

The IEM & IET Electrical Conference (IIEC 2015) on Safe, Smart and Innovative Development in Power Systems

ELECTRICAL ENGINEERING TECHNICAL DIVISION



reported by
Ir. Ng Win Siau

Ir. Ng Win Siau graduated from the National University of Singapore in Bachelor of Engineering and a Master of Engineering in Electrical Engineering. He is currently an electrical engineer with Perunding MM20-20 and a committee member of EETD.

The IEM & IET Electrical Conference 2015 at Sime Darby Convention Centre gathered more than 150 participants, including local and overseas experts. This is the third IIEC, jointly organised by the Electrical Engineering Technical Division (EETD) of The Institution of Engineers Malaysia (IEM) and the Institution of Engineering and Technology (IET), Malaysia Network. The IIEC has been held biannually since 2011.



Deputy President Ir. Tan Yean Chin visiting the technical exhibition accompanied by Ir. Yau Chau Fong

This year, the conference theme was "Safe, Smart and Innovative Development in Power Systems", in line with the nation's push for enhancing safety in electrical supply and usage, improving energy efficiency with technology and the effective adoption of renewable energy sources. The conference provided a platform for participants to stay updated on the latest trends and technologies in the industry, and for experts to gain valuable feedback on the industry requirements.

A one-day tutorial session was held on 30 November 2015 while the two-day conference was held on 1-2 December, 2015. Throughout the 3 days, there was an exhibition where companies showcased their safe, smart and innovative solutions.

30 NOVEMBER: TUTORIAL SESSION

The first speaker, Ir. Assoc. Prof. Dr Gobbi Ramasamy, an associate professor in the Faculty of Engineering, Multimedia University, Malaysia, presented a tutorial on "Motor And Drives". Dr Gobbi started with a brief introduction on the relationship between motor and pumps, and the generation of flow while determining the power output and types of losses. He explained that with motor efficiency of only about 30% at light load, Variable Speed Drives (VSD) offers a significant reduction in losses, bearing in mind that each unit loss in motor output is equivalent to about 3 unit loss in energy production cost.

He then introduced High Efficiency Motors (HEM), describing the efficiency classes under the international standards. In the examples he showed, the higher efficiency class entailed higher initial costs but showed a significant amount in energy costs saved during the lifespan of the motor, with potential payback within 2 years. He highlighted the low uptake of HEM in a Malaysian market study largely due to challenges in convincing the decision makers considering the low electricity tariff and unregulated price of HEM.

While encouraging the use of VSDs, Dr Gobbi cautioned on the need for the proper implementation of VSD while sharing its typical practical issues. The production of undesirable power harmonics by the DC Link in VSD, the effects of power harmonics including overheating, power factor reduction and bearing current, and a comparison of the harmonics mitigation methods were discussed. Also discussed were parameter settings without good understanding of motor physical limitations and equipment location choice, considering



Second tutorial by Assoc. Prof. Dr. Izham bin Datuk Zainal Abidin

the environment temperature and cooling capacity. He made particular focus on the effect of our climate to VSD systems in his examples. The issues prompted the recommendation for proper training on operation and maintenance of VSD.

The second speaker, Assoc. Prof. Dr. Izham bin Datuk Zainal Abidin, Dean of the College of Engineering, Universiti Tenaga Nasional (UNITEN) spoke on "Research Trends in Power System Analysis Research with Focus Towards Smart Grid". He introduced the Smart Grid as a complete electrical system, from generation to consumption, beyond general perception relating the Smart Grid to just smart meters. He described the benefits of a Smart Grid such as its capability to incorporate renewable energy sources without jeopardising the grid, handling new consumption including charging of electrical vehicles, smart metering with communication of demand to the utility and a transmission system with more sensors to ensure stability and reliability. As he talked about the criticality of standards to govern the application of the Smart Grid, he also spoke of Standards Malaysia's effort in looking into international standards to ensure compliance and compatibility of Smart Grid devices in Malaysia.

He went on to present researches currently taking place on Smart Grid to tackle the various grid issues including fluctuations of renewable energy source, demand side management, personal data protection, smart home affordability, practicality and robustness of operation, cyber security, integration of different communication protocols and standards, application and network communication reliability. He cited research works from Universiti Putra Malaysia, Universiti Malaya, Universiti Teknologi Malaysia and Universiti Tenaga Nasional.

