

CURRENT ISSUE TOPICS

CEO's Message
Visitors to EMC
Singapore Electricity Roundtable 2015
Rule Change Updates
Market Update
New MSCP Member
New MPs in the NEMS
User Forums
EMC Training Programme



CEO'S MESSAGE

With effect from 1 September, Dave Carlson has moved on to another role in Singapore Exchange. I would like to take this opportunity to thank Dave for his guidance, and to express our deep appreciation for his contributions and achievements as the former CEO of EMC. On behalf of the

management and staff of EMC, we wish him the very best.

EMC's flagship event, the Singapore Electricity Roundtable that was held on 8 July at The St. Regis Singapore, received much positive feedback from attendees. Aside from gaining valuable insights from the presentations, I think many attendees cherished the opportunity to network and reconnect at the event. I would like to thank our distinguished speakers for taking time off their busy schedules to join us, as well as all new and returning attendees for their support.

Aside from the Roundtable, there was much activity in the National Electricity Market of Singapore (NEMS) and in EMC the last two months.

In July, the Market Surveillance and Compliance Panel welcomed a new member, while the NEMS registered two new market participants. We also hosted a delegation from the Philippines in July,

and both parties were pleased to exchange ideas and developments on our respective power sectors.

In the following month, the Energy Market Authority approved rule changes pertaining to the provision of regulation by batteries and the eligibility of energy and reserve offers.

Looking at the market's performance, the monthly average Uniform Singapore Energy Price crossed the \$200/MWh mark for the first time this year in July due to a tight supply cushion and high forecasted demand. It retreated to below \$200/MWh again in August.

Finally, on a more personal note, I would like to express my heartfelt appreciation to Dave and the EMC Board for the opportunity to lead the EMC team forward. I look forward to the industry's support and partnership as we evolve the NEMS in keeping with the developments in Singapore's energy sector.

Toh Seong Wah
Chief Executive Officer

EMC WELCOMES VISITORS FROM THE PHILIPPINES



PEMC and DOE delegates with EMC representatives

Seven delegates from the Philippine Electricity Market Corporation (PEMC) and Philippines' Department of Energy (DOE) visited EMC on 9 July.

The delegation was led by PEMC President Melinda L. Ocampo, who was in town to speak at the Singapore Electricity Roundtable 2015. The team wanted to learn more about specific features of and new developments in the National Electricity Market of Singapore.

We appreciate the opportunity to exchange ideas and learn about the latest developments in other power sectors through visits like this.

HIGHLIGHTS OF SINGAPORE ELECTRICITY ROUNDTABLE 2015



Arnaud Dubois-Denis from BG Singapore Gas Marketing speaking at the Roundtable

The tenth Singapore Electricity Roundtable, held on 8 July at The St. Regis Singapore, saw strong support from the industry once again.

The majority of participants were representatives from the National Electricity Market of Singapore, but we also saw an increased representation from the gas sector this year. Other participants included government officials and operators from the local and regional electricity industries, consultants, service providers, suppliers, bankers, lawyers, and large consumers.

The event opened with a welcome address by EMC Chairman, Wong Meng Meng. He outlined recent developments in Singapore's energy landscape, particularly the electricity and gas markets. He also touched on power sector changes in the Philippines and the Gulf Cooperation Council (GCC), as well as gas market developments in Europe and Asia.



Question from a Roundtable participant during one of the presentations



Roundtable conference in session

We were privileged to have two gas experts among our distinguished speakers this year. Arnaud Dubois-Denis, General Manager of BG Singapore Gas Marketing, shared his views on the establishment of an Asian LNG hub. Martin J. van der Lugt, Director of Chambers Street (UK) who flew in from the United Kingdom to participate in the Roundtable, updated us on gas market developments in Europe.

Two other renowned industry veterans spoke at Roundtable 2015. Melinda L. Ocampo, President of the Philippine Electricity Market Corporation, did an insightful presentation on the latest developments in the Philippines' power industry. Participants also had a peek into the GCC power sector from Lim Yeow Keong, Chief Executive Officer of Sembcorp Salalah Power & Water Company, who spoke on the company's experience in the setting up of its water and power plant in Oman, including the challenges faced in the process.

(Continued on page 3)



Roundtable participants networking at the event



Relaxing cocktail at The Clifford Pier against the Marina Bay waterfront backdrop



Roundtable networking dinner in the elegant The Clifford Pier

Developments in Singapore were shared by Eugene Toh, Director (Policy) at the Energy Market Authority as well as Toh Seong Wah, former Deputy Chief Executive Officer of EMC. Collectively, they provided different perspectives of recent initiatives that have been introduced in Singapore's power sector to forge a progressive energy landscape for sustained growth in the long run.

The Roundtable ended with a networking cocktail and dinner at The Clifford Pier, a heritage waterfront restaurant at The Fullerton Bay Hotel. Guests were treated to an evening of western classics reminiscent of the landmark's glorious past, set against the backdrop of the Marina Bay waterfront skyline.

