



Center for Research on Microgrids

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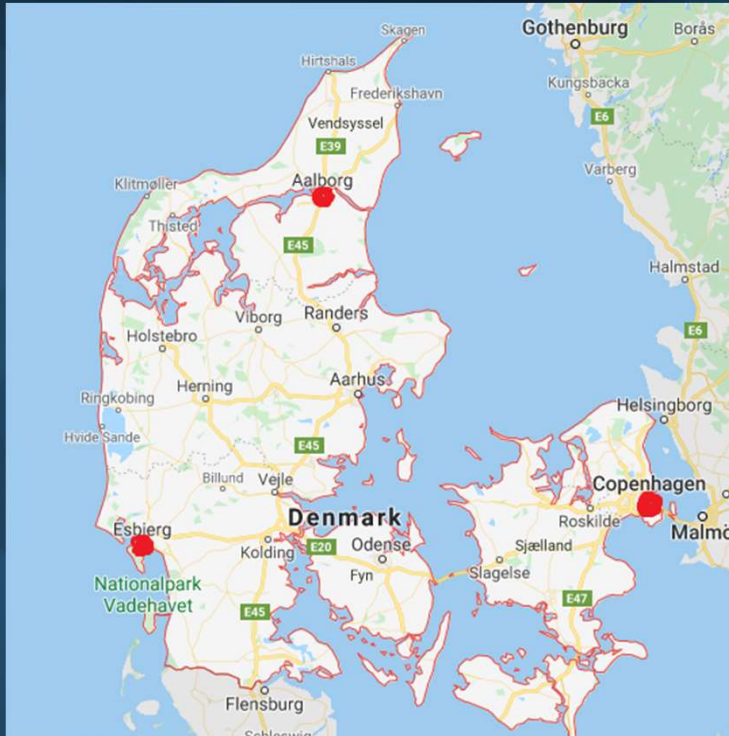
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WWW.CROM.ET.AAU.DK



Aalborg University

Aalborg University was created with the establishment of a number of new faculties in 1974. Aalborg University is characterised by its education form of Problem Based Learn (PBL) – also known as the *Aalborg model*. The number of students is around 20,000.



Aalborg University

- At Times Higher Education Aalborg University is ranked as no. 18 in the Top 100 under the age of 50. In the THE Impact Ranking Aalborg University is ranked no. 23, and is ranked as the world best university in SDG 4: Quality Education.
- According to US News World Ranking, Aalborg University ranks as no. 4 in the world, and best in Europe, within the field of Engineering.
- According to Shanghai/ARWU World Rank, Aalborg University is no. 7 in the world within the field of Electronic and Electrical Engineering.
- According to the 2018 MIT report, Aalborg University is considered to have the best engineering programme in Europe – a programme that takes fourth place in the world!

Department of Energy



- Around 200 researchers
- 5 IEEE fellows and 3 Villum Investigators
- Approximately 100 PhD students
- Approximately 50% of the turnover comes from external projects
- 129 Researchers from AAU were ranked in the top 2% of scientists in the world according to the Stanford University's list. 36 of the 129 researchers are with AAU Energy

RESEARCH GROUPS



CROM WHO WE ARE

CROM is a European leading research center, affiliated to the AAU Energy Department at Aalborg University. CROM provides **Sustainable, Cost-effective, Resilient and Scalable Electrification solutions:**

- **Sustainable** development on multi-disciplinary energy frameworks.
- **Resilient** and electrification solutions for rural communities and islands
- **IoT-based** Energy Solutions for residential households and buildings



