HYPERRIDE

THE FUTURE OF POWER DISTRIBUTION

HYbrid Provision of Energy based on Reliability and Resiliency via Integration of DC Equipment

Coordinator:
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Power and Renewable Gas Systems

www.hyperride.eu

@Hyperride_H2020

Project overview

October 1, 2020

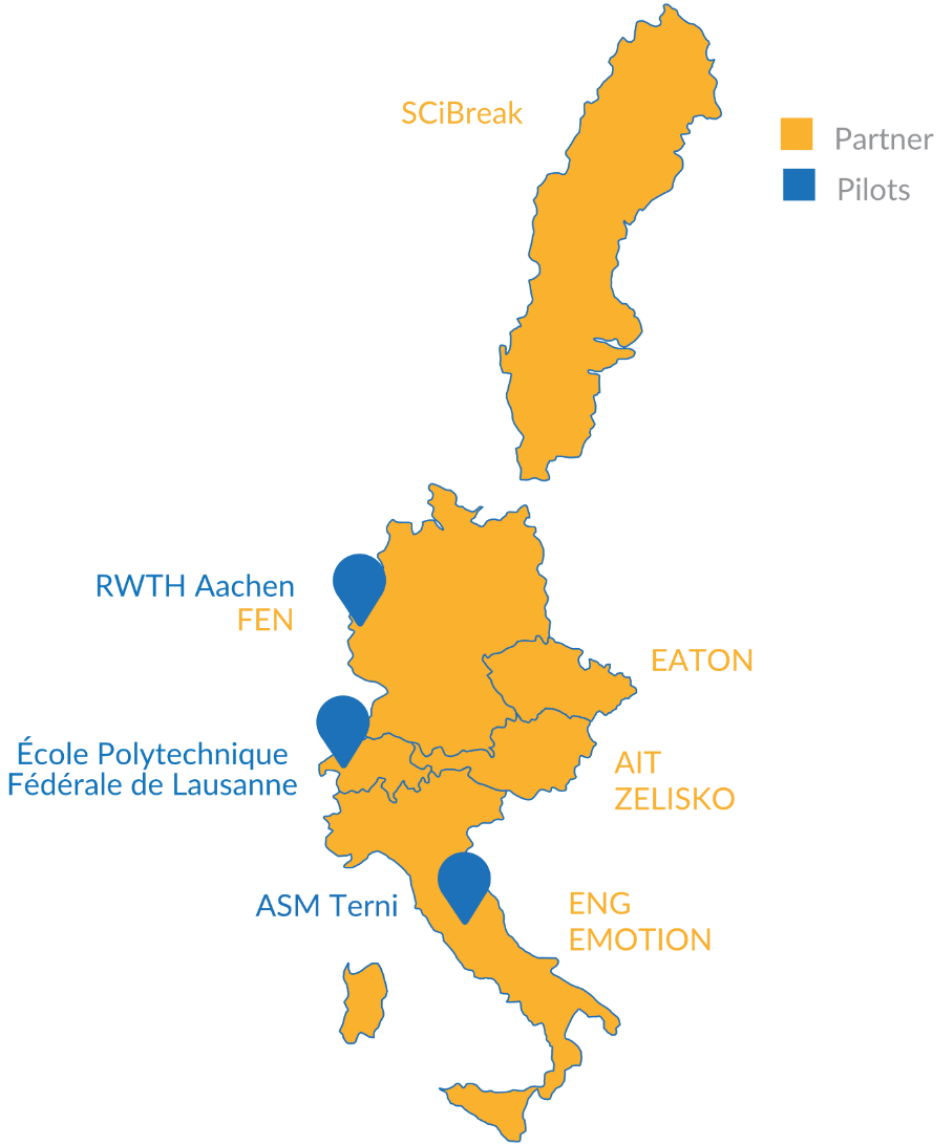
4 years

European Union Horizon 2020 Research & Innovation Programme under grant agreement No. 957788

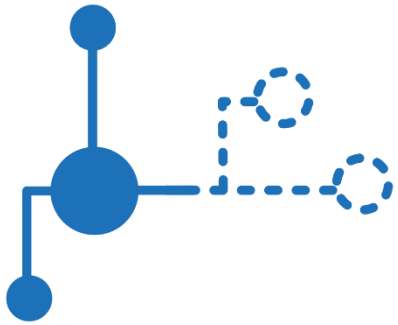
Innovation Action
Budget: 7 Million Euros

