efficiency and environmental compatibility. "Nuclear power will be used as a core component in the promotion of optimal combination of power sources," he said.

He hypothesized that if coal and oil fired thermal plant was replaced by nuclear; CO₂ emissions could be reduced by 30.2 million t per year.

The use of renewables in the drive to cut CO₂ was also mentioned, in particular geothermal, wind and biomass.

In April 2006, Kyushu commissioned the Hatchoubaru geothermal binary cycle power plant, which has an output of 2 MW.

Meanwhile a new wind project is being built that is scheduled for commissioning in October 2008. Called the Nagashima Wind Hill, it will have an installed capacity of 50.4 MW generated from 21 wind turbines. These will be the largest wind turbines adopted by Kyushu to date.

In terms of biomass, Kyushu started up two plants in 2005 – the 11 MW Miyazaki plant which runs on poultry litter and the 29 MW Fukuoka Clean Energy, Tobu plant which burns general waste.

But while adjusting the energy mix is important, it is perhaps more important to improve the efficiency of coal fired plants. Improving the efficiency of a 1000 MW coal plant by just 1 per cent could cut CO₂ emissions by 110 000 t/year he concluded. Katayama pointed out that this would be done by moving to advanced



AESIEAP

CEO Conference 2007

10-12, October 2007

ultra supercritical units. Kyushu also sees a role for coal gasification. Katayama described a demonstration IGCC plant that has just begun operation at Nakoso. This will run in a test phase until the end of 2009.

In the following address, Jen-Ming Hsu, Deputy General Manager at the Research Institute of the Taiwan Power Company, gave more of a global overview of the technologies to combat CO₂. He opened by saying that there was evidence of climate change, with the major contribution from the burning of fossil fuels.

Hsu outlined a three point strategy for CO₂ reduction that included: expanding the use of carbon free or low carbon energy; adopting high efficiency generating technologies; and the introduction of carbon capture and storage (CCS).

He looked at hydro, geothermal, wind, solar, biomass and nuclear and presented figures on their share in the global energy mix, the limitations of further expansion and the cost of generation from each.

Interestingly, Hsu was the only presenter to give cogeneration any real mention. "Although its share in global electricity production is 7 per cent, it is the most efficient way of using energy," he commented.

On the subject of carbon capture, Hsu believed it was the ultimate solution for CO₂ emissions reduction from fossil fired plants but at the same time noted the current limitations of cost, maturity and lack of storage sites.

He summed up by drawing on the Stern report in saying that the large-scale reduction of CO₂ to mitigate climate change was "an unprecedented challenge but it should be seen not simply as a cost but also as an opportunity".

In the debate that followed, Roy Adair, CEO of Senoko Power and moderator of the session asked: "Will clean coal technology be one of the saviors of the future? It's a concept that has been around for a long time but we've not seen it come through. But with the pressure of a carbon charge of anything between \$30 and \$50 per MWh on the cost of electricity, will we now see it come through?" Nguyen responded by saying that this will force the US to accelerate the development of carbon capture.

One burning question from the floor was: are there any plans to introduce carbon charges? There was no definitive answer but the general belief was that until this is determined, there was no economic incentive to make carbon capture happen.

Looking forward to CEPSI 2008

No doubt the key questions addressed at the 4th AESIEAP CEO Conference will be further examined at CEPSI 2008. This event, hosted by CEM, will be held at the Venetian Exhibition and Convention Centre October 27-31. Approximately 2000 electricity industry representatives, utility managers, professionals and researchers from over 30 countries and regions all over the world including the 17 member countries and regions of AESIEAP will be in attendance.



AESIEAP

CEO Conference 2007

10-12, October 2007

As hosts, CEM, together with the Macau organising committee wants to ensure a return to the traditional format and quality standards so the event can continue towards its traditional growth. The theme for next year “*The Power Sector in a fast changing world*” is a perfect reflection of the changes that will affect the Asian power market.

With developing countries predicted to be responsible for more than three quarters of global CO₂ emissions between 2004 and 2030 the debate on China and India’s role in tackling climate change is becoming more intense. In the coming years, the pressure will be on as to how the Asian power and energy markets can adjust to address this global issue through technology, business and market innovations supported by political policies. These and other key issues will be addressed in Macau next year.