Our Team Members: The CROMers

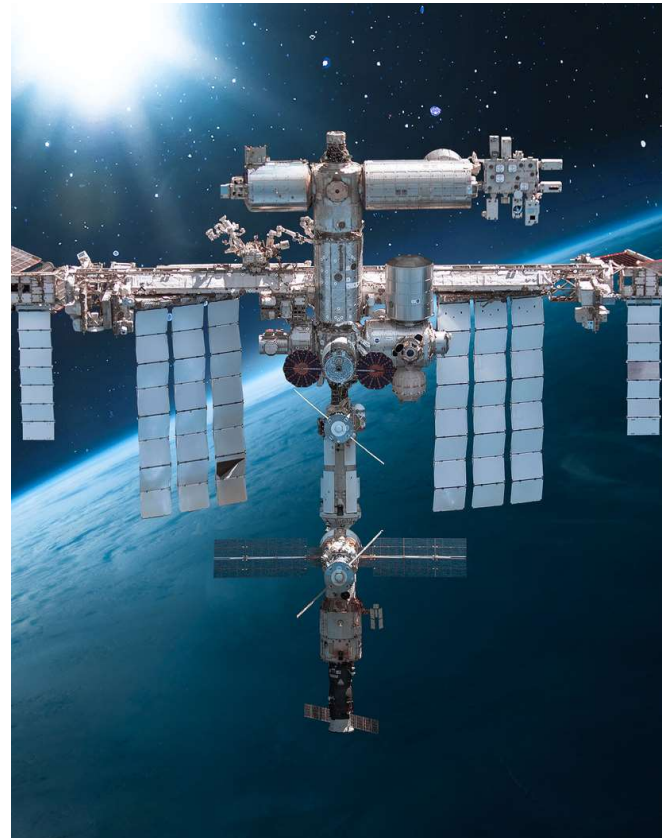


2 Center Directors
4 Associate Professors
3 Assistant Professors
7 Postdoc Researchers
1 Research Assistant

+20 Visiting scholars
5 Ongoing PHD Students
10 MSC Students

OUR FOCUS AREAS

- Low and medium voltage AC and DC microgrids
- Microgrids in emergent countries and communities
- Electrification of rural areas
- Maritime microgrids for shipboards and seaports
- Protection and communication systems for microgrid clusters
- Bio-inspired microgrids
- Advanced metering infrastructures
- Smart homes (automation, energy optimization, and security)
- Energy trading applications
- Energy management systems and SCADA systems
- Hybrid energy storage solutions for islanded grids





Research and Industrial Projects

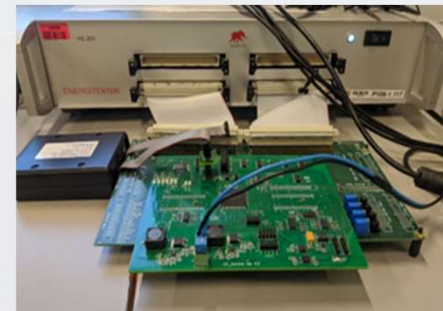
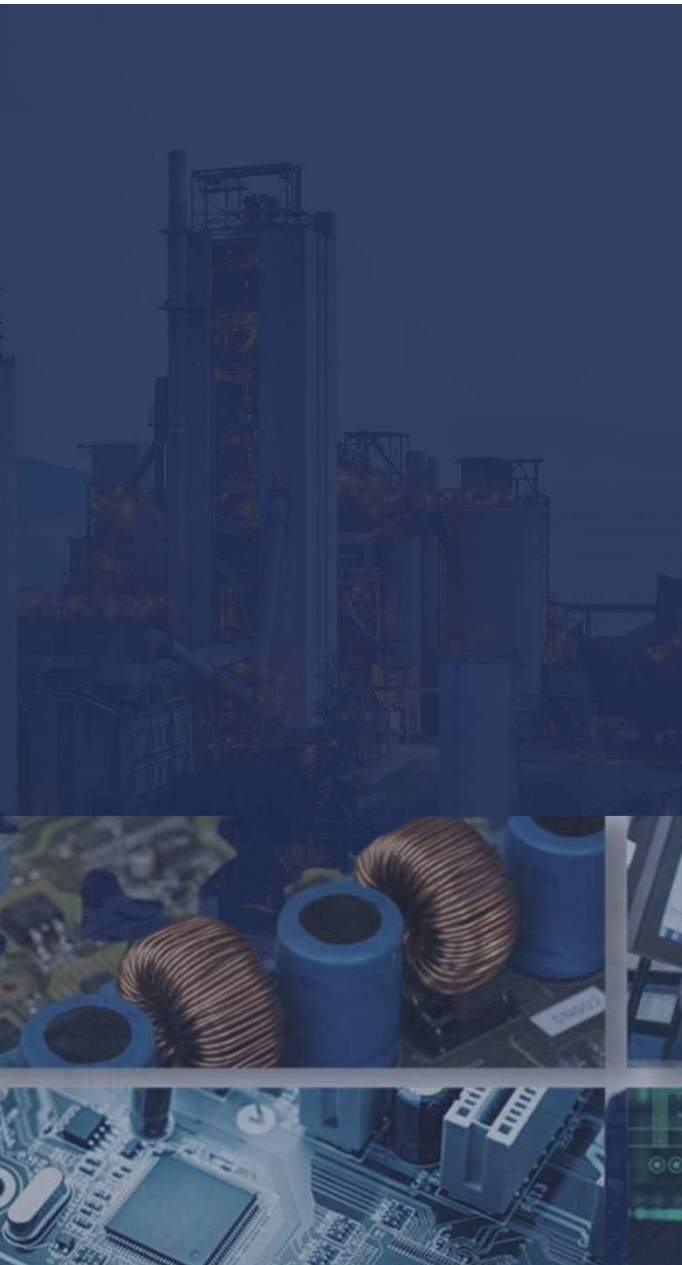
Ongoing Research Projects

- **National Energy System Transition Facilities – NEST**
Danish National Council on Research Infrastructure, NUFI - Period: 2024 - 2028
- **Large-Scale Integration of Wind Power Generation in Ethiopia – LastWind**
Danida Fellowship Centre - Period: 2023 - 2026
- **Hybrid Electric regional Aircraft distribution Technologies - HECATE**
Clean Aviation - Period: 2023 - 2026
- **Center for Research on Microgrids - CROM**
The Velux Foundations - Period: 2019-2025

Research and Industrial Projects

Completed Research Projects

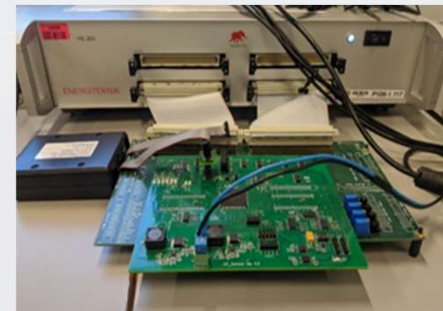
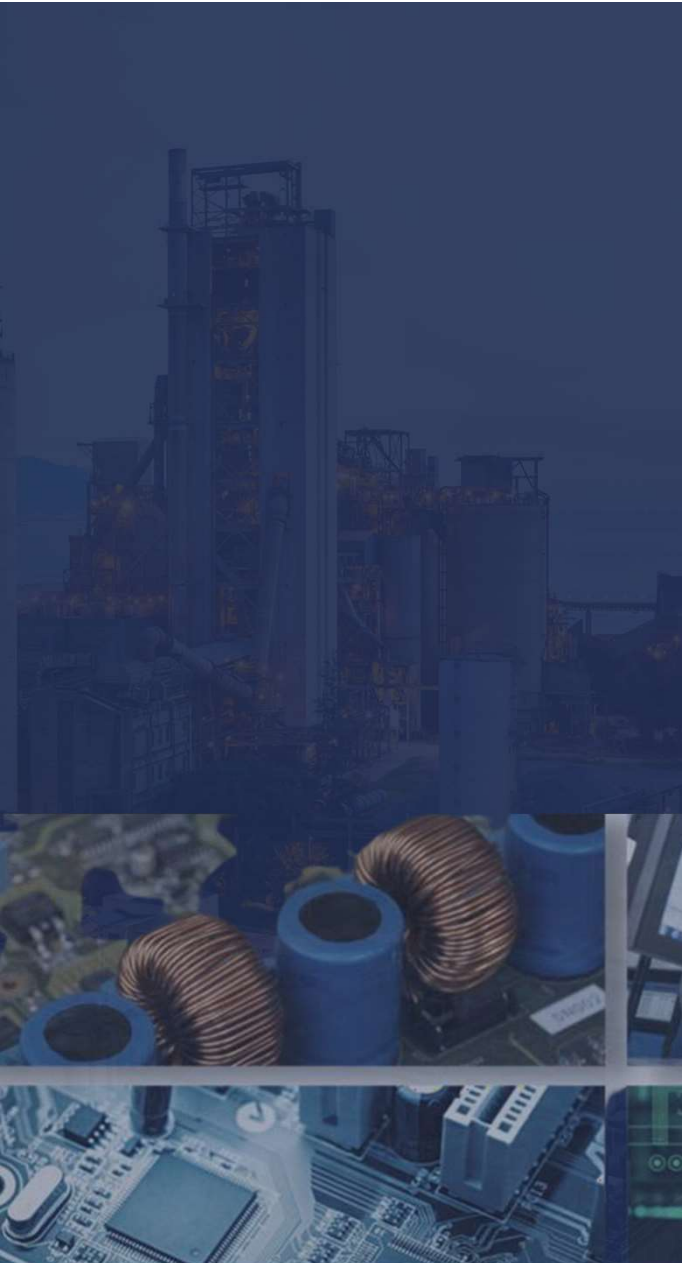
- **Renewable Energy based Minigrid Clusters in Ethiopia - REMCE**
Danida Fellowship Centre - Period: 2021 - 2024
- **Microgrid Technologies for Remote Indonesian Islands – TECH-IN**
Danida Fellowship Centre - Period: 2021 - 2024
- **Offshore Wind Farms Large-Scale Integration in Turkey - WindFlag**
Danida Fellowship Centre - Period: 2020 - 2023
- **DC Voltage Railways Catenary – DC VOLTA**
Industrial Project - Salicru S.A - Period: 2021 - 2022
- **Synchronization of Parallel Single-Phase Inverters with Power Sharing Control - Synchrony**
Industrial Project - Sonnen inc - Period: 2020 - 2022
- **Holistic and Scalable Solution for Research and Education targeting Energy Transition - ASSET**
H2020 -LC-SC3-CC5-2018 - Period: 2018-2020
- **Renewable Energy Converters Connected in Parallel - REConnect**
Industrial Project – REConvert - Period: 2020
- **Center for Data-Intensive Cyber-Physical Systems - DiCyPS**
InnovationFonden, Research Centre - Period: 2016-2021
- **Distributed Converter and Microgrid Advanced Control Algorithms**
Industrial Project - Huawei Technologies – Period: 2018-2020