He ended his presentation with an overview on the status of Smart Grid implementation in Malaysia, showing the various implementations in the transmission, distribution and standards. He recommended good communication with clear objectives to address the implementation challenges. In conclusion, he stressed on the need for a strategic implementation, with the Malaysian Smart Grid in its infancy, with the potential to grow.

The third speaker, Ir. Thomas K.C. Chan from Hong Kong, is a Director of WSP/Parsons Brinckerhoff and Vice-President of The Hong Kong Institution of Engineers (HKIE). He presented the tutorial "LV Electrical Installation Design

- Hong Kong Perspective", which focused on the key issues of Low Voltage (LV) electrical design in Hong Kong.

Ir. Chan started with an introduction to the Electricity Ordinance (Chapter 406), its subsidiary regulations, Code of Practices, Standards and other related ordinances and regulations applied by Hong Kong. He talked about the general assessment of the purpose, supplies and structure of an electrical installation, such as the type of incoming supply, its maximum demand and diversity, supply characteristic, external influences, compatibility and maintainability.

He covered the best engineering practices in the selection of cables and wiring methods, circuit arrangement design, overcurrent protection and its discrimination, protection against electric shock for direct and indirect contact as well as protective conductors' types and requirements. In Hong Kong, aluminium was less used as a conductor, except by supply companies and Cross-linked Polyethylene (XLPE) cable insulation usage was picking up pace. Frequent references were made to The Code of Practice for the Electricity (Wiring) Regulations, 2009 edition.

Ir. Mohd Zamri Laton was the final tutorial speaker with the topic, "Renewable Energy: Current Status and Further Development of Feed-in Tariff". He is currently attached to the Feed-in Tariff Division of Sustainable Energy Development Authority (SEDA Malaysia), focusing on Solar Roof top Programme.

First, he introduced SEDA Malaysia, the Renewable Energy (RE) development in Malaysia since the 8th Malaysia Plan in 2001, and the Malaysia National RE Targets of 4000MW by 2030. He then shared the history, objectives and functions of the Renewable Energy Act 2011 and SEDA Malaysia, and how it led to the implementation of Feed-in Tariff (FIT).

He described FIT as a mechanism that allowed electricity produced from indigenous RE resources to be sold to power utilities at a fixed premium price and for a specific duration. It served to provide a conducive and secured investment environment. The key RE sources eligible for FIT were biomass, biogas, small hydro and solar PV. Under the "polluters pay" concept, an additional 1-1.6% has been imposed on tariffs collection in consumer electricity bills to fund the FIT since 2011.

Through statistics and examples of FIT implementations, Ir. Mohd Zamri showed that the 2015 target had not been achieved, with less interest in biogas and biomass, financial difficulties, and river concession approval challenges with small hydro projects. Finally the RE mix tilted towards solar PV, which had higher FIT rates, easier access to financing and lower risk with shorter construction time.

He talked about the revision of Malaysia's RE target for year 2020 to 9000MW, following the inclusion of large hydro and off-grid hybrid RE systems into the RE classification. To increase the share of RE through solar PV, which was seen to have greater potential beyond the existing quota, the Net Energy Metering (NEM) and Utility Scale Solar (USS) mechanisms were introduced, overcoming the limited FIT

fund. NEM allows electricity consumers to install PV systems for self-consumption, with the balance being exported to the grid, and net-off from their monthly bills at displaced cost. USS allows PV plants with capacity less than 50MW to be selected through open bidding and connected to the distribution or transmission network.

1 DECEMBER 2015: FIRST DAY OF CONFERENCE

In the opening ceremony of the IIEC 2015, Ir. Dr Matthew Teow Yok Wool, Chairman of The Institution of Engineering and Technology (IET), Malaysia Network gave the first welcome address. He reiterated the long solid partnership with IEM and thanked IEM, especially the organising committee, for the support in delivering the event, bringing in experts from various technical fields. He then shared the history of IIEC since 2011 and highlighted the strong relevance of the theme of IIEC 2015: Safe, Smart and Innovative Development in Power Systems.

The next welcome address was by Ir. Tan Yean Chin, Deputy President of The Institution of Engineers Malaysia (IEM). He congratulated EETD and IET for jointly organising IIEC 2015 and said IIEC is a forum for practicing engineers to discuss safety issues. He stressed that engineering was the key component in building the energy infrastructure. Finally, he thanked the sponsors and declared IIEC 2015 officially opened.

