

International Conference on

Power and Energy Engineering

September 29-30, 2016 London, UK



Rikiya Abe

The University of Tokyo, Japan

Digital grid - New grid architecture for renewable energy era

Conventional electric network systems have been well designed, and expanded largely to thousands of kilo-meters, in last 140 years. Smart grid and microgrid concepts tried remodeling this architecture, however, the fundamental mechanism of synchronous system has never changed. An increase of wind energy and photovoltaics is a significant challenge to this synchronous system, because these new energies do not have synchronization mechanism in nature. In order not only to accept but also to fulfill with these free energy in the grid, we have to create a new grid architecture. Digital grid concept proposes the mitigation process to remodeling of the current grid system. First, we propose to segment the conventional grid into smaller grids to create renewable energy-rich “Cell” via asynchronous back to back (BTB) interface. Second, we propose “Time-based Synchronization” as a new synchronization mechanism for many power conditioners and inverters inside the cell. Third, we propose such BTB interfaces are to be identified with IP addresses, so that all the power transactions are tagged and logged. Our proposal of “Digital Grid Router (DGR)” has these features, which is composed of multiple AC/DC bi-directional inverter with common DC bus. DGR will be a software driven inverter with common hardware design. Internet connection of the DGR will provide similar function of money server and receiver. Block chain will be a promising technology for financial side of power, CO₂ transaction and those derivatives. Power electronics, internet and fintech will create a new future of grid architecture for renewable energy era.

Biography

Rikiya Abe graduated in the Electronics Engineering from the University of Tokyo and received Doctor degree at Kyushu University, working long time at whole sale power company, J-POWER in Japan. He was a Visiting Researcher at Electric Power Research Institute (EPRI). He is now a Project Professor at the University of Tokyo, Graduate course of Technology Management for Innovation (TMI) from 2008. He developed the Digital Grid concept which represents “Internet of Power”. He established a “not-for-profit organization of Digital Grid Consortium” in September 2011 and is working as a CEO. He is a Co-Chair of Presidential Endowed Chair of the “Electric Power Network Innovation by Digital Grid”, at the University of Tokyo, from June 2012. He also started a venture company, the Digital Grid Inc., to apply Digital Grid technology in the world. The company has started off-grid solution in Tanzania and is operating 550 solar kiosks to provided minimum electricity requirement. His research fields are: Smart Grid, Micro Grid, Digital Grid, Energy Storage, Power Electronics, Demand Response and Demand Fix.

abe-r@tmi.t.u-tokyo.ac.jp

Notes: