ADCGS
Aachen DC Grid Summit

# Aachen DC Grid Summit

## Where the International DC Community Meets

April 19th - 20th, 2018
Aachen

www.aDCgs.org

Organizer:
FEN Research Campus

# Aachen DC Grid Summit

## Preface

Dear DC Grid Community,

In the recent past, direct current (DC) grid technology has become increasingly important all over the world. DC is a key technology for our future energy supply system. Its high potential has already been widely recognized, yet it still has to be established as a standard technology. Conducting research and development in the field of DC grids means taking responsibility for our future energy supply.

Let us take this responsibility together and step into a future with a reliable, sustainable and affordable energy supply.

To further advance the DC grid technologies, we created an international platform: Aachen DC Grid Summit. The summit will bring together the world's experts from industry and academia in DC grids. Visit ADCGS and profit from getting to know the latest research results as well as new market trends, innovative products and services.

We are very pleased to welcome you at the first Aachen DC Grid Summit.

Sincerely yours,

ADCGS Advisory Committee



## ADCGS Advisory Committee

Dr. Reinhold Bayerer
*Infineon Technologies AG*

Prof. Dr. Dr. Rik W. De Doncker
*PGS, RWTH Aachen*

Robert Heiliger
*E.ON SE*

Prof. Dr. Eva-Maria Jakobs
*TLTK, RWTH Aachen*

Dr. Sylvio Kosse
*Siemens AG*

Holger Krings
*Phoenix Contact GmbH*

Prof. Dr. Reinhard Madlener
*FCN, RWTH Aachen*

Prof. Antonello Monti, Ph.D.
*ACS, RWTH Aachen*

Prof. Dr. Albert Moser
*IAEW, RWTH Aachen*

## Why you should attend?

**Networking and Cooperations**

**Conference Proceedings**

**Latest Updates on Research Results and Market Trends**

**Meet Technical Leaders and Experts from Industry and Science**

**Exhibition Area**

**Best Poster Award**

# Program Day 1

*09:30*
**Start and Registration**

*10:00*
**Opening**
Dr. Peter Lürkens, Scientific Coordinator FEN Research Campus

*10:10*
**Opening Address**
Univ.-Prof. Dr. ir. Dr. h.c. Rik W. De Doncker, Director of FEN Research Campus

*10:30*
**Keynote**
Dr. Peter Friedrichs, Senior Director Wide band gap, Infineon Technologies

*11:15*
**Keynote**
Dr. Peter Steimer, Corporate Research Fellow, ABB Switzerland Ltd.

*12:00*
**Lunch Break**

Poster Session & Exhibition

**Parallel Session 1: “Grids - Planning, Operation, Protection“**

13:30 - 13:40 Opening
Univ.-Prof. Dr.-Ing. Albert Moser, Director of IAEW at RWTH Aachen University
13:40 - 14:05 *“Structural design of medium-voltage DC grids considering power flow control“*
M.Sc. Jens Priebe, IAEW at RWTH Aachen University
14:05 - 14:30 *“Activities of the VDE ETG Task Force – Direct Current in Electrical Energy Distribution Applications“*
Dr. Marco Stieneker, PGS at RWTH Aachen University
14:30 - 14:55 *“Study report on a compact MVDC back-to-back system to couple two 110 kV grids“*
Dipl.-Ing. Mark Schocke, Westnetz GmbH
14:55 - 15:10 Discussion Part 1

*15:10*
**Coffee Break**

**Parallel Session 1: “Grids - Planning, Operation, Protection“**

16:00 - 16:25 *“MVDC Plus and applications“*
Dipl.-Ing. German Kuhn, Siemens AG
16:25 - 16:50 *“On the way to a European HVDC grid“*
Dr. Athanasios Krontiris, ABB AG
16:50 - 17:15 *“Special requirements regarding VSC converters for operation of hybrid AC/DC overhead lines“*
Dr. Bartosz Rusek, Amprion GmbH
17:15 - 17:30 Discussion Part 2

*18:30*
**Evening Event at Tivoli Business & Events, Krefelder Straße 205, 52070 Aachen**



Program Day 1

**>> You can choose between Session 1 or Session 2.**

**Parallel Session 2: “Grid Management and Automation“**

13:30 - 13:40 Opening
Univ.-Prof. Antonello Monti Ph.D., Director of ACS at RWTH Aachen University
13:40 - 14:10 *“Towards a system-level approach for multi-terminal DC grid automation“*
Univ.-Prof. Antonello Monti Ph. D., ACS at RWTH Aachen University
14:10 - 14:30 *“Innovative instrument transformers for DC power networks and the new product Standards IEC 61869-14 IEC61869-15“*
Prof. Lorenzo Peretto, University of Bologna
14:30 - 14:50 *"Improving sustainability through DC grid energy storage systems for offshore and marine applications”*
Stig Settemsdal, Siemens AS
14:50 - 15:10 "*Embedded HVDC for stronger and smarter grid*"
Dr. Lidong Zhang, ABB Schweiz AG

