



UTM
UNIVERSITI TEKNOLOGI MALAYSIA

Centre of Electrical Energy Systems (CEES)

www.utm.my

Innovative Research and Developments in Power and Energy Systems

September 2011

<http://cees.utm.my>

Vision

To be an internationally renowned R&D Centre of Excellence

Mission

To provide innovative research and development ideas and solutions in electrical power and energy systems

Diamond Building Officiating Ceremony and Energy Commission 10th Year Anniversary

On the 31st May 2011, the Malaysian Energy Commission (EC) conducted the opening ceremony of the "Energy Commission Diamond Building" in conjunction with their 10th Year Anniversary celebration at Precint 2, Putrajaya. The ceremony was officiated by YAB Tan Sri Dato' Hj Muhyiddin Hj Mohd Yassin, the Deputy Prime Minister of Malaysia. Apart from the ceremony, the Energy Commission also held the exhibition about their projects. CEES's PQ Team has participated in the exhibition showcasing the current project, "Power Quality Baseline Study for Peninsular Malaysia".



POWER QUALITY BASELINE STUDY FOR PENINSULAR MALAYSIA

STAKEHOLDER WORKSHOP 1

19 OCTOBER 2011

PUTRA WORLD TRADE CENTRE (PWTC)
KUALA LUMPUR



Centre of
Electrical
Energy
Systems
(CEES)



A study funded by
Akaun Amanah Industri Bekalan Elektrik (AAIBE)

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Assoc. Prof. Ir. Hayati Abdullah

Dr. Mohamed Shaaban

Dr. Md. Afendi M. Yusuf

Dr. Md Pauzi Abdullah

Wan Zaidi Wan Omar

Fatimah Bt. Salim

Dalila Bt. Mat Said

Faridah Bt. Hussin

Noor Diran Bt Mohamed

Norzanah Rosmin

17 Ph.D Students

10 Master Students

3 Research Engineers



This is the third edition of CEES newsletter. CEES was founded just over two years ago and has achieved much in a

short span of time. In a month or so, CEES office would be moving to a new building, together with four research laboratories. These facilities were proposed by proposers and promoters of the Energy Centre in late 2000's from the Faculty of Electrical Engineering and many of these persons are currently actively involved in CEES. New spaces in a new building are a just reward for their foresight, determination and commitment of doing their best for the nation, UTM and the world.

While new spaces have some significance, yet CEES exists for performance and contributions. So far, CEES members have not been found wanting in their efforts to deliver those objectives. Last year the UTM top management has graded CEES performance as good and subsequently gave CEES a reasonable operating budget. On top of that CEES members have obtained more

than RM600, 000 in research funds this year. Our postgraduate students have increased to nearly 30, of which nearly 20 are Ph.D students. CEES have been building facilities for world class computing, simulation and analysis, with world-class software and high-performance computers. CEES have put in a lot of efforts in parallel computing and two Ph.D students have recently submitted their Ph.D thesis in this area.

CEES have established itself as the National reference for Power Quality. CEES members has made good progress in the implementation of the multi-million ringgit PQ Baseline study research and consultancy project for the Energy Commission of Malaysia. We have demonstrated the project progress in an exhibition held in conjunction with the officiating of the Energy Commission building, where the Deputy Prime Minister visited our exhibition booth.

CEES is putting in a lot efforts to develop simulation and analysis expertise in Smart Grid. A smart grid simulator has been purchased and arrangements are being made to co-operate with a local manufacturer of smart me-

ter to integrate a demonstration smart grid system that can be used for postgraduate teaching and research in Smart Grid technologies. We have also developed software tools that are able to analyse unbalanced distribution network with distributed generations.

CEES has three other research groups that are actively pursuing research in energy industry market study, renewable energy and energy efficiency. These groups have obtained research fundings and published papers in journals with ISI impact factor. With the continuing efforts by its members, with the continuous support of the industries and the firm commitment of UTM, CEES expects to flourish in the future.

In this newsletter details of CEES activities are being reported to share with those who have wished us well and to those who share the common interests in energy efficiency and environmental friendly energy technologies. I am sure readers will enjoy sharing with CEES the news presented in this edition of a newsletter.