- Providing solutions to overcome barriers in the field implementation of DC and hybrid AC/DC grids for successful infrastructure concepts throughout Europe
- Demonstrate MV - LV DC - AC/DC hybrid grids (micro/nano-grids) on TRL range 5-8

Project overview



Impact and benefits



Provision of guidelines for grid planning and operation strategies of hybrid structures

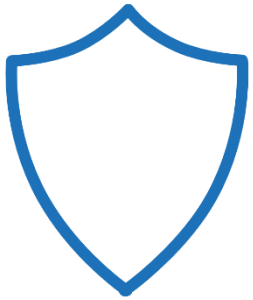
Automation solutions and algorithms of DC and AC-DC infrastructure

(including open, interoperable ICT platform)

Component solutions will showcase benefits of hybrid infrastructure

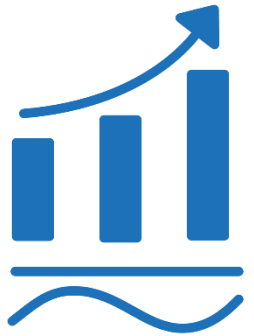
(e.g. MVDC breakers and sensors, DC measurement unit)

Impact and benefits



Safety and security solutions will ensure a resilient energy supply e.g. automatic grid reconfiguration in case of cyberattacks

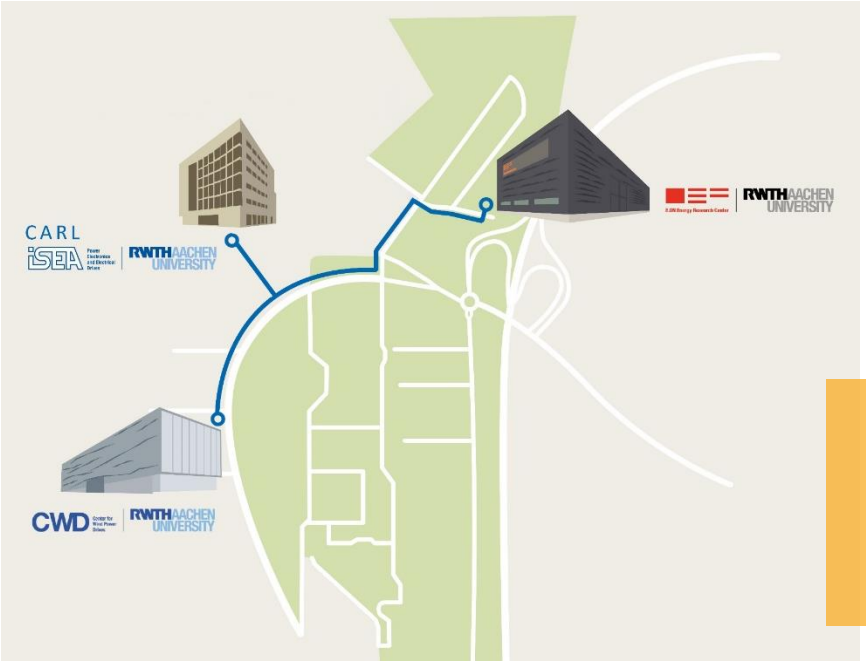
Provide feedback to enabling technologies based on demonstration experience



Enable business models along the value chain to foster market uptake of AC-DC installations