- **Open Virtual Neighbourhood Network to Connect IoT Infrastructures - VICINITY**
H2020-ICT-2015 - Period: 2016-2019
- **The Energy Internet – Integrating Internet of Things into the Smart Grid**
AAU Strategi - Talent Management Programme - Period: 2017-2019
- **DCNextEve- LVDC Microgrids for Evolved Energy Communities**
H2020-MSCA-IE-IF - Individual Intra-European Fellowship



Research and Industrial Projects

Completed Research Projects

- **DCNextEve- LVDC Microgrids for Evolved Energy Communities**
H2020-MSCA-IE-IF - Individual Intra-European Fellowship
- **Off-shore Application of the Flywheel Energy Storage System - EFFICIENSEA**
InnovationsFonden and Danske Maritime Fond - Period: 2014-2018
- **Intelligent DC Microgrid Living Lab**
DSF SinoDanish - Period: 2014 - 2018
- **UPS SLC-TROY Project**
Industrial Project - Period: 2015 - 2017
- **Microgrid Technology Research and Demonstration**
EUDP SinoDanish - Period: 2014 - 2017
- **Flexible Electric Vehicle Charging Infrastructure Flex – ChEV**
SmartGrids ERA-Net (3rd SmartGrids ERA-Net Joint Call. Period: 2014 - 2016
- **Future Residential LVDC Power Distribution Architectures**
Danish Agency for Science Technology and Innovation - DFF Starting Grant Period: 2014 - 2016
- **Active filter functionalities for power converters in wind power plants**
Period: 2014-2016
- **Control and Management of Multi-Microgrid Clusters in Taiwan.**
Institute of Nuclear Energy Research - INER, Atomic Energy Council, Taiwan. Period: 2013
- **Microgrid Technology Research Based on Wind/PV/Storage Hybrid System - HyMG**
Sino-Danish renewable Energy Development Programme (RED) Period: 2013



