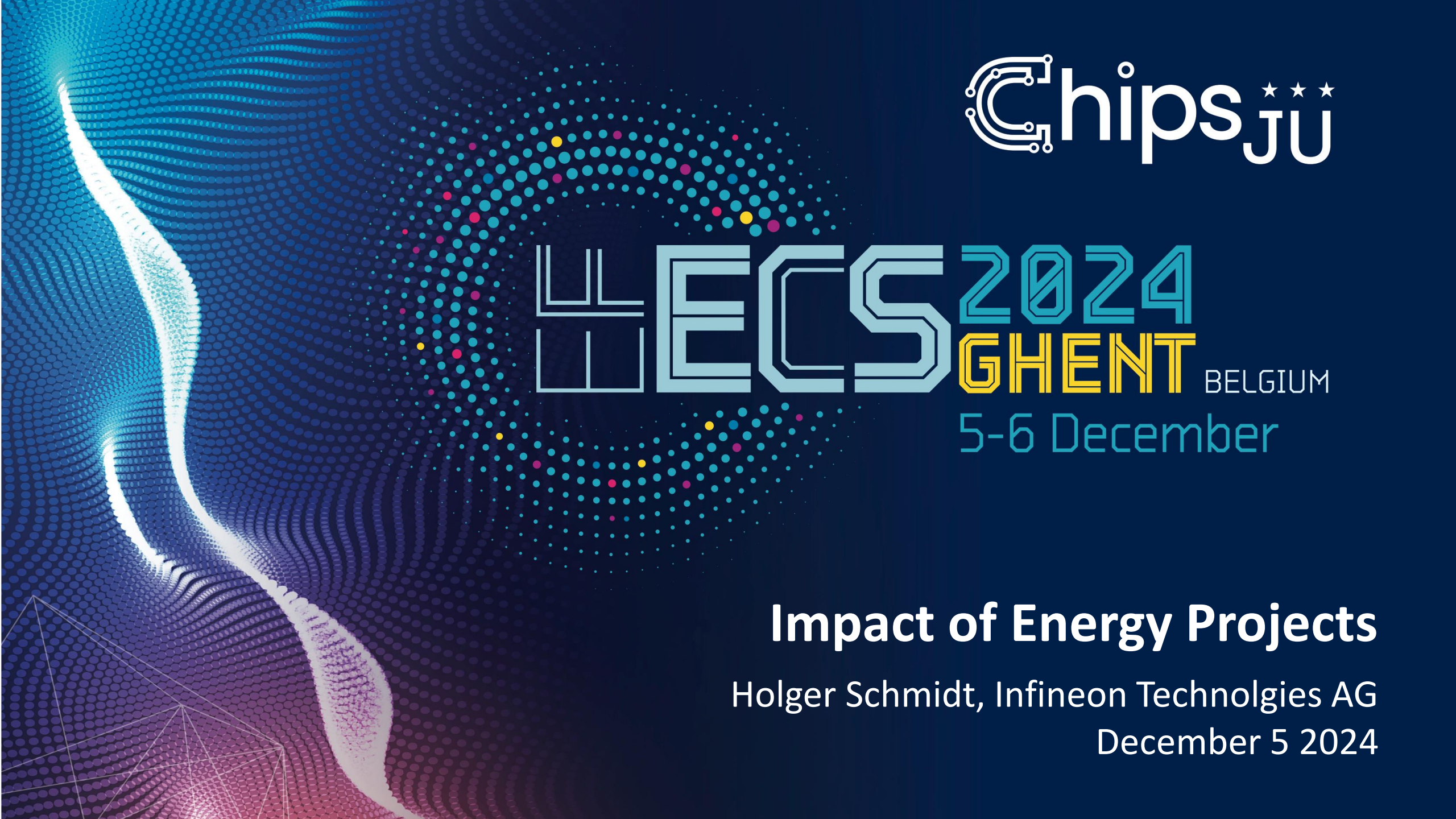