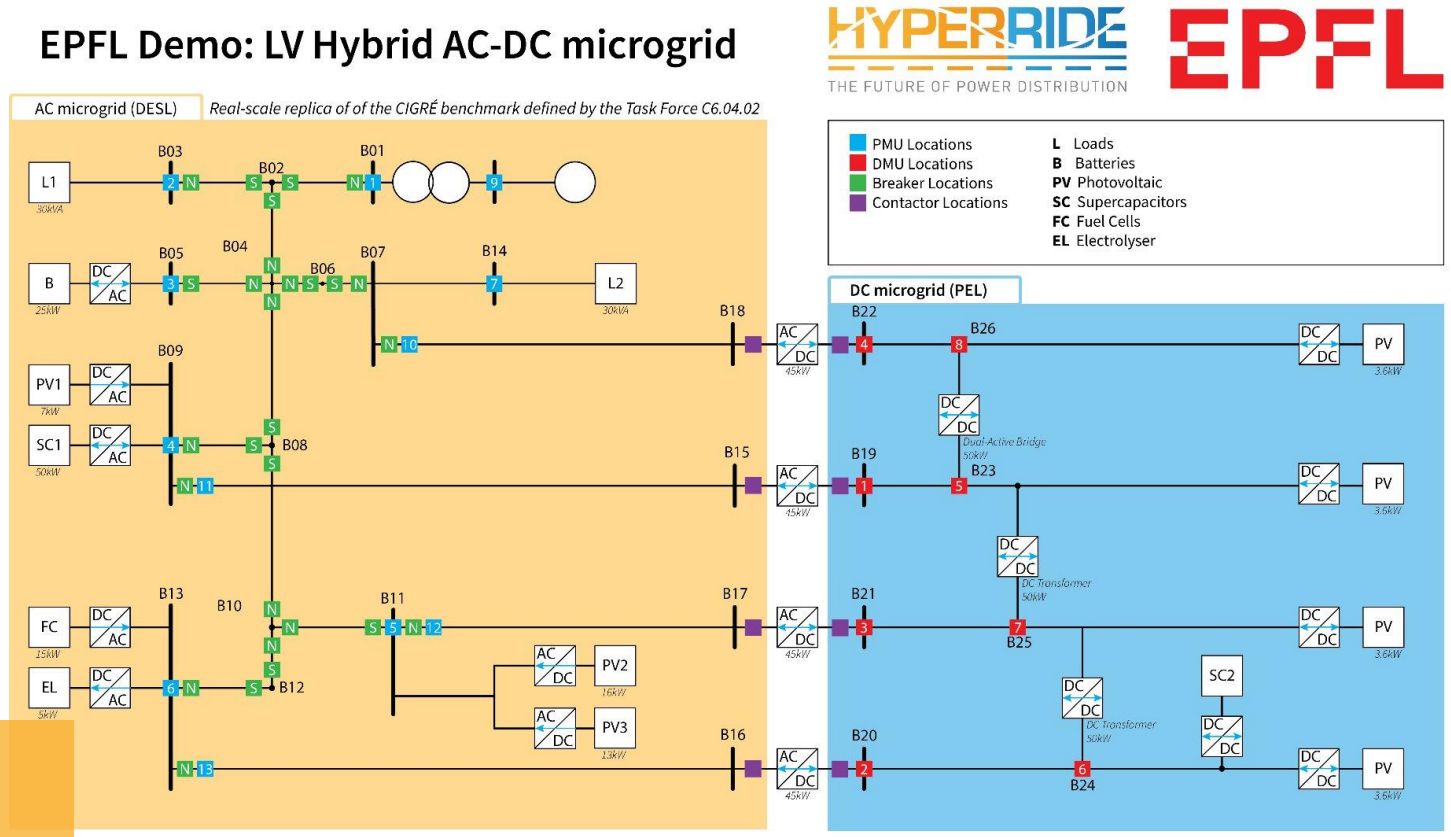
Demonstrations

- Demonstration sites in Germany, Switzerland and Italy
- Provision of 3 (virtually linked) demonstration sites in 3 different countries at EPFL, RWTH Aachen and ASM TERNI



Swiss Pilot

- Connection of CIGRE 15-node 400 Vac grid DES Lab and MV LVDC PE Lab MVDC up to 10 kVdc and 4 LVDC busses up to 750 Vdc, 45 kW
- LVAC applications: PV, BESS, EV-charging, fuel cell, supercapacitor, electrolyzer, hydro oxygen storage, heat pump
- Optimal power flow control, adaptive feeder reconfiguration, protection coordination, stability assessment