We would like to thank all participants for their continued support of the Roundtable. We look forward to welcoming both returning and new participants at the next Roundtable in 2017.

RULE CHANGE UPDATES

The following two rule changes were approved by the Energy Market Authority (EMA) in August.

Provision of Regulation by Batteries

Currently, only conventional generators provide regulation via automatic generation control (AGC) in the Singapore Wholesale Electricity Market (SWEM). However, batteries are also capable of providing regulation, through charging or discharging. The small sizes of batteries allow them to change their energy output in very small resolutions, while their high ramp rates allow them to respond rapidly and accurately to regulation signals. It is therefore proposed that batteries be allowed to participate in the regulation market.

The proposal suggests for the existing treatment of conventional generators in regulation provision to apply to batteries. One key difference between conventional generators and batteries is the limited storage capacities of batteries. This would constrain the ability of batteries to provide regulation up or down when they are fully discharged or charged. To counter this limitation, batteries shall provide regulation via the dispatch mechanisms approved by the Power System Operator, instead of AGC. The dispatch mechanisms should ensure that the battery provides regulation continuously, without being fully discharged or charged, and prohibit the battery from exhibiting reverse behaviour.

The participation of batteries in the regulation market will be beneficial to the SWEM. The potential increase in quantity and quality of regulation complements the expected increase in deployment of renewable energy sources like solar energy (whose intermittency

may increase the regulation requirement) by improving system security. Greater competition in the regulation market will also improve market efficiency, potentially driving regulation prices down.

This rule change will come into effect with the Demand Response (DR) project, as its implementation will be aligned with other system changes taking effect for the DR project.

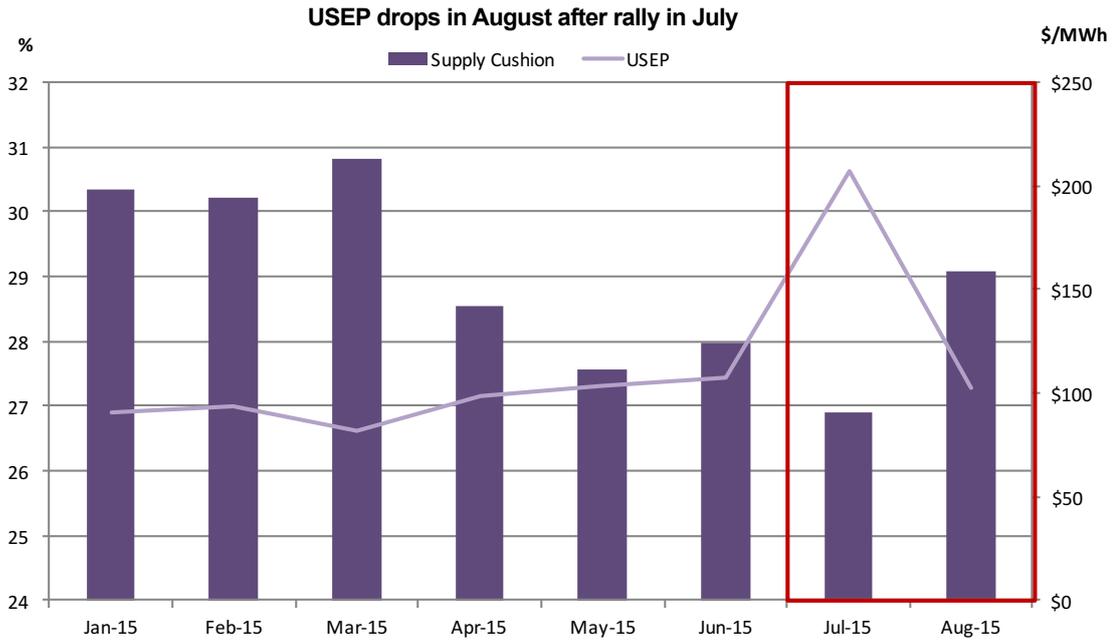
Eligibility of Energy and Reserve Offers

This proposal recommends use of a better proxy i.e., ExpectedStartGeneration instead of StartGeneration, to represent the output of a generator at the beginning of a dispatch period (BOP) in the Market Clearing Engine formulations. Currently, ExpectedStartGeneration is only used to check if a generator is eligible to provide regulation.

StartGeneration captures the output of a generator ten minutes before the BOP, potentially deviating from the generator's actual output at the BOP. ExpectedStartGeneration, on the other hand, projects the output of a generator at the BOP using its energy schedule of the prior period and physical constraints i.e., its StartGeneration and maximum ramp rates. It is therefore proposed that ExpectedStartGeneration, instead of StartGeneration, be used in other constraints to represent the output of a generator at the BOP.

This rule change will come into effect three months after the DR project.