The logo for CROM features the word "CROM" in a bold, white, sans-serif font. The letter "O" is replaced by a circular icon containing a stylized wind turbine and a solar panel, with two curved arrows indicating a clockwise cycle.

CROM

Laboratory Facilities

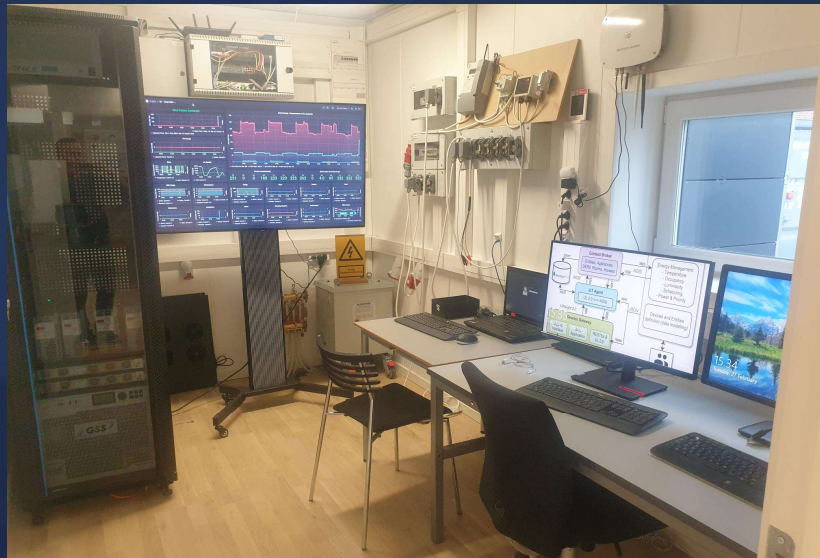
Microgrids Laboratory



Maritime and MG-HIL Laboratory



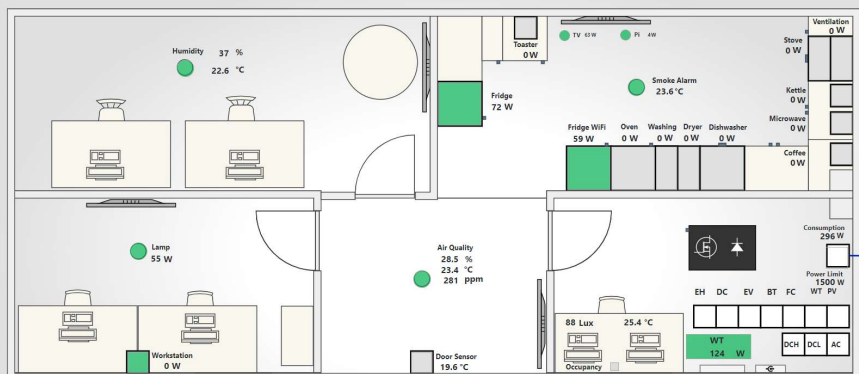
IoT Microgrid Demonstration Laboratory



The Residential Microgrid Demonstration Laboratory (IoT-MG)



Home Kitchen Living Room Office Control Room Service Config Layout



EH: Electrical Heating
DC: DC-MGLab Connection
EV: Electrical Vehicle
BT: Battery

FC: Fuel Cell
WT: Wind Turbine
PV: Photovoltaic Panels

SM: Smart Meter
DCH: DC 400 V
DCL: DC 48 V
AC: AC 230 V

National Energy System Transition Facilities – NEST

Microgrids and P2X

National Energy System Transition Facilities – NEST
NUFI - Period: 2024 – 2030