The first keynote speaker on the topic "Electrical Safety in Malaysia" was Ir. Mohd Elmi bin Anas, Director of Department of Electrical Safety Regulation, Suruhanjaya Tenaga Malaysia, representing Datuk Ir. Ahmad Fauzi bin Hasan, CEO of Suruhanjaya Tenaga Malaysia. Ir. Mohd Elmi explained the roles and function of the Energy Commission, stressing on the protection of the public from dangers arising from the supply and use of electricity as provided for under the electricity supply laws. He said the recent amendment to the Electricity Supply Act, 1990 was gazetted on 5 November 2015 and was awaiting enforcement.



Ir. Mohd Elmi, Director of Department of Electrical Safety Regulation, Suruhanjaya Tenaga Malaysia

He presented the statistics of electrical accidents in Malaysia, which he believed was important to gauge the situation. Although the number of reported accidents since 2002 showed a slight upwards trend, the rate of casualty per million consumers was a declining and stabilising trend. Nevertheless, he added, we need to constantly look into minimising electrical accidents.

He said major causes of accidents were improper installation and maintenance as well as non-compliance to safety work procedures, with a majority of the accidents occurring in utility installations. The Residual Current Devices (RCD) showed that the highest number of accidents involved electrical appliances, hence the stringent equipment testing requirement imposed. He also highlighted the disparity between the large number of certificate of competency issued and the low number of registered competent persons in the workforce.

As a way forward, strengthening of the regulatory framework, enhancement of enforcement activities, increasing awareness of safety and promotion of high voltage training centre were some of the key initiatives taken by the Energy Commission.

The first session with the sub-theme, "Electrical Safety", was chaired by Mr. Murugiah Suppiah. The first speaker was Dato' Ir. Jimmy Lim Lai Ho, CEO of Tokai Engineering (M) Sdn. Bhd., who presented on MS IEC 62305 Lightning Protection Standard Overview and Lightning Safety Management of Personnel and Equipment. He said Malaysia ranked second in the world for lightning activity, with an average of 2.59 million strikes per year. He pointed out a high profile incident, the 2009 collapse of Putrajaya Hospital wall due to lightning, as the catalyst for endorsement and approval of MS IEC 60325. He then spoke in detail about the 4 parts of the MS IEC 60325 before highlighting the major differences between BS 6651 and the MS IEC 62305, and the concept of Lightning Safety Management for Open Areas.

The second speaker, Ir. Mohd Elmi bin Anas, presented "Electrical Safety from a Regulatory Perspective". He talked about the latest amendment to the Electricity Supply Act, 1990, aimed at achieving a reliable and affordable electricity supply for our economic development towards being a developed nation by 2020. The amendments were categorised into four objectives: To enhance governance of the industry, to improve safety practices, to protect consumer interests and to enable more effective enforcement.

The third speaker, Ir. Lim Kim Ten of Hager Engineering (M) Sdn. Bhd. presented on the topic, "Household Electrical Protection", which encompassed the parties involved and responsible, the types of electrical faults and circuit breaking devices, and a detailed overview of the Residual Current Devices (RCD) and the wiring regulations.

Datuk Ir. Baharin bin Din, Vice President (Distribution), Tenaga Nasional Berhad presented the second keynote address on "Energy Efficiency and Management". He started by describing sustainability challenges, including

fossil fuel dependency, increasing cost, energy security, emissions reduction and higher customer demand. He then talked about the green and smart society related initiatives in Malaysia such as the pledge to reduce emissions, the Feed-in-Tariff (FIT) programme, efficient and green generation, TNB renewable energy and smart meters as well as energy management regulations. He spoke in detail on the Demand Side Management (DSM) and Energy Efficiency (EE) Initiatives in TNB, citing the 1000 smart meter project AMI business case driven by TNB and government objectives.

The session continued with the sub-theme "Energy Efficiency And Management", chaired by Ir. Lam Sing Yew.

The first speaker was Ir. Abdul Rahim bin Ibrahim, Director of Energy Management, Suruhanjaya Tenaga Malaysia, who presented the "Energy Performance Contract Roadmap". He said Energy Efficiency (EE) was embedded in Malaysia's national energy policy and talked about the history of EE promotion initiatives leading to the Minimum Energy Performance Standards (MEPS) 2013 regulations. He showed charts of increasing but stabilising electrical intensity and emphasised on the need to decrease electrical intensity as Malaysia ranked second highest among ASEAN countries for electrical intensity and electrical consumption, and our electrical intensity was much higher than that of developed nations.