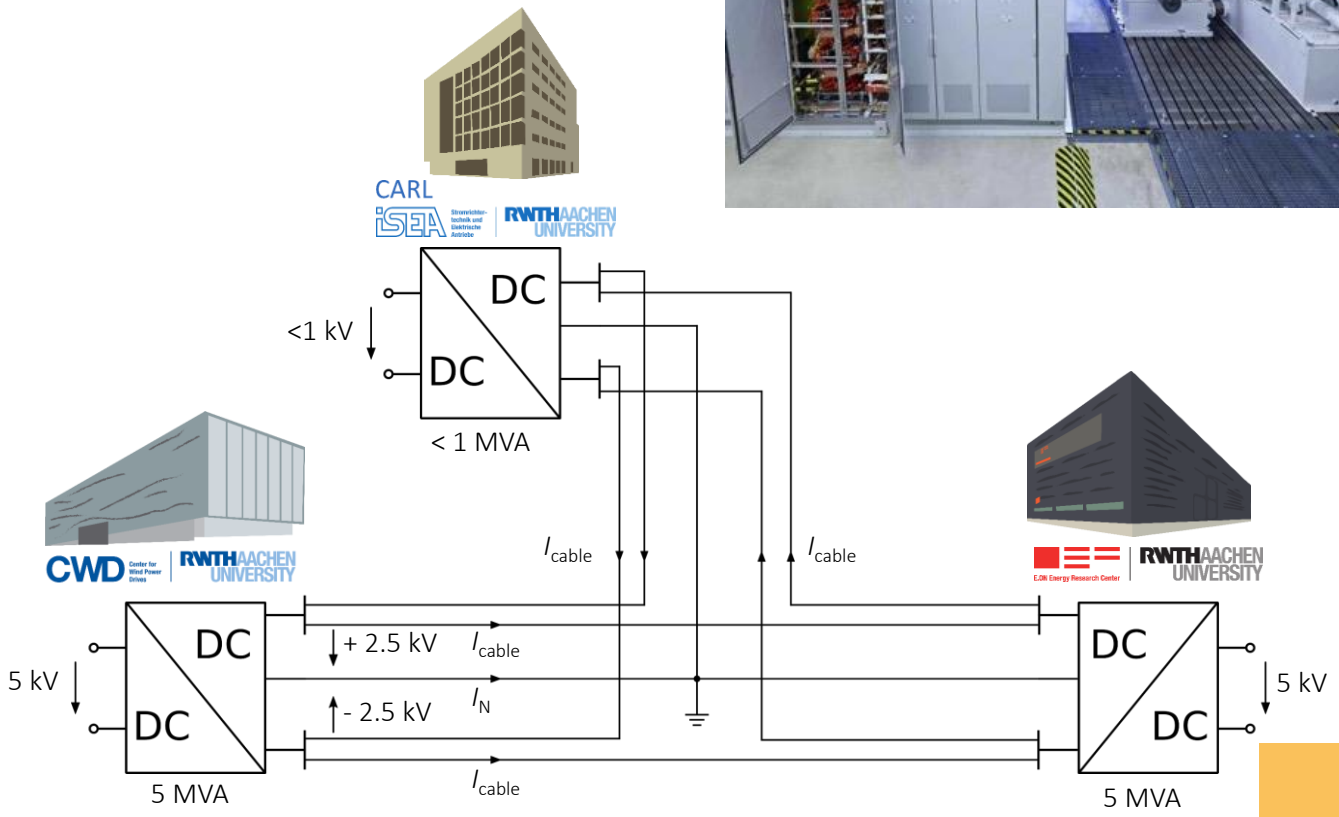
Swiss Pilot

EPFL Demonstration Workshop and General Assembly Sept. 15-16 2022 Lausanne

German Pilot

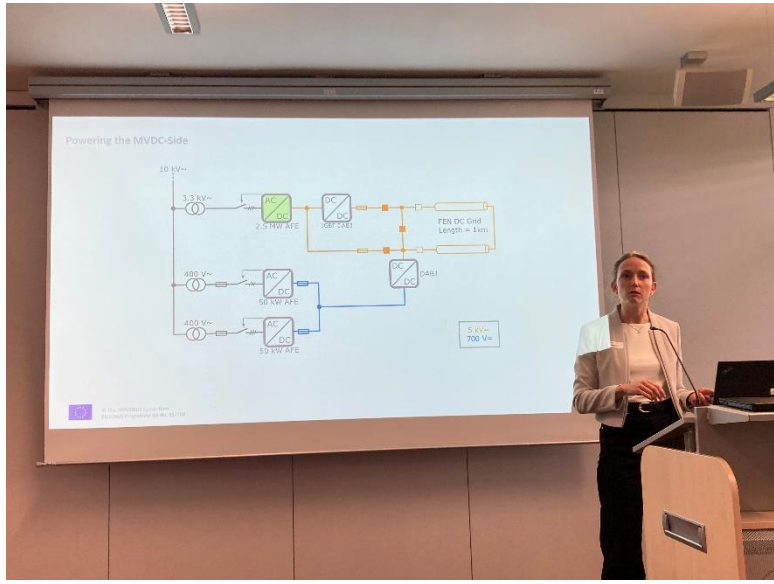
- Consists of 5 km MVDC cables connecting three different locations
- Including MVDC circuit breakers and sensors
- 5 kV(±2,5 kV) grid, MV LVDC solid-state converters in MW range, Active front end converter
- Potentially LV applications: PV, BESS and fast EV-charging stations (380-1000 Vdc)
- DC measurement units, optimal power flow, fault detection and location

