

**FLEXIBLE  
ELECTRICAL  
NETWORKS**  
RESEARCH CAMPUS



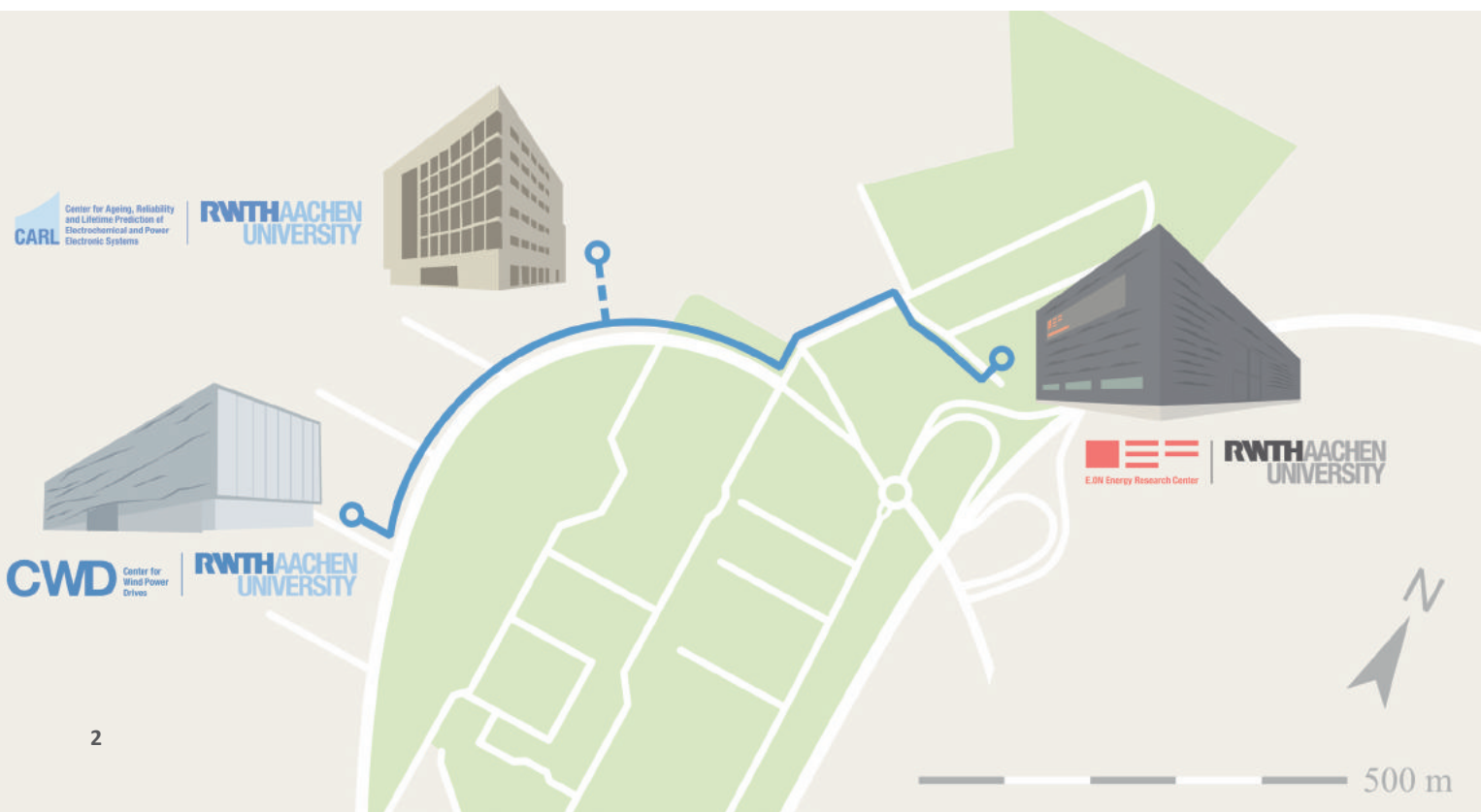
# Flexible Electrical Networks FEN Research Campus

Research for the Grids of the Future

# Our Vision

„The aim of the FEN Research Campus is to research and develop a flexible power grid consisting of a high proportion of decentralised and renewable energy sources.

This grid will enable a secure and affordable energy supply in the future.“



# Foreword

Dear Readers, dear Friends of FEN,

I'm sure you remember the gas crisis last winter: monuments in darkness, churches in twilight, sparingly heated rooms and water-saving shower heads.

Measures like these to secure the energy supply were previously unheard of. For decades, we could rely on our energy supply to be stable and secure. The situation last winter forced us to rethink and forcefully demonstrated the limits of our energy system. We not only need to rethink- we need to act quickly and decisively. However, changing our electrical supply system to use environmentally friendly energy sources requires the development of a new stable grid infrastructure. The transmission, distribution and storage of energy must become more efficient, more stable and more flexible.

This is precisely where our BMBF-funded FEN Research Campus comes in. The aim is to research and develop a flexible power grid. This grid will ensure the future energy supply with a high proportion of decentralized and renewable energy sources and enable a secure and affordable energy supply in the future.