*15:10*
**Coffee Break**

**Parallel Session 2: “Grid Management and Automation“**

16:00 - 16:20 *“Low-level control strategies for DC and AC/DC grids“*
Dr. Jon Andoni Barrena, University of Mondragon
16:20 - 16:40 *"Power Electronics Power Distribution Systems: Control and Protection"*
Prof. Andrea Benigni & Prof. Herbert L. Ginn, University of South Carolina
16:40 - 17:00 *“Reliability in HVDC systems“*
Patrik Lindblad, ENTSO-E

# Program Day 2

Poster Session & Exhibition

*09:00*
**Start and Welcome Coffee**

*09:30*
**Keynote**
Univ.-Prof. Dr. ir. Dr. h.c. Rik W. De Doncker, Director of FEN Research Campus

*10:15*
**Keynote**
Aldo Danelli, Project Manager, CESI

**Parallel Session 3: “Components - Converters, Switches, Cables“**

11:00 - 11:20 Opening
Univ.-Prof. Dr. ir. Dr. h.c. Rik W. De Doncker, Director of FEN Research Campus, Director of ISEA and PGS at RWTH Aachen University
11:20 - 11:40 *”DC as accelerator for energy transition“*
Harry Stokman, Direct Current BV
11:40 - 12:00 *”Protection Challenges in Future DC Homes“*
Dr. Torsten Hager, Hager Group
12:00 - 12:20 *”BlueDrive PlusC – DC power Grid for Marine & Offshore“*
Wolfgang Voss, Siemens AS
12:20 - 12:40 *”DC Technology in Wind Farms“*
Dr. Philip Kjær, Vestas Wind Systems A/S

*12:40*
**Lunch Break**

**Parallel Session 3: “Components - Converters, Switches, Cables“**

14:00 - 14:20 *”DC System and Components from Low Voltage to High Voltage“*
Dr. Takushi Jimichi, Mitsubishi Electric Corporation
14:20 - 14:40 *”New DC-Grids - Opportunities and challenges for SME“*
Dr. Jochen von Bloh, AixControl GmbH
14:40 - 15:00 *”Galvanically Isolated High Power Converters for MVDC Applications“*
Prof. Drazen Dujic, Ph.D., EPFL Lausanne
15:00 - 15:20 ”How direct will the future electricity be?“
Prof. Pavol Bauer, Ph.D., Delft University of Technology

*15:20*
**Conclusion & Outlook incl. Best Poster Award**

*16:15*
**End of Day 2**

*16:30*
**Optional Excursion to FEN Research Campus + RWTH Aachen Campus (1,5 h)**



# Program Day 2

**>> You can choose between Session 3 or Session 4.**

**Parallel Session 4: “Business Models, Innovations and Social Aspects“**

11:00 - 11:10 Opening
Univ.-Prof. Dr. phil. Eva-Maria Jakobs, Director of TLTK at RWTH Aachen University
Univ.-Prof. Dr. rer. soc. oec. Reinhard Madlener, Director of FCN at RWTH Aachen University
11:10 - 11:30 *”Economics of Diffusion of Innovative Electric Network Technologies"*
Univ.-Prof. Dr. rer. soc. oec. Reinhard Madlener, FCN at RWTH Aachen University
11:30 - 11:50 *”Economic evaluation of MV-DC Potential in NRW“*
Dr. Christian A. Oberst, IW German Economic Institute / INFER International Network for Economic Research
11:50 - 12:10 ”Replacing 110kV powerlines with MVDC cables in german cities"
Dipl.-Ing. Benjamin Casper, ISL at RWTH Aachen University
12:10 - 12:40 Round Table Discussion

*12:40*
**Lunch Break**

**Parallel Session 4: “Business Models, Innovations and Social Aspects“**

14:00 - 14:20 *„The EU energy governance and its impact on the German energy transition“*
Prof. Michèle Knodt, TU Darmstadt
14:20 - 14:40 *”Why perception and acceptance matter. Evaluation of local energy supply systems in a supra-regional comparative study“*
Agnes Grabietz, Christine Mauelshagen, Prof. Jakobs, TLTK at RWTH Aachen University
14:40 - 15:00 *”High voltage drive or challenge? How social and organisational factors influence the E-Taxi business“*
Dr. Rüdiger Goldschmidt, zirius at University of Stuttgart
15:00 - 15:20 Round Table Discussion

# Which session should I attend?

The program offers parallel sessions. To choose the session which is the most in line with your interests, you can find a description of each session below.