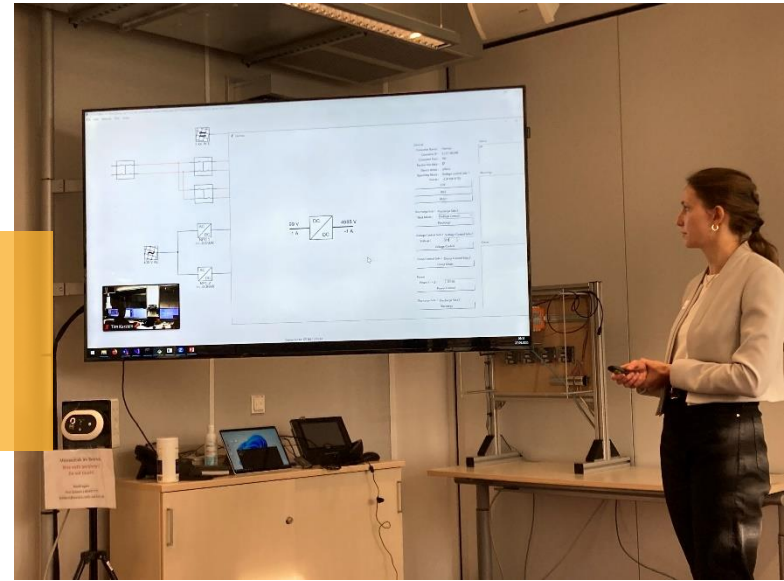
- 5 kV (bipolar ±2,5 kV)
- 6,2 MW
- 2,3 km



German Pilot

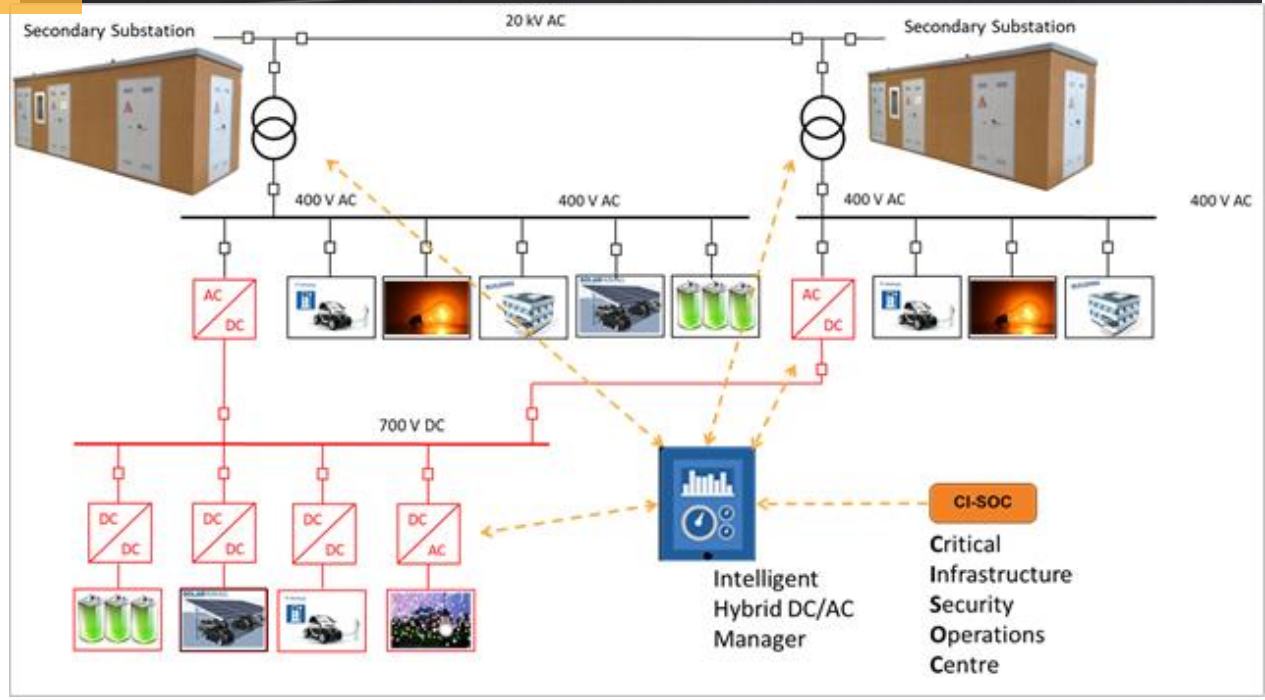
RWTH Aachen Demonstration
Workshop and General Assembly
Sept. 26-27 2023 Aachen