He also talked about Energy Performance Contracting (EPC) as a mechanism to implement energy saving measures in government building by private investment, to overcome the capital cost. Energy Service Companies (ESCOs) are engaged to evaluate and execute the project, with payment based on guaranteed savings achieved. Development of the ESCOs, measurement and verification by registered electrical energy manager and effective financing of the EPC project will be important for further success in the EPC implementation.

Ir. Ahmad Izdihar of Malaysia Green Building Confederation was the second speaker and he presented on "Profiling Energy Use for Buildings". He described the steps in building energy profiling towards effective understanding and usage of the collected data.

The third speaker, Mr. Toni Niemi of ABB, presented on "Latest Electric Motor Technology to Reduce Total Cost of Ownership". He introduced the Super-Premium efficiency IE4 efficiency class launched last year and described the areas of losses in electrical motors. He talked about Synchronous Reluctance Motor Technology which eliminates resistive rotor losses to achieve the IE4 efficiency in a magnet-free design.

The fourth speaker was Mr. Siegfried Kreutzfeld, President of WEG China and Asia market, with the topic, "How Electric Motor Could Help Improve the GDP Efficiency of a Country". Saying that motors represent about 50% of a country's electric energy consumption, he introduced a term GDP efficiency (nation's GDP divided by its electrical consumption) and explained how improving the efficiency of the existing large install base

of low efficiency motors would significantly improve the GDP efficiency.

The third session with sub-theme, "Electrical Installation Codes and Standards". It was chaired by Ir. Rocky H.T. Wong, who gave an insight into the standards writing organisation and its role in the development of the Malaysian Standards.

Ir. Thomas K.C. Chan, the first speaker, presented on "Electrical Installation Safety at Construction Site – Hong Kong Perspective". Speaking from his experience in Hong Kong, he shared the statistics of electrical accidents in Hong Kong, its primary causes and the protection and preventive measures taken including ensuring a safe electrical environment at site.

The second speaker, Ir. Lim Kim Ten, presented an "Overview of Latest Malaysian Standards, MS 1979 and MS 1936", describing the different scopes of each standard. He described the changes after the adoption of MS IEC 60364 and clarified the interpretation of the voltage drop requirements and Malaysian specific electrical safety protection requirements such as RCD.

The third speaker, Ir. Francis Xavier Jacob, Chairman of Working Group for IEM EETD Electrical Installation Inspection Guidelines, presented on "Guidelines for Low Voltage (LV) Electrical Installations of Buildings – Verification by Inspection and Testing". He gave a brief background on the Electrical Inspection Standard approved by AFEO in December 2011 and how IEC 60364 Part 6 was adopted as the base requirements. He then described in detail the components of planning, inspection and testing in IEC 60364 Part 6.

2 DECEMBER 2015: SECOND DAY OF CONFERENCE



Third keynote address by Ir. Prof. Academician Dato' Dr Chuah Hean Teik

The day started with the third keynote address by Ir. Prof. Academician Dato' Dr Chuah Hean Teik, President/CEO of Universiti Tunku Abdul Rahman (UTAR), who presented on "Educating Engineers as Trend Setters and Problem Solvers". Regardless of stone or computer age, it is science that drives civilisation, with each evolution period becoming shorter. The upcoming life science and



Q & A panel for session chaired by Mr. Murugiah Suppiah

ecosystem evolution will not allow complacency, requiring continuous skill update. Engineering would continue to create the value in a globalised world with faster pace, borderless, well informed and higher expectations.

He compared the past (where focus was on small group of experts, hardware based and requiring big investment) with the future (which is human centric, focusing on knowledge creation and an open market with smaller investment barriers). He talked about the booming and widening trends and described the challenges faced. Education remained the driver, creating the critical source of human capital. He shared his concern on the dropping percentage of science stream secondary school students in Malaysia even as we aimed for a 1:100 ratio of engineers to population by 2020. Malaysia will need to utilise the lessons learned from the developed nations, balancing between ready to market and ready to evolve in the global market.

He concluded with a story of the farmer and the cocoon, highlighting that, at times, struggle would be critical before we could learn to fly.

The conference continued with the fourth session with sub-theme "Electrical Engineering Education" chaired by Ir. Dr Matthew Teow.