## Session 1: Grids - Planning, Operation, Protection

The session provides a platform for various topics in the field of planning and operation of DC only grids, hybrid AC/DC grids as well as single DC applications in existing AC grids. It focuses on DC technology in grids with a systemic view and is divided into two parts in which scientists, associations, system operators and product manufacturers address DC-related topics in both distribution and transmission grids. The first part deals with research aspects and will begin with a presentation of planning approaches for medium-voltage DC grids and the impact of power flow controllability. Subsequently, an overview of DC and its applications in electrical energy distribution will be given. The research part will end with a report on a specific project in which the connection of two 110 kV groups by a DC link was investigated. The second part has a stronger industrial focus. A medium-voltage DC solution and its applications will show the need for and benefit of DC technology. After this, the state of the art and open tasks will summarize the vision of a European HVDC transmission grid. Moreover, concrete HVDC projects in the German transmission grid will be presented. In both parts, the contents of the presentations can be intensively discussed with the speakers.

## Session 2: Grid Management and Automation

In this session, the speakers will discuss the management, control and automation of DC and hybrid AC/DC distribution grids. The topics refer to the development of novel control strategies for such grids and their realization through automation architectures. The session is divided in two parts, where speakers from university institutes, research organizations, system operators as well as companies will contribute to this field. The first part will start with a presentation of the research achievements in a FEN Research Campus project in the area of DC systems‘ control and automation. This will be followed by two presentations from product manufacturers focusing on the design challenges of components suitable for DC and hybrid AC/DC grids. The first part will close with a presentation from university scientists on DC technologies for distribution systems. The second part also combines presentations from scientists and industry. First, the future of DC networks will be presented through projects in research organizations on grid control and automation. Subsequently, an overview of DC sensor technologies for grid monitoring will be provided by industry. The second part will end with a presentation on the reliability of DC systems from a system operator perspective. In both parts, the presented topics can be discussed with the speakers.



## Session 3: Components - Converters, Switches, Cables

Session 3 concentrates on components that are required for the implementation of DC systems. The first part of this sessions deals with an overview of possible fields of application. Afterwards, the presenters show implemented systems and emerging challenges. In particular, protection systems for future DC homes are discussed. In the field of high-power applications, DC power grids for marine vessels and offshore applications are presented. The afternoon session goes more into detail and topics related to power electronic converters are discussed. Also, the interaction between power electronic converters is analyzed and measures to mitigate this issue are shown.

## Session 4: Business Models, Innovations and Social Acceptance

”Business Models, Innovations & Social Aspects” prerequisites will be discussed for technology acceptance and adoption of direct current technology in electrical grid installation and infrastructure with an outlook on future business models. The focus is on medium-voltage application. Results from several studies with different methodological approaches will be presented and discussed. This includes results from a survey and a choice experiment study on public preferences of the future regional electrical grid, a regional economic and urban planning analysis of influences and effects of possible medium-voltage direct current installation studies, acceptance of DC technologies and local energy supply systems, communication studies as well as discourses from a political and social-scientific perspective.

# Location

ADCGS will be held in **Aachen** at **Tivoli Business & Events**, a multifunctional conference center located in the Tivoli Soccer Stadium, home of Alemannia Aachen. The business area spans about 4 000 m² split on three floor levels.

The venue can easily be reached from the city center and central station by public transport or by taxi. Participants can also use private or hired cars as sufficient parking is available on site.

**Address:**
Krefelder Straße 205
52070 Aachen


Aachen is also home of **Flexible Electrical Networks (FEN) Research Campus**, a central initiative for direct current (DC) technology innovation. The use of DC plays a crucial role: for example, to demonstrate the feasibility and potential of DC, a medium-voltage research grid will be implemented on Campus Melaten of RWTH Aachen University, using state-of-the-art industrial technology. FEN Research Campus is supported i.a. by the funding initiative “Research Campus - Public-Private Partnership for Innovation“ of the Federal Ministry of Research and Education (BMBF) with the assigment to establish a persistant center of innovation beyond the initial start-up incentives.

RESEARCH CAMPUS
Public-Private Partnership for Innovation

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# Organizers

FORSCHUNGSCAMPUS
FLEXIBLE ELEKTRISCHE NETZE

Flexible Electrical Networks (FEN) Research Campus

Supported by:

Institute for Automation of Complex Power Systems (ACS)
at RWTH Aachen University

Institute for Future Energy Consumer Needs and Behavior
(FCN) at RWTH Aachen University

Institute of Power Systems and Power Economics (IAEW)
at RWTH Aachen University

Institute for Power Generation and Storage Systems (PGS)
at RWTH Aachen University

Chair of Textlinguistics and Technical Communication (TLTK)
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