Italian Pilot

- LV DC –AC/DC hybrid grid in a “living” DSO network
- Modular (cellular) smart hybrid AC-DC decentralized operation of MV/LV electricity grid
- Increase grid operation efficiency, reduce reverse power flow towards MV and reduce cyber-security risk
- LVDC applications: battery energy storage, PV array, V2G EVSE fast charging station and office loads
- nearby commercial and 17 residential loads



NEFI
NEW ENERGY FOR INDUSTRY

DC PILOT

Austrian DC Pilot Factory – Green Production utilizing flexible DC-power grids with E-Vehicle bidirectional storage

Coordinator:
Gerhard Jambrich, AIT Austrian Institute of Technology GmbH
Power and Renewable Gas Systems

www.nefi.at

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Project overview

March 16, 2023

3 years

FFG
Climate and Energy Fund
Energy Model Region Call 2021 under grant agreement No. FO999901616

Experimental development
Budget: 1,7 Million Euros

- Providing solutions for flexible and scalable industrial DC grids with PV-plants and E-vehicle bidirectional storage
- Demonstrate LV DC – industrial grids (micro/nano-grids) on TRL range 5-8 at a manufacture-site in Austria as first pilot

Project overview

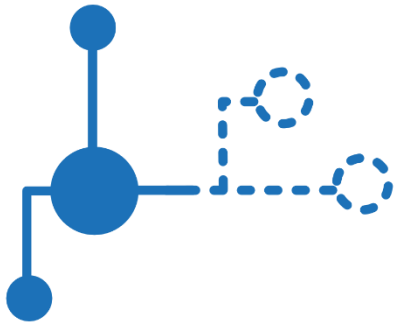
Demonstrations
Partners

Assoziiert:
OVE DC Initiative
Innovation Consult (Dr. Hansjörg Hauer)

Italy (Apulien)

Climate and Energy Fund
Energy Model Region 2021 GA No. FO999901616

Impact and benefits



Provision of guidelines for grid planning and operation strategies of flexible and scalable industrial DC grids with PV-plants and E-Vehicle bidirectional storage

Automation solutions and algorithms of industrial DC infrastructure

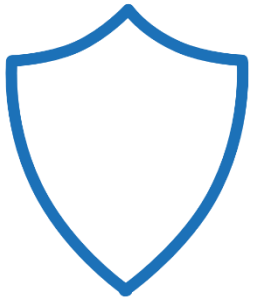
(including energy management IT platform)

Component solutions will showcase benefits of industrial DC infrastructure

(e.g. bidirectional DC-powered EV fast charging station)