Khalid Mohamed Nor

Research and Development Teams

CEES is organized into five research groups called research teams. The teams focuses on specific area of research but synergise with other teams whenever necessary. The current teams and leaders are:

| Research Team | Team Leader |
|--------------------------------------------------------------------------------|--------------------------------------------------|
| Power Systems Engineering - analysis, design, planning and optimisation | Prof. Dr. Khalid Mohamed Nor |
| Electrical Energy Markets and Generations Studies | Assoc. Prof. Dr. Mohammad Yusri B. Hassan |
| Renewable Energy | Assoc. Prof. Md. Shah B. Majid |
| Power Quality and Energy Supply Reliability Engineering | Dalila Bt. Mat Said/Prof. Dr. Khalid Mohamed Nor |
| End-user and Customer Side Energy Efficiency | Dr. Md Pauzi B. Abdullah |

Visiting Academic Researchers

Prof Saifur Rahman was the international speaker at the 'Seminar on Smart Grid as the Facilitator for Demand Control and Integrating Intermittent Sources of Generation' held by the Energy Research Alliance at Block P03, FKE. Prof. Dr. Saifur Rahman is the Joseph R. Loring professor of electrical and computer engineering and the founding director of the Advanced Research Institute at Virginia Tech.



Electrical Energy Markets and Generations Studies

The Electrical Energy Market and Generations Study Group (EEMGS) is actively conducting a few research projects on electricity market model and generation studies. The research team has been awarded another two GUP research grants amounting to a total of RM80, 000. This grant will be allocated for two new postgraduate students who should be joining the team this September. Besides, there are already two postgraduate students who are currently working on transmission pricing and generation location studies. As for publications, the research team has published two papers in Impact Factor Journals and another two papers in International Conferences.

Technical Talk : Smart Grid Development in Singapore

The Technical Talk jointly organized by IEEE-Power and Energy Malaysia Chapter, (IEEE-PES) Centre of Electrical Energy Systems (CEES) and IEEE - Women In Engineering Malaysia Affinity Group (IEEE-WIE), was successfully held on 20th July 2011 at Dewan Jumaah, Universiti Teknologi Malaysia, Kuala Lumpur. The main speaker was Er. Seow Kang Seng, who has more than thirty-five years of experience in the electricity industry, from working in Public Utilities Board, Singapore Power and Energy Market Authority as well as providing specialist consultancy to the electricity industry in the region. Mr. Er. Seow Kang Seng shared with the audience on the various definition of Smart Grid and recent Smart Grid pilot projects in Singapore.



Registration



The Speaker, Mr. Er. Seow Kang Seng



The Audience



Souvenir for the Speaker

End-user and Customer Side Energy Efficiency

End user and Customer Side Energy Efficiency group (ECEE Group) focus on research related to end-users of electricity such as an energy efficiency and demand response. The current research project is the study of how electricity can be reduced by optimizing the use of a variety of demand-side management programs. This study was funded by tier-2 Research University Grant with an allocation of RM40,000. ECEE Group is also involved in the Research University Flagship Project, worth nearly RM900,000 entitled "Intelligent Building Power Monitoring and Control System". ECEE Group is tasked to perform a comprehensive energy analysis, which include energy usage patterns and demands of a facility and identify opportunities to improve and energy efficiency. RM200880 is allocated for the task. Currently, there are two research students (1 Ph.D and 1 M.Eng) working with the group and another 2 PhD students are expected to register in September 2011.

Energy Audit at 'Puteri Nilam Satu' Vessels



Energy Efficiency Activities



Site Visits at The New FKE Building



Briefing session by the Project Engineer

The Power Generation Research Lab

The Power Quality Research Lab

Second Seminar for Energy Commission

On the 18th and 19th July 2011, the second seminar for the Energy Commission staffs was successfully held at the BATC Seminar Room, UTM International Campus, Kuala Lumpur. The seminar objective was to introduce and discuss the power quality monitoring system and preliminary data analysis. Besides that, the participants were given training on the usage of the power quality database and Fluke Power Log software. During the seminar, the topics that were discussed included the analysis of the Harmonics, Voltage Sag, Voltage Unbalanced, PQ Logging Data, PQ Monitoring Data, PQ Event Source, PQ Database and Fluke Power Analysis Training. The main speakers during the seminar were Prof. Dr. Khalid b Mohamed Nor, Mrs. Dalila bt Mat Said, and Mrs. Fatimah bt Salim. The seminar was also assisted by Mr. Ahmad Lutfi b Kamaruddin, Mr. Mohd Sabhi b Bachok and Mrs. Nor Asyikin bt Md Ghani.