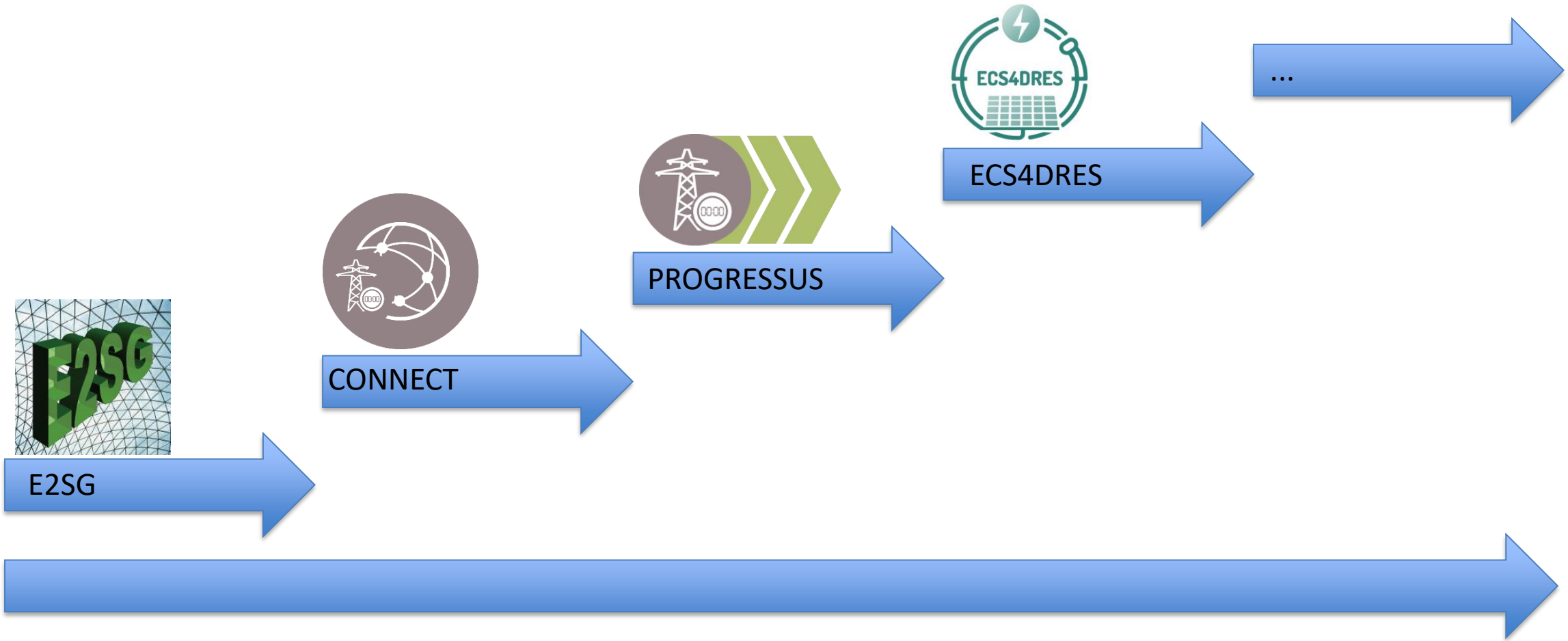