Climate and Energy Fund
Energy Model Region 2021 GA No. FO999901616

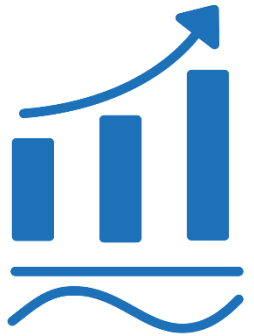
Impact and benefits



Safety and security solutions will ensure a resilient energy supply

Implementation of novel high-power solid-state LVDC breakers

Provide feedback to enabling technologies based on demonstration experience

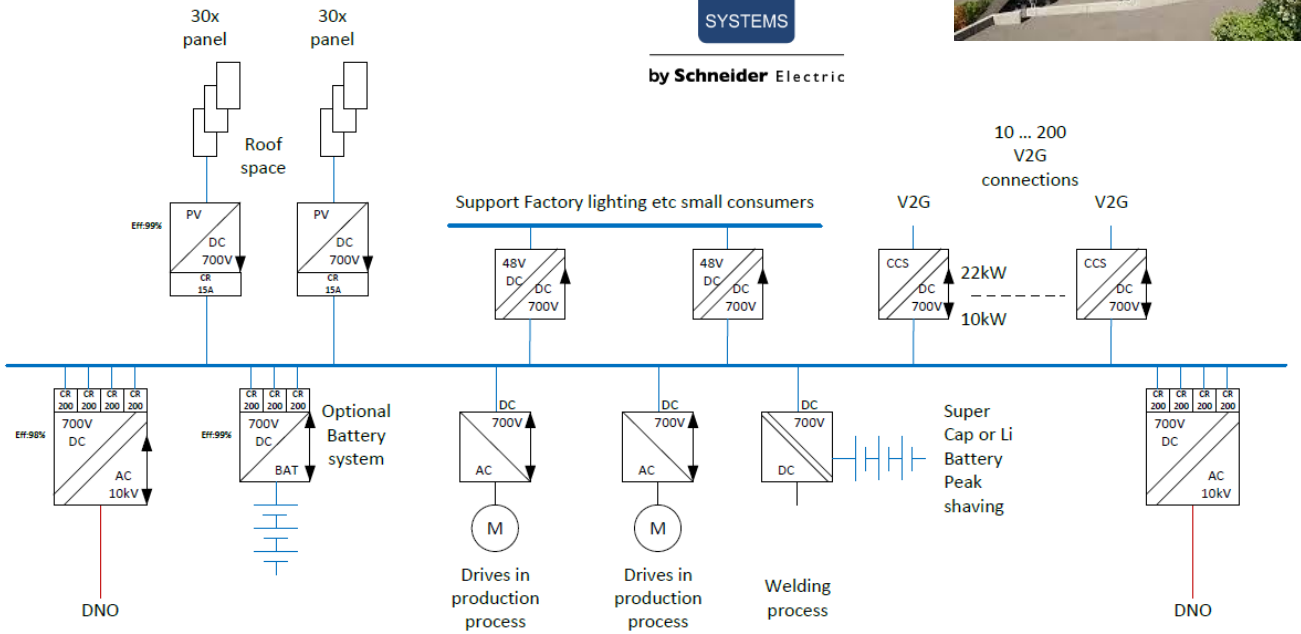


Enable business models along the value chain to foster market uptake of industrial DC installations

