Invited talk by Pavol Bauer, Delft University of Technology, The Netherlands

Roadmap towards Direct Current: How direct will the future electricity be?

ABSTRACT

Increasing number of decentralised energy resources and loads that operate with direct current, such as photovoltaic cells, fuel cells, batteries and electric vehicles, result in dc microgrids having the potential to provide more advantages than ac microgrids in certain applications. DC microgrids (both grid connected and stand- alone) can provide higher flexibility by allowing the controlled injection of locally generated electrical energy and by enabling the optimisation of energy storage, leading to a better deployment of resources. Integration of renewable energy sources namely solar cells and storage (Electric Vehicles) is addressed in the presentation. Several examples of integration of dc microgrids and needed power electronic interfaces and systems with high efficiency will be shown. DC microgrids have potential to grow into a dc distribution grids in a modular way. Roadmap towards the dc distribution grids will be presented and challenges listed and explained. HV/MV DC Transmission Networks for large scale implementation of Renewable Energy Sources (solar, wind, wave), optimization and controllability of HVDC transmission grids is addressed too.

Pavol Bauer is currently a full Professor with the Department of Electrical Sustainable Energy of Delft University of Technology and head of DC Systems, Energy Conversion and Storage group. He published over 80 journals and almost 300 conference papers in his field, he is an author or co-author of 8 books, holds 5 international patents and organized several tutorials at the international conferences. He has worked on many projects for industry concerning wind, solar and wave energy, power electronic applications for power systems such as Smarttrafo; HVDC systems, DC distribution grids and microgrids, projects for smart cities such as PV charging of electric vehicles, PV and storage integration, contactless charging; and he participated in several Leonardo da Vinci and H2020 EU projects as project partner (ELINA, INETELE, E-Pragmatic) and coordinator (PEMCWebLab.com-Edipe, SustEner, Eranet DCMICRO).