Impact of Energy Projects

Holger Schmidt, Infineon Technolgies AG

December 5 2024

JU‘s Energy Projects

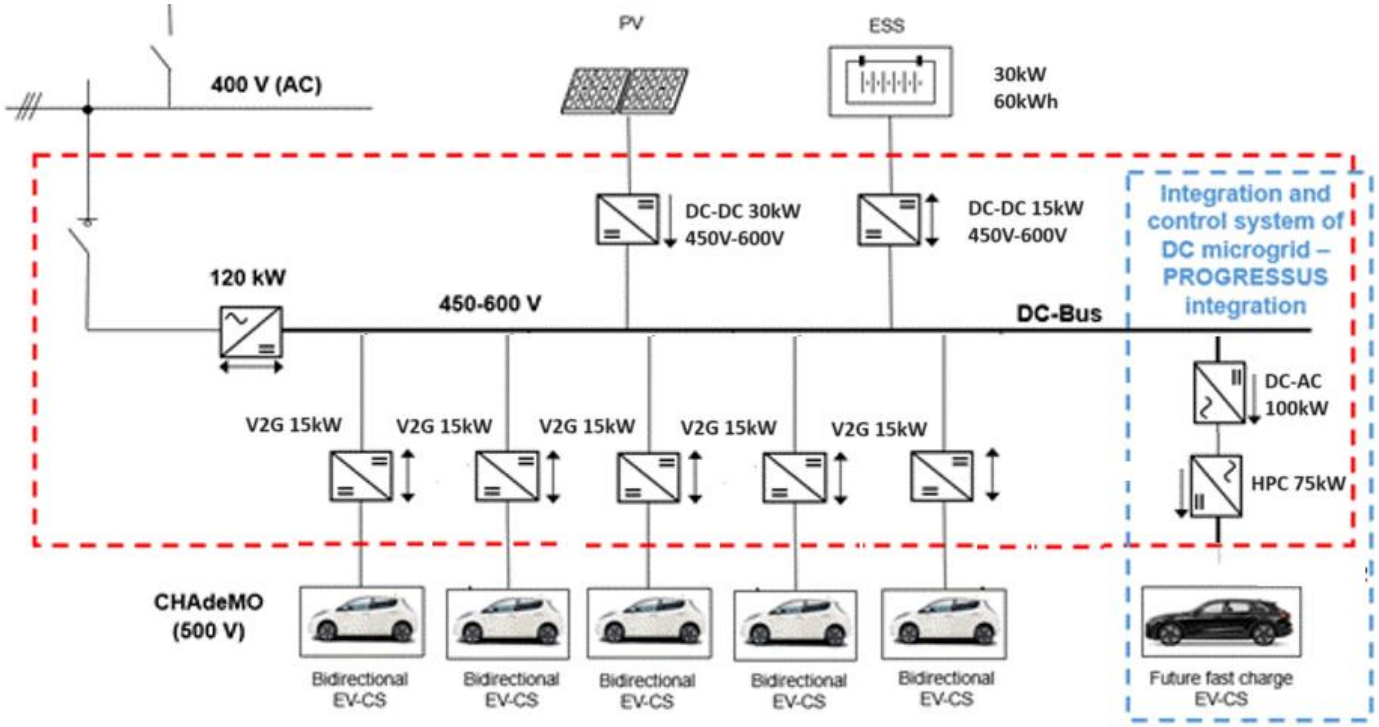


Main Areas of Work & Objectives

Microgrid Energy Management

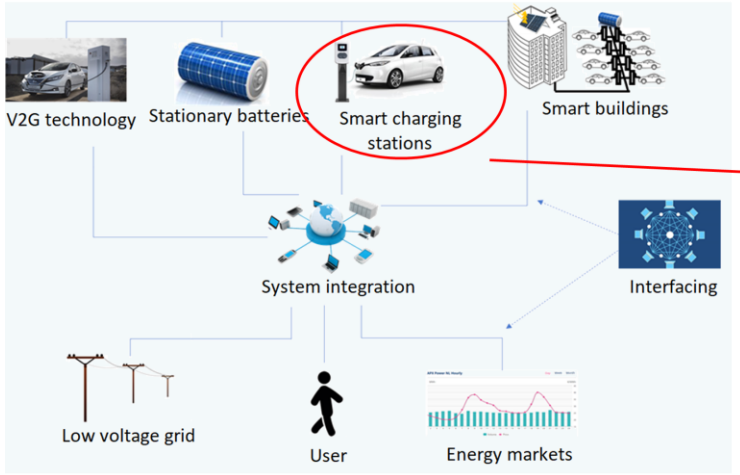
Politecnico di Bari

enel way

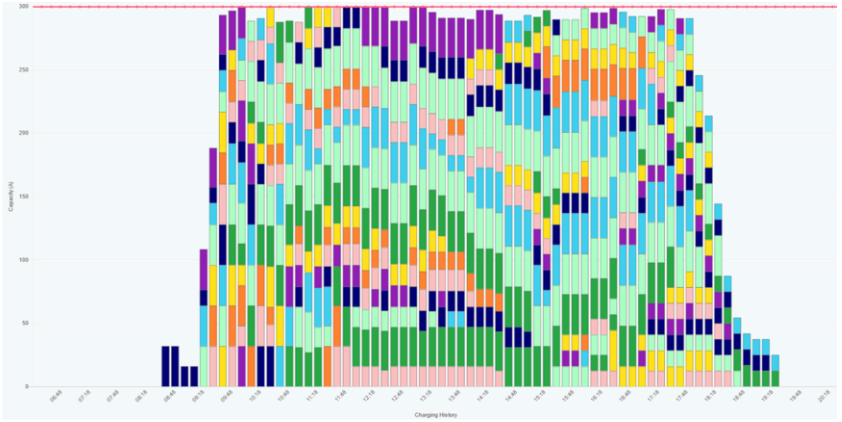


- Microgrid energy procurement cost reduction: 20-30%
- Peak reduction to the distribution grid 8 – 15%

Charge Station Management



Ability to create an energy management system by making decisions based on multiple inputs