Prof Khalid was giving an explanation to participants



Participants able to deal with the PQ database

Briefing Session for TNB Engineers

The briefing session for TNB engineers were held in order to facilitate data logging for TNB installations. The first briefing session was held at the Wisma TNB, Perak on 24th February 2011. The project briefing was given by Ir. Abdul Aziz (representative of Energy Commission) and Prof Khalid (Chief Consultant). This session involved only the TNB engineers from northern region of Peninsular Malaysia in order to identify the logging site for the northern region. Besides that, on 4th March 2011, a discussion with TNB Penang was held to identify the suitable sites for logging in Penang.

The second briefing session was held on 1st June 2011 at the Wisma TNB Kuantan, Pahang and this session involved the TNB engineers from Eastern region of Peninsular Malaysia. During the briefing, the engineers in charge in the selected commercial and residential sites for eastern region were identified and the date for the logging activity was set.



Briefing session at Wisma TNB Perak



Presentation by Ir. Abdul Aziz from Energy Commission

CEES Publications at Energy Policy

| No | Title | Conferences (National/International) | Authors |
|----|------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| 1 | PSCAD/EMTDC Based harmonic Studies Impact of Microturbine on a Distribution Systems | The 7 th Jordanian International Electrical & Electronic Engineering Conference, Jordan. 11-14 April 2011. ISBN:978-9957-469-01-6 | M.S.Majid, M.Y.Hassan, H.A.Rahman, & SAA Wahid |
| 2 | Designing Dynamic Controller and Passive Filter for a Grid Connected Micro-turbine | IEEE Applied Power Electronics Colloquium, IAPEC, Johor Bahru, 18-19 April 2011 | Rasoul Rahmani, Meysam Tayyebi, M. S. Majid, M. Y. Hassan, H. A. Rahman |
| 3 | Assessment of Locational Marginal Prices (LMP) Based on Total Dispatch Cost Minimization | 11-13 May 2011, IEEE PowerEng 2011, Malaga, Spain | Hossein Zeynal, Khalid Mohamed Nor, Alimorad Khajeh Zadeh |
| 4 | Parallel Three-Phase Load Flow Analysis for Large Scale Unbalanced Distribution Networks | 11-13 May 2011, IEEE PowerEng 2011, Malaga, Spain | Syafii, Khalid Mohamed Nor & Mamdouh Abdel-akher |
| 5 | Voltage Stability Assessment: An Approach with Expanded Newton Raphson -Sydel | The 5th International Power Engineering and Optimization Conf. (PEOCO2011), Shah Alam, Selangor, MALAYSIA: 6-7 June 2011 | M. Eidiani, H. Zeynal, A. Khajeh Zadeh, S. Mansoorzadeh, K. M. Nor, S. M. Yusof |
| 6 | Optimal Location of a New Generating Unit Using Particle Swarm Optimization | The 5th International Power Engineering and Optimization Conf. (PEOCO2011), Shah Alam, Selangor, MALAYSIA: 6-7 June 2011 | M. N. Suharto, M. Y. Hassan, M. P. Abdullah, M. S. Majid and F. Hussin |
| 7 | Prospects of Cogeneration for the Iron and Steel Industry in Malaysia | The 5th International Power Engineering and Optimization Conf. (PEOCO2011), Shah Alam, Selangor, MALAYSIA: 6-7 June 2011 | Mohamed Shaaban and Khalid M. Nor |