An ambitious goal and a complex task. Solutions cannot be developed by industry or science alone; interdisciplinary cooperation is needed. We need a high degree of transdisciplinary research including social, ecological and economic aspects.

This idea is also the guiding principle of our concept: Industry on Campus! Here we work together on an equal footing and find solutions for the future. Currently, 15 institutes of the RWTH Aachen University and 17 industrial companies are developing tailored, pragmatic concepts at the FEN Research Campus. This cooperative, practice-oriented environment facilitates the use of the shared infrastructure, helps to implement innovations more quickly and promotes young scientists.

At the same time, our Research Campus is not a "closed shop". We are open to new ideas and to new partners who want to shape the energy supply of tomorrow with us.

Feel free to contact us.

With best regards



Univ.-Prof. Dr. ir. Rik De Doncker



# The FEN Research Campus

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## **Cooperation between Industry and Science as equal Partners**

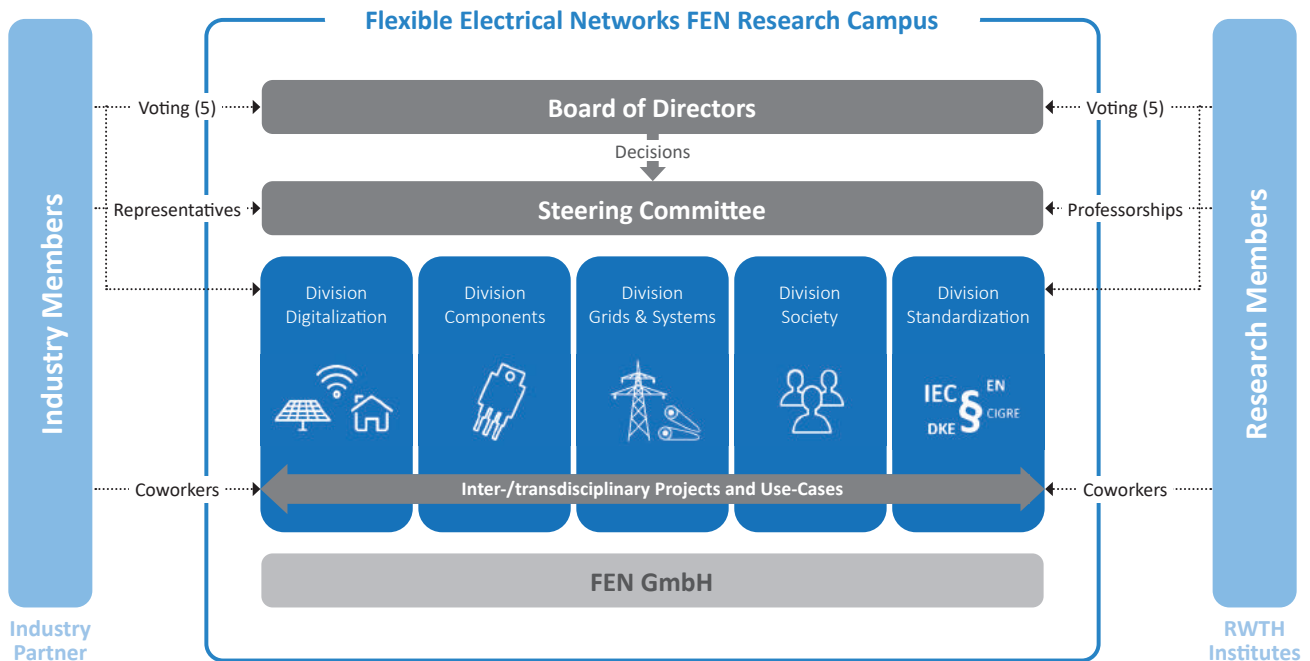
The FEN Research Campus is an association of institutes of RWTH Aachen University and industrial partners. The joint research of science and industry under the common roof of the FEN Research Campus promotes an efficient exchange of knowledge between the partners.

In order to successfully meet the challenge of our future energy supply, this transdisciplinary exchange of different experiences and disciplines is necessary to achieve innovations faster across the entire range of individual competencies.

## **Technology Region Aachen**

The research activities of the FEN Research Campus take place in the middle of the RWTH Aachen University campus. The joint work under one roof- in the so-called “FEN Think Tank” – enables direct exchange between the partners. In addition to the transdisciplinary exchange opportunities, various test benches of RWTH Aachen University can also be used. Each expert has his or her own workstation. The office space can be used by all partners of the FEN Research Campus.

# FEN Governance



The FEN Research Campus is divided into five departments (Digitalization, Components, Grids & Systems, Society, Standardization), which combine technical, social, economic and ecological research approaches in an interdisciplinary manner. Each department is headed by a representative of RWTH Aachen University and the FEN Industry Steering Committee.

The FEN Research Campus model is based on the funding initiative of the same name “Research Campus - Public-Private Partnership for Innovation” of the Federal Ministry of Education and Research (BMBF), which thus supports long-term cooperation between science and industry.