Cloud-based smart charging of electric vehicles

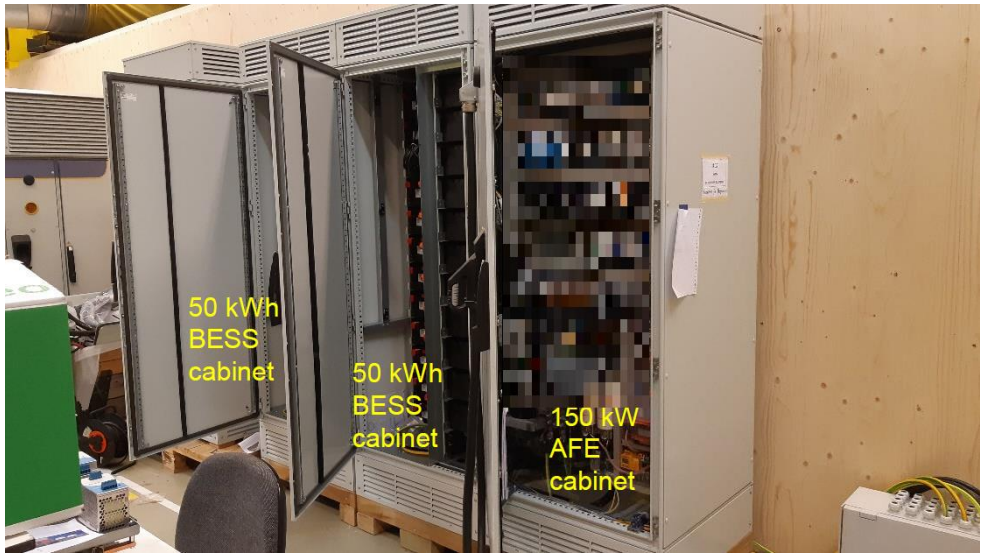
- Ability to control charging power of EVs
- Possible to place more chargers on the same location for both AC and DC charging (up to 10x more for AC charging)
- Possible to utilize EV charging to stabilize the electricity grid
- Prevent grid congestion
- Support (inter)national balance

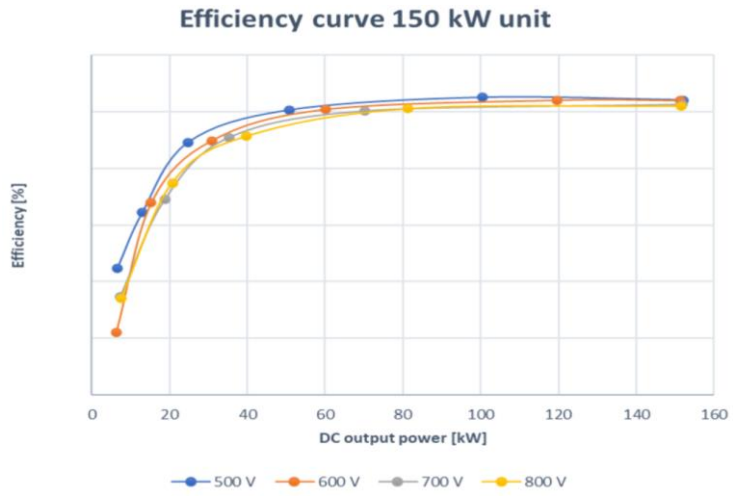
- Installation utilization improvement – up to 10x more AC chargers
- Peak power reduction of up to 70% for specific scenarios
- Contributions to OCPP and OCPI

Funding Projects Impact

- Founded in 2011
- 5 employees in 2015, ~50 employees in 2020, >100 employees now
- Projects like CONNECT, PROGRESSUS and ECS4DRES have significantly helped GreenFlux to grow and thrive in the emobility market.
- Especially in the early days projects like CONNECT and PROGRESSUS allowed GreenFlux to survive as a company financially as well as to research new products.
- ECS4DRES allows GreenFlux to dive into more complex, risky and challenging topics as well.
- Algorithms developed in PROGRESSUS and especially CONNECT are really making a real-life impact, with over 10.000 charge points utilizing the technology developed there, and this number is growing rapidly!