Listing Postgraduate Student Supervised by CEES Members

| No | Name | Level | Project Title | Supervisor/co-supervisor name |
|----|-------------------------------|--------|------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| 1 | Abdul Rahman Omer Idris | PhD | Distribution System Analysis of El-Ain UAE | Prof. Dr. Khalid |
| 2 | Ahmad Sukri Ahmad | PhD | Development of Energy Consumption Pattern using Data Mining Technique | PM Dr. Yusri Hassan, PM Md.Shah |
| 3 | Alimorad Khajehzadeh | PhD | Optimal Scheduling of Electric Power System | Prof. Dr. Khalid |
| 4 | Dalila bt Mat Said | PhD | Harmonic Losses Estimation in Power Distribution System | Prof. Dr. Khalid, PM Md.Shah |
| 5 | Fatimah bt Salim | PhD | Optimal Monitoring of Voltage Sags | Prof. Dr. Khalid |
| 6 | Hasimah bt Abdul Rahman | PhD | Engineering and Economic Analysis of Photovoltaic System in Malaysia Environment | Prof. Dr. Khalid, PM Dr. Yusri Hassan |
| 7 | Hendri Novia | PhD | Integration of Temperature Monitoring into Electrical Substation Data Logging System | Prof. Dr. Khalid, PM Md.Shah |
| 8 | Hossein Zoynel | PhD | Development of an Efficient Optimal Reactive Power Dispatch (ORPD) in Electric Power System | Prof. Dr. Khalid |
| 9 | Husna Syadli | PhD | Demand Side Management for Developing Economics | Dr. Md. Pauzi |
| 10 | Kaveh Abookazemi | PhD | Technical and Economical Aspects of Suitable Locations for Distributed Generation Expansion in Deregulated Power Systems | PM Dr. Yusri |
| 11 | Khairul Anwar Hanafiah | PhD | Design of BKA Prosthesis | Dr.Afendi |
| 12 | Mohamed A.M. AlMaktar | PhD | Develop a Mathematical Modeling for PV/T System Integration for Middle East Application | PM Dr. Yusri /Pn.Hasimah |
| 13 | Mohamed Ali Mohamad Osman | PhD | Sliding Mode Control of Low Speed Permanent Magnet Synchronous Wind Generator Applicable for Small Grid | PM Dr. Yusri, PM Md.Shah |
| 14 | Raja Nur Syazana | PhD | Development and Optimization of a Hybrid PV/Wind System Under Malaysian Condition | PM Dr. Yusri /Pn.Hasimah |
| 15 | Syafii Ghazali | PhD | Distributed Generation Analysis | Prof. Dr. Khalid |
| 16 | Syarifuddin Nojeng | PhD | Transmission Pricing Analysis in Electrical Power Plant based on Energy Management System | PM Dr. Yusri Hassan |
| 17 | Syukri Yunus | PhD | Unbalanced Three phase Harmonics Load Flow | Prof. Dr. Khalid |
| 18 | Che Ku Farhana Che Ku Amran | Master | Unbalanced Three Phase Harmonics Power Flow | Prof. Dr. Khalid Mohamed Nor, Pn.Dalila |
| 19 | Maizan Hj Sulaiman | Master | Experimental Study Of Macro Level Capillary Flow in Fibre Based Porous Medium | Dr.Afendi |
| 20 | Mohd Hamizan B. Omar | Master | Multi -level Control Street Lighting | PM Md Shah, Pn.Hasimah |
| 21 | Mubarak A Nadwiy Suharto | Master | A Study of Technical and Economics Aspect of Suitable Locations for Generation Expansion in Restructured Power | PM Dr. Yusri |
| 22 | Najaatul Fariah Hamidi | Master | Towards Green Electricity Consumption: Application of Demand Side Management (DSM) as strategic option to reduce consumption | Dr. Md Pauzi Abdullah |
| 23 | Nor Shahida Hasab | Master | Sliding Mode Control Of Low Speed Permanent Magnet Synchronous Wind Generator Applicable For Micro-Grid | PM Md Shah Majid |
| 24 | Nurehan Othman | Master | Development of CompetitiveElectricity Market Model for Malaysia Electric Supply Industry | PM Dr. Yusri. Cik Faridah Hussin |
| 25 | Suhaila Samsuri | Master | Study and Modelling of Stall Regulated Variable Speed Wind Turbine using Squirrel Cage (SC) Induction Generator | PM Dr. Yusri, Pn.Norzanah |
| 26 | Tan Wen Shan | Master | Technical and Economical Aspects of Optimal Location of Distributed Generation Sources | PM Dr. Yusri Hassan, PM Md.Shah |
| 27 | Mohd Dzulhafizi Hj Mohd Usman | Master | Risk-based Security Evaluation in a Smart Grid | M. Shaaban |

Publications—Journals with Impact Factors

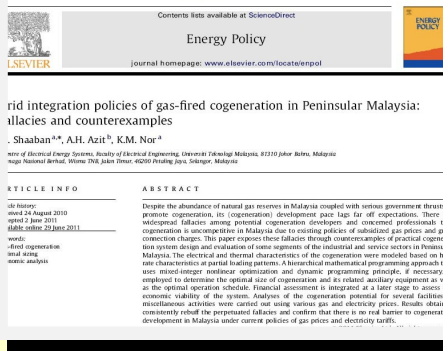
| No. | Authors | Article Title | Journal Title | Impact Factor |
|-----|---------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|---------------|
| 1 | H Zeynal, Ali Khajeh Zadeh, and KM Nor | Security Constrained Economic Dispatch Using Multi-Thread Parallel | International Journal of the Physical Sciences, ISSN 1992 – 1950 | 0.554 |
| 2 | H.Zeynal, KM Nor & M. Shaaban | Performance Evaluation of SuperLU and PARDISO in Power System Load Flow Calculations | Electrical Review Journal (ISSN0033-2097) | 0.196 |
| 3 | M. P. Abdullah, M. Y. Hassan, and F. Hussin | Cost Allocation Base on Contribution for Pool Market | International Review of Electrical Engineering - April 2011 (Vol. 6 N. 2) - Papers Part B | 1.364 |
| 4 | Kaveh Abookazemi , Hussein Ahmad, Alireza Tavakolpour and Mohd Y. Hassan | Unit Commitment solution using an optimized genetic system | International Journal of Electrical Power & Energy Systems Volume 33, Issue 4, May 2011, Pages 969-975 | 2.073 |
| 5 | M. Shaaban | A Bi-level Voltage Control Scheme of Power Systems via Automatic Zone Partitioning | International Review of Electrical Engineering—August 2011 | 1.364 |
| 6 | M. Shaaban, A. H. Azit and KM Nor | Grid integration policies of gas-fired cogeneration in Peninsular Malaysia: Fallacies and counterexamples | Energy Policy, Vol. 39, no. 9, pp. 5063-5075, September 2011 | 2.614 |