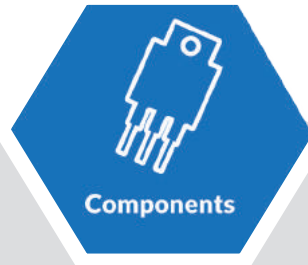
# Research Fields

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## DIGITALIZATION

In this area, the scientists are working on the realization of a cloud platform for intelligent energy services. Standardized communication connections can be used, for example, to forward energy profiles and forecasts on load and generation to a superordinate instance, which can efficiently control consumers and generators by means of a software platform.



## COMPONENTS

In this field, electrical components and systems required for the construction and operation of DC grids are researched and developed.



## GRIDS & SYSTEMS

In this area, in addition to determining the planning principles adapted for DC grids, the repercussions on the systems of the higher- and lower-level conventional AC grids are analysed.







Society

## SOCIETY

In this field, the scientists at FEN Research Campus are looking at DC grids from non-technical points of view in addition to the technical research fields. These include social acceptance as well as biological, ecological, urban planning and economic aspects.



Standardization

## STANDARDIZATION

The FEN Research Campus actively participates in the development and international establishment of standards and norms for DC voltage grids and components. Suitable standards are defined for DC voltage grids and components.





Members of FEN Steering Committee meeting

Foto: FEN GmbH



# FEN - Partners

## Flexible Electrical Networks FEN Research Campus

### Industry Partners



### Scientific Partners



### Applicants and Academic Cooperations



The partners of FEN Research Campus come from both industry and academia. They belong to different industries, scientific disciplines and nations, so that the complex societal questions can be addressed under inter- and transdisciplinary aspects. Research is carried out among one roof at the premises of FEN in order to ensure the rapid implementation of the results into innovation products and services. Furthermore, it is possible to get involved in the FEN Consortium at any time.

# Benefits for all FEN Partners

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- Training opportunities in favorable conditions, for example at RWTH Aachen University International Academy
- PhD lectures at RWTH Aachen University
- Internal workshops and colloquia
- International exchange programs for students



- Application-oriented, pre-competitive and transdisciplinary research
- Publicly funded projects (BMBF, BMWi, etc.) and projects based on the partners' ideas
- Administrative support for publicly funded projects
- Access to studies as well as theses and further professional publications
- Use of registered patents



- Office space at “FEN Think Tank” in one of the largest technology-oriented research landscapes in Europe: RWTH Aachen University Campus Melaten
- Access to the laboratory infrastructure of the RWTH institutes
- DC experimental building
- MVDC research grid



- Transdisciplinary team of experts
- Joint research and direct exchange of knowledge between science and industry in “FEN Think Tank”
- Corporate meetings: Steering Committees
- Access to new Start-Ups
- Access to junior researchers
- Online platform „meinFEN“ (wiki, overview of test benches, internal documents etc.)



# Testimonials

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“Participation in the FEN consortium - especially in the DC-SOCIO-ECONOMIC project- opens up new perspectives on the exciting and little-researched topic of how technical innovations can be developed on a broad scale. Questions of acceptance, niche readiness, market diffusion and spatial relevance play a central role here. If we want to achieve real progress in the field of sustainable energy supply and security, this requires a transdisciplinary approach, such as we are testing in our project team.”

**Prof. Christa Reicher**

Chair of Urban Design and Institute for Urban Design and European Urbanism  
UNESCO Chair of Cultural Heritage and Urbanism at RWTH University

Foto: Michel Kitenge

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“For us in EATON, being at FEN continues to be a rewarding experience. Coming together with experts from industry and academia enables us to drive our innovation on the DC technologies further and extend our horizons on design, automation and operation of future power systems. Through collaboration on interdisciplinary projects, our Eaton Research Labs engineers have a unique opportunity to develop innovative solutions that bring value to our research strategies and provide incentives for the next generation of products and services.”

**Martina Josevski**

Eaton

## Testimonials

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“When OPAL-RT Germany was founded in 2018, a primary goal was to establish a strong R&D base in Germany. FEN gave us exactly what we needed - technical collaboration, a rich network of industrial and academic innovators, and access to excellent students, some of whom we have hired and who work under the FEN roof. We are excited to work with our partners on the power grid of the future!”

**Ravinder Venugopal**

OPAL-RT Germany

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“It is a great experience to be part of the FEN Research Campus. FEN has fostered my learning not only in my own domain, but also in a multidisciplinary area, which has helped me to gain a better overview of the field of DC systems. And this was achieved through exciting discussions and fruitful collaboration with my talented colleagues in FEN, with whom we have performed high-level research.”

**Asimenia Korompili**

E.ON ERC, Institute for Automation of Complex Power Systems RWTH Aachen University



# Publishing Information

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Flexible Electrical Networks FEN Research Campus  
FEN GmbH

### Editors

Dr. Regina Oertel  
Diana Schikowski, M.A.

### Graphic Design

Ming Fei

### Photos

E.ON ERC	: High Voltage Transformer
Winandy	: Campus Melaten, Campus GmbH
Volkman	: Cluster Photonik
Rik De Doncker	: Madeira
Fotolia	: Other photos
FEN GmbH	: Other photos

### Print

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Aachen, September 2023  
2<sup>nd</sup> edition

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Federal Ministry  
of Education  
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