Climate and Energy Fund
Energy Model Region 2021 GA No. FO999901616

Fill Pilot

SYSTEMS
by Schneider Electric



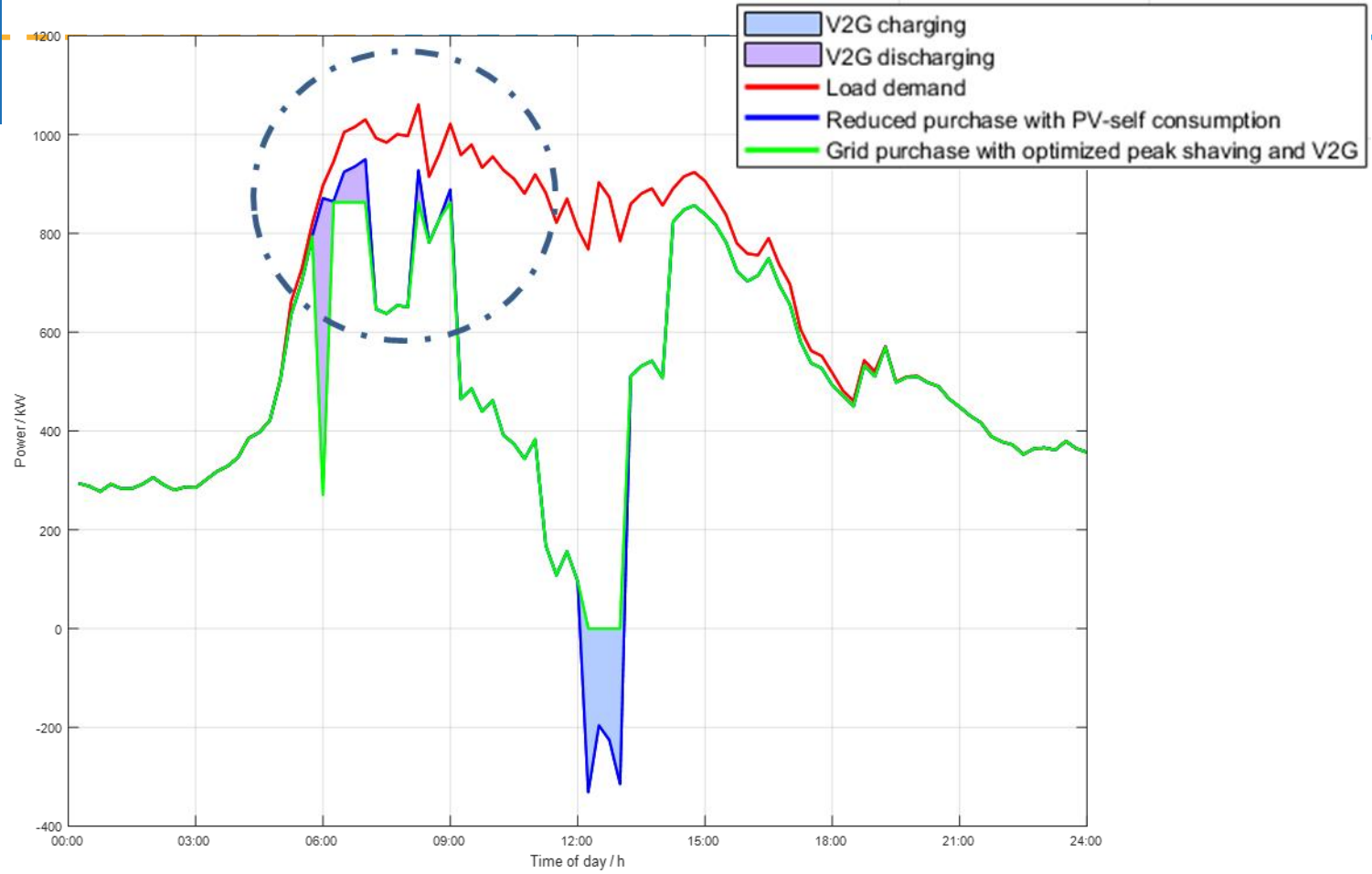
- Demo with 700 V distributed industrial DC grid installation:
- Connect up to 3 PV strings 10 kW each (roof)
- Integration of FILL Sycromill H machining center (2 spindles, 7 motor moduls, 80 kW active line module)
- 50 kV DC-DC bidirectional E-Vehicle fast charging station
  output: 50-500 V (max. 900 Vdc)
  1xCCS COMBO2, 2xCHADEMO

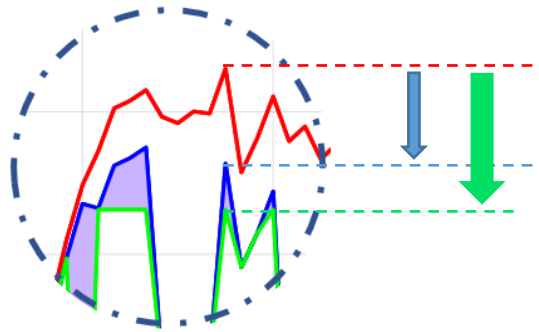
Climate and Energy Fund
Energy Model Region 2021 GA No. FO999901616

Fill Pilot

FILL Use-Case (including V2X):

- Simulation example (real data of selected summer day)
- on-site electricity demand with existing fluctuating 1,4 MWp PV plant
- 40 additional employee E-Vehicles 50 kWh each arrive 6am and leave 3pm, both with 50% SoC
- Benefits: optimized V2X charging operation (to be evaluated):
  +/- peak power reduction (FILL & utility)
  increased on-site self-consumption &
  CO_2 savings and machines total uptime





Peak load

Reducted purchase (PV)

Reducted purchase (PV + V2G)

Climate and Energy Fund
EU H2020 Programme GA No. 957788
Energy Modellregion 2021 GA No. 7099901616

Pilotfabrik TU Wien Pilot

2nd Demo with 700 V distributed industrial DC grid installation:

- @ TU Wien Pilotfabrik Industrie 4.0, Vienna, based on FILL Demo grid
- Integration of flexible, modular robot application (BECKHOFF)
- 50 kV DC-DC bidirectional E-Vehicle fast charging station, PV emulator
- Benefits: optimized V2X charging operation (to be evaluated): increased system energy & resources efficiency, machines total uptime and occupational safety

Climate and Energy Fund
Energy Model Region 2021 GA No. FO999901616