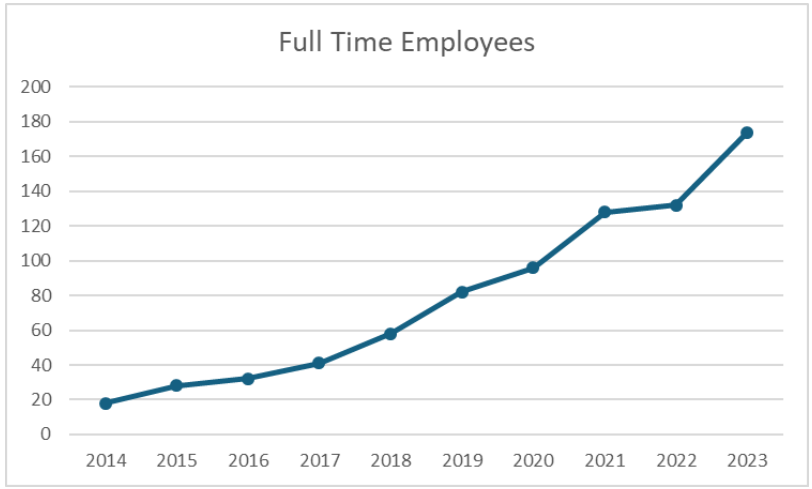
Power Conversion for Trucks/Buses

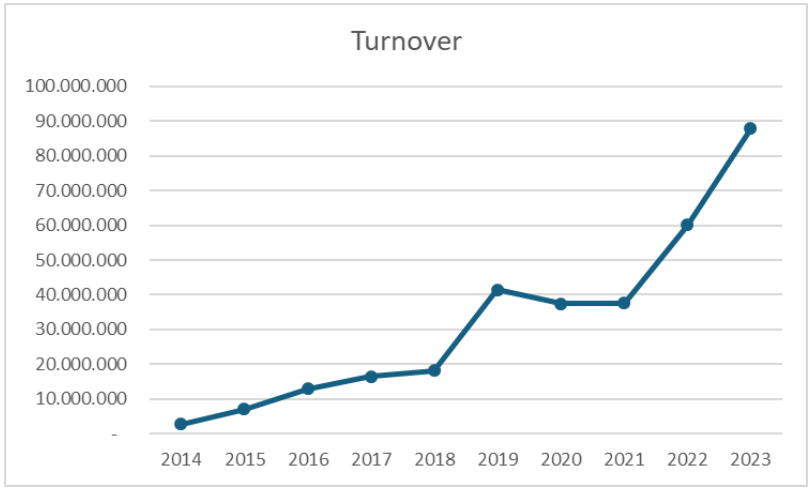




- Peak power drawn from the grid reduced by 67%
- Cost and size reduction by about 20%
- Conversion efficiency peak 97%, above 95% for a large operating range

Funding Project Innovations





- High power fast chargers enabled for smart grids
- Integration of BESS into the (smart) charging infrastructure
- Bidirectional power conversion technology
- Power conversion technology capable of reactive power compensation
- SiC based high efficient bidirectional fast charging technology

Charging Station with Load Buffering Battery

CEUS

FAU Friedrich-Alexander-Universität Technische Fakultät

Infineon

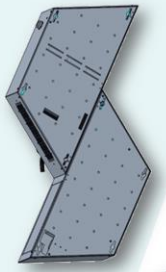
Integration and design of a highly efficient DC charging station with integrated peak battery buffer

CEUS – Battery / Integration

PEAK POWER – MODULAR – EFFICIENT

Key Hardware Facts
- Designed highly integrated modular charging station
- Designed sealed thermal management of power electronics
- Test with different geometric cell types
- Reducing temperature of battery tap hotspot

Innovative Technology
- Modular setup with battery storage
- Deployable in extreme environments
- New parameter set for direct laser welding of batteries
- Geometry features for laser welding to reduce
- thermal influences of the process



Two stage converter design to fulfill isolation requirements and charging standards with Bidirectional power transfer to enable storage capability of renewable energies

FAU – Power Electronics

Key Hardware Facts
- 50 kW nominal output power
- 97% target efficiency of each converter stage
- 11 kW/l power density of H-bridge converter
- CCS output voltage range up to 1000 V and current range up to 60 A

Innovative Technology
- Novel IFAG SMD power modules with high power density and low switching losses
- High bandwidth, high resolution inductor current sensing devices provided by Infineon
- Highly integrated planar power inductor