Note: CEES members in **bold**

Other Publications

| No. | Authors | Title | Journal |
|-----|--------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| 1 | Hossein Zeynal, Alimorad Khajeh Zadeh, Khalid Mohd Nor and Shiva Mansoorzadeh | Evaluation of Locational Marginal Price (LMP) Based on Total Dispatch Cost Optimization and Modified AC-OPF | Journal of Energy and Power Engineering, USA, May. 2011, Volume 3, No.12 (Serial No.25) ISSN1934-8975 |
| 2 | M. S. Majid, M. Y. Hassan and H. A. Rahman | Damping Power System Oscillations Using Superconducting Magnetic Energy Storage for Single Machine Infinite Bus | International Review on Modeling and Simulations (Vol. 4 N. 2) - April 2011 - Papers (Part B) |
| 3 | Syafii, Khalid Mohamed Nor and Mamdouh Abdel-Akher | Steady-State Wind Turbine Generation Model for Three-Phase Distribution Load Flow Analysis | International Review on Modeling and Simulations (Vol. 4 N. 2) - April 2011 - Papers (Part B) |

CEES Publications in The Journal Energy Policy



Despite the abundance of natural gas reserves in Malaysia coupled with serious government thrusts to promote cogeneration, its (cogeneration) development pace lags far off expectations. There are widespread fallacies among potential cogeneration developers and concerned professionals that cogeneration is uncompetitive in Malaysia due to existing policies of subsidized gas prices and grid-connection charges. This paper exposes these fallacies through counterexamples of practical cogeneration system design and evaluation of some segments of the industrial and service sectors in Peninsular Malaysia/ The electrical and thermal characteristics of the cogeneration were modeled based on heat rate characteristics at partial loading patterns. A hierarchical mathematical programming approach that uses mixed-integer nonlinear optimization and dynamic programming principle, if necessary, is employed to determine the optimal size of cogeneration and its related auxiliary equipment as well as the optimal operation schedule. Financial assessment is integrated at a later stage to assess the economic viability of the system. Analyses of the cogeneration potential for several facilities of miscellaneous activities were carried out using various gas and electricity prices. Results obtained consistently rebuff the perpetuated fallacies and confirm that there is no real barriers to cogeneration development in Malaysia under current policies of gas prices and electricity tariffs.

Research Opportunities for Postgraduate Student

Currently, CEES has received nearly RM250, 000 FRGS grants from Ministry of Higher Education, MOHE, in various fields of research. In addition, CEES has received RM510, 000 RU grants from UTM that will give great opportunities for local students to pursue their postgraduate studies in various fields of interest. In addition, CEES members also applying for more grants from MOSTI to create more opportunities for international students. We are currently applying for a few more ERGS and FRGS.

CEES can also supervise research students under a MOHE program call 'MyBrain15' for the sponsorship of postgraduate studies at the Masters & PhD levels. The objectives of the programs are to simulate and encourage graduates of high calibre to pursue their studies at the higher levels in key areas in line with the country's development plan. This will simultaneously develop and maintain/retain human capital will catapult the transformation of Malaysia to a high income country.

Postgraduate research opportunities in the fields of:

- Power System Engineering**
- Electrical Energy Markets and Generations Studies**
- Renewable Energy**
- Power Quality Engineering**
- End-user and Customer Side Energy Efficiency**
- Grid-Connected Cogeneration Systems**

Join CEES to share our experience and enhance your knowledge from our expertise. Visit us www.cees.utm.my

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