

Half-Day Workshop on Energy Storage Application in Smart Power Systems

ELECTRONIC ENGINEERING TECHNICAL DIVISION

reported by



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Group photo of the speakers and workshop participants

The Electronic Engineering Technical Division and Electrical Engineering Technical, in collaboration with the Institution of Electrical Engineers Japan (IEEJ), jointly organised a half-day workshop on "Energy Storage Application in Smart Power Systems" on 5 November, 2017, at Penang Skill Development Centre (PSDC).

The programme chairman, Alex Looi Tink Huey, extended a warm welcome to the four speakers from

Japan: Prof. Toshihisa Funabashi (Nagoya University), Prof. Masahide Hojo (Tokushima University), Assoc. Prof. Ryoichi Hara (Hokkaido University) and Dr Yoshinobu Ueda (Meidensha Corporation).

Prof. Toshihisa Funabashi introduced renewable energy sources and smart power systems. The domestic power supply in Japan comes from two major energy sources: Fossil (oil, coal, natural gas) and non-fossil fuel

(nuclear, hydroelectric, geothermal, photovoltaic, wind).

The supply voltages are $100 \pm 6V$ and $202 \pm 20V$, ranging from 50-60 Hz (depending on power traffic of the day) and are controlled by a battery energy storage system (BESS) which regulates variable output of energy source and power system to meet the energy demand in a distribution system.

The BESS system is able to meet the demand for fast charge and

discharge of power, is also easily installed and freely controlled by power conversion system (PCS).

The second topic, delivered by Prof. Masahide Hojo, was on the stabilisation of small-scale power systems using inverter control. Various renewable energy sources, such as photovoltaic and wind power injected to the main power grid, are difficult to balance the voltage phase. This is because renewable power generation is unpredictable and depends on energy source rather than demand.

The conventional voltage phasor control is unable to synchronise voltage phase at the coupling terminal point. So, to improve power quality in microgrid effectively, Prof. Hojo proposed voltage phasor regulation to overcome this shortcoming.

The third speaker, Assoc. Prof. Ryoichi Hara, talked about energy storage applications in microgrids. He said a local power and energy supply, equipped with distributed generations (DGs), energy storage system and information and communications technology (ICT) based distribution system, can improve power quality. Such a method also encourages renewable power supplies such as wind turbine and photovoltaic to be locally generated and stored in batteries. Therefore, a continuous power supply from a local energy management system can be assured in the event of power interruption in the main distribution system during an emergency.

The last speaker, Dr Yoshinobu Ueda, talked about successful power supply generation in rural areas. Initially, diesel engine-based power generation with a rating of 58kW was used for limited-time energy supply to 4 villages in central Laos.

A geographical study was then conducted and the existing power generator was replaced with a small-scale and local independent hybrid power system using cross-flow hydro turbine and photovoltaic systems. The new power generator supplied 110kW at 400V \pm 10% with 50Hz \pm 2%. Electrical double layer capacitor (ELDC) was used to stabilise variations in voltage and frequency for good power quality. The project took approximately 3 years to complete. Currently, it provides 24-hour power supply to 10 villages in Laos.

The 15 participants raised questions and exchanged ideas, especially about renewable energy such as bio-diesel since this was abundantly available in Malaysia. It was also in line with local policies that encouraged bio-diesel generation in reducing palm oil waste.

Before the workshop ended, Ir. Ting Chek Choon and Ir. Bhuvendhrra Rudrusamy, representing IEM Penang branch and Electronic Engineering Technical Division respectively, presented tokens of appreciation to the speakers. ■



Ir. Ting Chek Choon and Ir. Bhuvendhrra Rudrusamy representing a certification of appreciation to Prof. Toshihisa Funabashi and Assoc. Prof. Ryoichi Hara, respectively. Looking on is Alex Looi