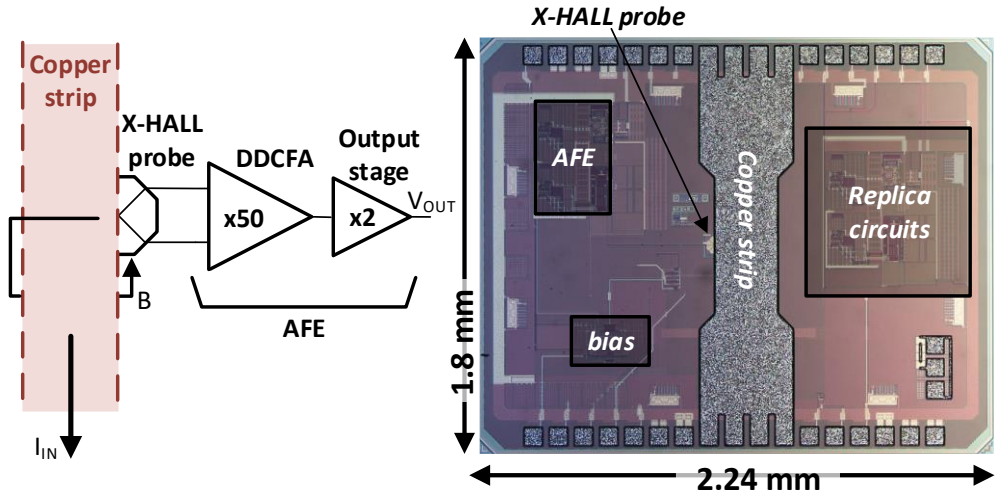
Highly efficient DC/DC converter

for DC fast charging DC Microgrids

Current Sensing

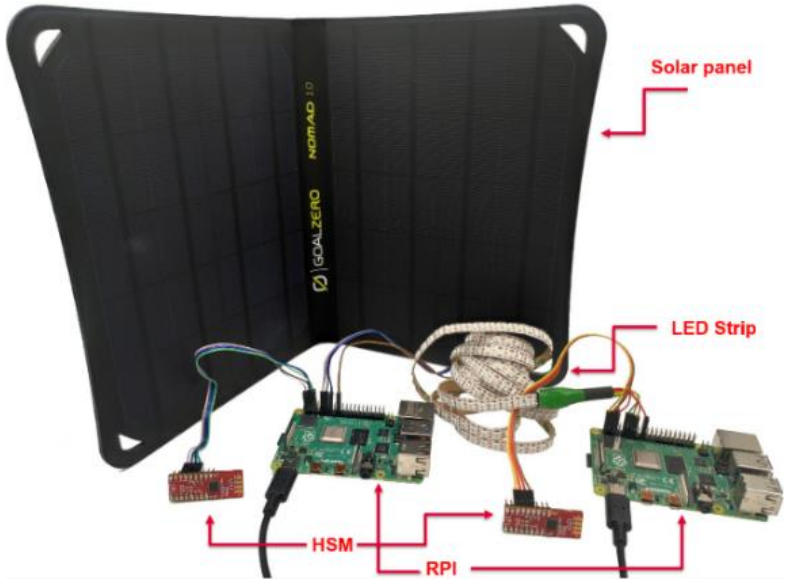
life.augmented

ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA



- Intrusion less (hall sensor)
- Bandwidth 12 MHz
- Power consumption < 11.6 mW
- Noise/Power/Bandwidth 569 MHz/A mW

Secured Smart Grid



- Hardware based security combined with blockchain
- Smart contracts, e.g. pricing, tracing energy from the source to the consumption, green certificates

Impact on the beneficiaries

- Collaboration industry / academia: e.g. Heliox / TU Eindhoven; ...
- International Collaboration: e.g. TH Cologne / Devolo / Greenflux; ...
- SMEs: Heliox, Greenflux, CEUS, Longvision, IQU, RDAS, ...
- Technological competitiveness
- Scientific recognition

Scientific / Technological

- Novel energy management algorithms
- Advanced power converter concepts
- Improved integration of storage and renewables (PV)
- High performance current sensing
- Hardware based security

Exploitation / Economical, Educational

- Components: secure elements, sensors
- Appliances: converters, communication gateways, security solutions
- Software: smart energy management
- Services: micro grid & charge station management
- Education: enhanced lectures (e.g. on power electronic and energy)

Impact to EU Green Deal / Societal

- EU climate targets and energy framework targets
- ETIP SNET R&I Implementation plan
- Lower dependency on fossil fuels
- Healthier environment through use of renewables & electrification of mobility
- Affordable, efficient, sustainable, resilient energy supply

Thank you