

HYPERRIDE – Hybrid Provision of Energy based on Reliability and Resiliency via Integration of DC Equipment

Project Overview

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Key Facts



DC – AC/DC hybrid grid for a modular, resilient and highRES share grid development

- Call under Pillar 3 "Secure, clean and efficient energy" Programme "A single, smart European electricity grid"
- Innovation Action (IA), 4 years (10/2020 09/2024), 7 Mio Euro funding
- 10 partners from 6 European countries and 3 (virtually linked) demonstration sites (CH, DE, IT)
 Objectives
- Planning, operation and automation solutions (incl. operation on and separated from main AC grid)
- Development of enabling technologies (MVDC circuit breakers and sensors, DC measurement unit, open interoperable ICT platform, test and validation services)
- Fault management and cybersecurity solutions
 (protection coordination, stability assessment, automatic grid reconfiguration)
- Technology demonstration (target TRL 5-8), effective business models & knowledge transfer, recommendations for standardization/regulation bodies



Overview of Activities



- Coordination (WP 1)
- Preparation (WP 2-5)
- Execution Pilots (WP 6-8)
- Business models, regulatory consumer engagement (WP 9)
- Accompanying: Dissemination and impact creation (WP 10)





Demonstration EPFL Campus



- EPFL campus (Lausanne, Switzerland)
 - LV ACDC microgrid: Interconnection of CIGRE 15-nodes 400 Vac grid (*DESL* Laboratory) and LVDC (*PEL* Laboratory) with 4 LVDC busses up to 750 Vdc, 45 kW
 - LV AC applications: PV, BESS, EV-charging, fuel cell, supercapacitor, electrolyzer, hydro oxygen storage, heat pump
 - Research objectives:
 - Power system level: Optimal power flow, adaptive reconfiguration, protection coordination
 - Converter level: Stability analysis of AC-DC and DC-DC converters in the grid













↑ Microgrid control architecture

DC-DC Converter (DAB topology, 100kW) →

Demonstration RWTH Aachen Campus





Demonstration ASM Terni - in the field



- DSO grid ASM TERNI (Terni, Italy)
 - LV DC ACDC hybrid grid in a "living" DSO grid (connection via MV LVAC-transformers), it extends a section of the AC grid, which already includes RES, industrial and residential customers.
 - Hybrid ACDC grid applications: battery energy storage, PV array, V2G EVSE fast charging station and office loads.







Drivers for hybrid ACDC distribution grids



- Drivers for transition of AC Transmission are known (addressed by HVDC), but are not the only ones!
- There is also a need for taking care of distribution grid levels (HV, MV, LV)
- The aim is to include a high share of renewables (& storages), new high-power DC loads (mainly EV) and solutions to support sector coupling for private, industry and traffic sectors
- AC grids with standard solutions will come to their limits in the coming years
- Introduction of hybrid ACDC grids as suitable solution for technical, economical <u>and</u> environmentally friendly restructuration to achieve the decarbonisation goals
- → Drivers for transition/needed flexibility of AC distribution grids come from APPLICATION side (bottom) !
- → Consider whole value chain from utility grid till customer installations to lift max. efficiency gain !
- → DC is on the way, but more research/funding to gather operational experiences needed and involvement of manufacturers to develop key standards now for the coming 3-5 years starting with LVDC & low MVDC !



Dissemination Activities



- Continuous dissemination of HYPERRIDE through established marketing tools and communication channels, which includes website, poster, flyer, newsletter, social medias and open-access publications.
- Participation in BRIDGE platform meetings, IEEE Int. Forum Smart Grids for Smart Cities 2020, CIRED 2021, ENLIT 2021, etc.







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Further News: Published CIRED Report DC Distribution Networks - WG 2019-1