MARKET UPDATE



The monthly average Uniform Singapore Energy Price (USEP) rose to \$207/MWh in July due to a tight supply cushion and a high monthly forecasted demand. The supply cushion measures the percentage of total supply available after matching off forecasted demand. In July, the supply cushion dipped to 26.9 percent, the lowest level in the past 20 months, while forecasted demand crossed the 5,700MW-mark for the first time this year. The USEP dropped to \$102/MWh in August, following a fall in the forecasted demand.

NEW MARKET SURVEILLANCE AND COMPLIANCE PANEL MEMBER

The EMC Board has appointed Professor Euston Quah as a member of the Market Surveillance and Compliance Panel (MSCP) from 1 July 2015 to 31 December 2016. Professor Quah is an eminent economist in Singapore and will be a valuable addition to the MSCP.

Professor Quah is Head of the Division of Economics, Vice-Chair of the Sustainable Earth Office and Immediate Past Chairman of the Senate Committee on University Policy Matters at the Nanyang Technological University (NTU), Singapore. He was formerly Chair of the School of Humanities and Social Sciences at NTU.

Professor Quah was also a Board member of the Energy Market Authority (EMA) previously. His other current appointments include the following:

- President of the Economic Society of Singapore
- President of the Asian Law and Economics Association

- Board member of the Energy Studies Institute at the National University of Singapore
- Member of the Complaints Committee of the Singapore Medical Council
- Review Panel Member for the Bill and Melinda Gates Foundation project
- Technical Reviewer for the National Research Foundation (Singapore)
- Editor of the Institute for Scientific Information (Social Sciences Citation Index) journal and The Singapore Economic Review
- Fellow member of the European Academy of Sciences and Arts

The MSCP is chaired by Thean Lip Ping. Other panel members include Lee Keh Sai, TPB Menon and Philip Chua.

NEW MARKET PARTICIPANTS IN THE NATIONAL ELECTRICITY MARKET OF SINGAPORE (NEMS)

The NEMS welcomes two new market participants, Buri Energy Pte Ltd and Sun Electric Power Pte Ltd, who joined the wholesale electricity market as retailers in July.

Market Information Sharing Forum (MISF)

The 82nd session of MISF, hosted by Chen Jian Hong from the Market Operations team, was held on 15 July. Jian Hong did a roundup for the first half year of 2015, as well as a summary of the market's performance and key highlights in May and June.

He also updated the progress of all ongoing projects in the NEMS. Among them, the update on the modification of the formula for the Automatic Financial Penalty Scheme drew the most attention from participants.

Responding to requests from the previous MISF, Jian Hong shared

details on the relationship between reserve and inertia in a more technical perspective during the forum. This was well-received. He concluded the forum with a brief on the requirements on the contract specifications of the bilateral file upload for Tender for Unvested Non-contestable Load.

We would like to thank all participants for their continuous support and strong interest in the MISF. The 83rd MISF was held on 10 September. Details will be covered in the next issue of the EMC Bulletin.

Market Systems User Group (MSUG)

The bi-monthly MSUG forum was held on 19 August. EMC IT updated attendees on the following topics:

- Overview of NEMS systems availability year-to-date for FY15/16;
- Overview of NEMS systems service desk calls received between July 2014 and July 2015;
- Overview of Change Releases that occurred between July 2014 and July 2015;
- Successful completion of Disaster Recovery Preparedness Exercise in August;
- Migration of EMC corporate website www.emcsg.com SSL certificate to SHA-2 hashing algorithm;
- Status updates on IT Infrastructure projects:
 - » Windows AD and Exchange migration;
 - » NEMS data storage replacement;
 - » NEMS Server virtualisation;
 - » Data Centre consolidation; and
 - » Enterprise Monitoring System replacement
- Status updates on key ongoing Application projects:
 - » Enhanced Forward Sales Contract Scheme; and
 - » Demand Response, Compensation & Penalty Project

The next MSUG forum is tentatively scheduled for Thursday, 15 October.

EMC TRAINING PROGRAMME NEXT COURSE ON 12 AND 13 NOVEMBER 2015

EMC will be holding the next run of its two-day course *Understanding Electricity Markets* on 12 and 13 November 2015. Our staff will be conducting six sessions covering the following topics:

- Understanding Electricity
- Why Reform and Regulation is Essential in the Electricity Industry
- The National Electricity Market of Singapore and its Unique Features
- Pricing Mechanism and Economic Dispatch
- Settlement
- How Consumers can Influence Electricity Markets

The course dates for 2015 and 2016 are as follows:

- » 12-13 November 2015
- » 18-19 February 2016
- » 12-13 May 2016
- » 18-19 August 2016
- » 10-11 November 2016

We advise you to book early to secure your place in the course date of your choice, and benefit from our early-bird discount.

Further details on the programme and on how to register are on our website, www.emcsg.com. For enquiries, please e-mail trainingprogramme@emcsg.com or contact Jan Lee at +65 6779 3000.

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