The first speaker was Dato' Ir. Prof. Dr Hj. Wan Hamidon Hj. Wan Badaruzzaman, Director of Engineering Accreditation Department (EAD), Board of Engineers Malaysia and Professor from Department of Civil and Structural Engineering, The National University of Malaysia (UKM). He presented on "Enhancing the Engineering Education Quality in Malaysia". He highlighted the role of Engineering Accreditation Council (EAC) under Board Engineer Malaysia (BEM) in enhancing the quality of engineering education in Malaysia. BEM is empowered by Malaysia Qualification Agency Act (MQA) 2007 and Registration of Engineers Act 1967 to conduct accreditation, ensuring the practice of continual quality improvement by Institutions of Higher Learning.

He talked about the need to raise the standard of engineering graduates, addressing complaints that many graduates were unfit for the industry, to which many of the conference participants agreed. Greater awareness of the engineering profession and leaving the comfort zone on a paradigm shift towards Outcomes-Based Education (OBE) will be critical to achieving the goals. References were made to the International Engineering Alliance (IEA), an independent authority on best practices in standards, assessment and monitoring of engineering education and professional competence.

The second speaker, Encik Ridwan Kassim, Senior Director (Standardisation) at Standards Malaysia, presented on the "Role of Standards Malaysia in Educating Electrical Engineers in Standardisation". He described the structure of Standards Malaysia, introducing Malaysia National Electrotechnical Committee (MyENC) as one of the main committees that oversee the Industrial Standards Committees (ISCs), Technical Committees and Working Groups. He spoke about the process of standard development and the status of MS standards in Malaysia, 57% of which were aligned with international standards.

He highlighted the importance of participation in international standards committees and international accreditation to safeguard national interest. Standards Malaysia educating in a big way to introduce new standards, with the National Standards Compliance Programme (NSCP) helping Small and Medium Enterprises (SMEs) comply with the standards. Memorandum of Understandings (MoUs) have been signed with IHLs to integrate standards education into university syllabus. Constantly improving standards awareness, young professionals were also sent to participate in technical committees and working groups in standards writing.

The third speaker, Associate Professor Ir. Dr Leong Wai Yie, presented the "ASEAN Perspective: Women in Engineering", sharing the report from IES Women in Science, Engineering and Research (WISER). She shared the statistics of women engineers by discipline and management rank. She said the participation of women in engineering was generally low compared to other professions. The 11th Malaysia Plan seeks to encourage women in engineering through more family-friendly employment strategies such as better access to quality childcare facilities, flexible working hours, work-from-home options and employment re-entry opportunities.

The fifth session with sub-theme, "New Frontiers in Power Engineering", was chaired by Ir. Chew Shue Fuee.

The first speaker, Mr. Mohamed Azrin Mohamed Ali, Vice President of Green Catalyst, Greentech Malaysia, presented "Electric Vehicle Roadmap in Malaysia". He spoke of the significantly higher efficiency in energy conversion of electric cars compared to cars with internal combustion engines (ICEs), which was the driver for electric mobility. He highlighted that many studies might have neglected the cost of refining and transportation of fuel in the calculation of efficiency for ICE. He mentioned multiple Electric Vehicle (EV) initiatives in Malaysia such as the Electric Mobility Blueprint promoting electric public transportation and private EV ownership and the strengthening of the eco-system and charging infrastructure to accelerate the technology localisation opportunities.

The second speaker, Encik Shyful Bahrin Ismail, Deputy Chief Engineer (Protection), Transmission, Tenaga Nasional Berhad (TNB) presented on "HVDC Technology - Malaysia (TNB) Experience, Future Development and Challenges". High Voltage Direct Current (HVDC) Technology provided economical energy transfer over long distance, connecting asynchronous AC power networks, with better control and efficiency. With higher initial equipment, training and

maintenance costs, break even occurred at distances above 800km or submarine links above 50km. He described the components in the HVDC system and TNB's HVDC experience at the 300MW 300kV DC Malaysia-Thailand interconnection, which allowed the sharing of spinning reserve between TNB and EGAT and alleviating multiple major power trip incidents. HVDC development continued on Ultra High Voltage Direct Current 800kV design with power capacity exceeding 5000MW on a single system, the shift towards use of Voltage Source Converters and Multi-terminal HVDC designs for HVDC grids.

The third speaker was Ir. Dr Amir Basha Ismail of Minconsult Sdn. Bhd., who spoke on "Malaysia's Electric Railways: A Systems View". He talked about the history of electric railway in Malaysia, beginning primarily with the Light Rail Transit (LRT) and KTMB train systems. The electric train system, comprising infrastructure, rolling stock and system of operating procedures, required more than just civil and structural engineering skills. Currently, a local electrical graduate has minimal knowledge of an electrical train system, traction power system, train control and signalling and operation software integration. Dr Amir Basha elaborated on the traction power system and the fundamentals of train propulsion, giving examples from KTMB 25kV AC Klang Valley traction power system and Prasarana/RapidRail DC traction power systems.

The final session with the sub-theme, "Renewable Energy", was chaired by Prof. Ir. Dr Vigna Kumaran.

The first speaker was Encik Thariq bin Husni of MTS Green Energy, who presented "The Present and the Future of Wind Turbine Technology in Malaysia". First, he asked participants if there was sufficient wind in Malaysia. Then, he gave a brief history of wind turbine and its design considerations, such as height of tower and propeller diameter, with a focus of existing installations in Malaysia. Wind technology remains a challenge due to the lack of data on potential wind area and insufficient incentives or confidence for its development.

The second speaker was Dr Thomas Riendl, Deputy CEO, Cluster Director, Solar Energy Systems, Solar Energy Research Institute of Singapore (SERIS), NUS, who presented on "Future Trends in Solar PV". He shared data on how the global Photo Voltaic (PV) market had boomed very quickly, with 40GW added in 2014 alone. The statistics showed that each time the cumulative production doubled, the PV module price went down by 20%. He said that solar cell efficiency was 18-23%, with only a marginal increase of about 0.5% each year. On the other hand, the PV system design, if not designed properly, could cause a large variance in the overall power output. Variability and uncertainty remain the two main challenges of PV systems penetration in electricity grid, prompting the need for PV power forecasting, optimised PV location planning and PV potential analysis. Dr Riendl spoke about the Levelised Cost of Energy (LCOE), which was critical for economical feasibility study of a Solar PV implementation.

The third speaker, Ir. Khor Chai Huat, Managing Director of Angkasa Consulting Sdn. Bhd., presented on "Viability of

Small Hydro Power Scheme Under The Renewable Energy Programme". There was a large jump in small hydro power of 10-30MW capacity in approved projects for 2016. Ir. Khor described the technical feasibility, economic viability and legal requirement studies prior to the licence application with the example of the Mini Hydropower Scheme in Way Malaya, Lampung Province, Sumatera, Indonesia. He highlighted common issues and risks involved, from feasibility studies to construction and final operation, one of which was the lack of stream flow records to predict power generation.

The fourth speaker, Prof. Dato' Ir. Dr A. Bakar Jaafar, Professor at UTM's Perdana School of Science, Technology, Innovation and Policy, spoke on "Ocean Thermal Energy - H₂ Fuel Cell Renewable Energy Mix in Electrical Power Generation in Malaysia". Ocean Thermal Energy (OTEC) converts part of the heat from the sun which is stored in the surface layers of a body of water, into electrical energy or energy product equivalent such as hydrogen, H₂. Prof. Abu Bakar spoke about the barriers of the technology and ways to overcome the challenge including the use of project life costing to overcome the high initial capital and the reference to Territorial Sea Act and Exclusive Economic Zone Act to govern the development of OTEC in the sea. He shared plans for the first public funded OTEC project off Pulau Layang-Layang under the 11th Malaysia Plan, to supply power to deep water oil and gas production, the surplus of which to generate H₂.

The fifth speaker, Dato' Ir. Muhamad Guntor Mansor Tobeng, Managing Director, Gading Kencana Sdn. Bhd., presented on "Powering the Economy with Solar Technology". First he spoke on government policies that helped the PV take-up in Malaysia with a target of 1.25GW capacity by 2020. He shared his experiences in the various projects implemented, elaborating on the restrictions of the actual available land area due to land use requirements, study of shadow casting and sun path considering the land terrain and the use of PV roof in aiding the cooling of the building.

The sixth speaker was Encik Sansubari Che Mud, Renewable Energy, Tenaga Nasional Berhad (TNB) who spoke on TNB Renewable Energy Guidelines. He described the implementation of the FIT scheme, defining the scope of TNB's role based on the capacity of the project and the status of projects in progress. With remote meters already implemented, in the bid to enhance customer experience, TNB is implementing projects to allow checking of RE account online, comparing self-consumption for the Net Metering scheme to be implement from 2016.

CONCLUDING REMARKS

The conference came to a close with Chairman of EETD, Ir. Yau Chau Fong expressing his gratitude and thanks to the organising committee, the conference secretariat staff and the participants for contributing to the success of the event. Ir. Yau and the organizing committee looked forward to meeting all the delegates again in the next IIEC in 2017. ■