THE PROGRESSUS PROJECT – HIGHLY EFFICIENT AND TRUSTWORTHY ELECTRONICS, COMPONENTS AND SYSTEMS FOR THE NEXT GENERATION ENERGY SUPPLY INFRASTRUCTURE

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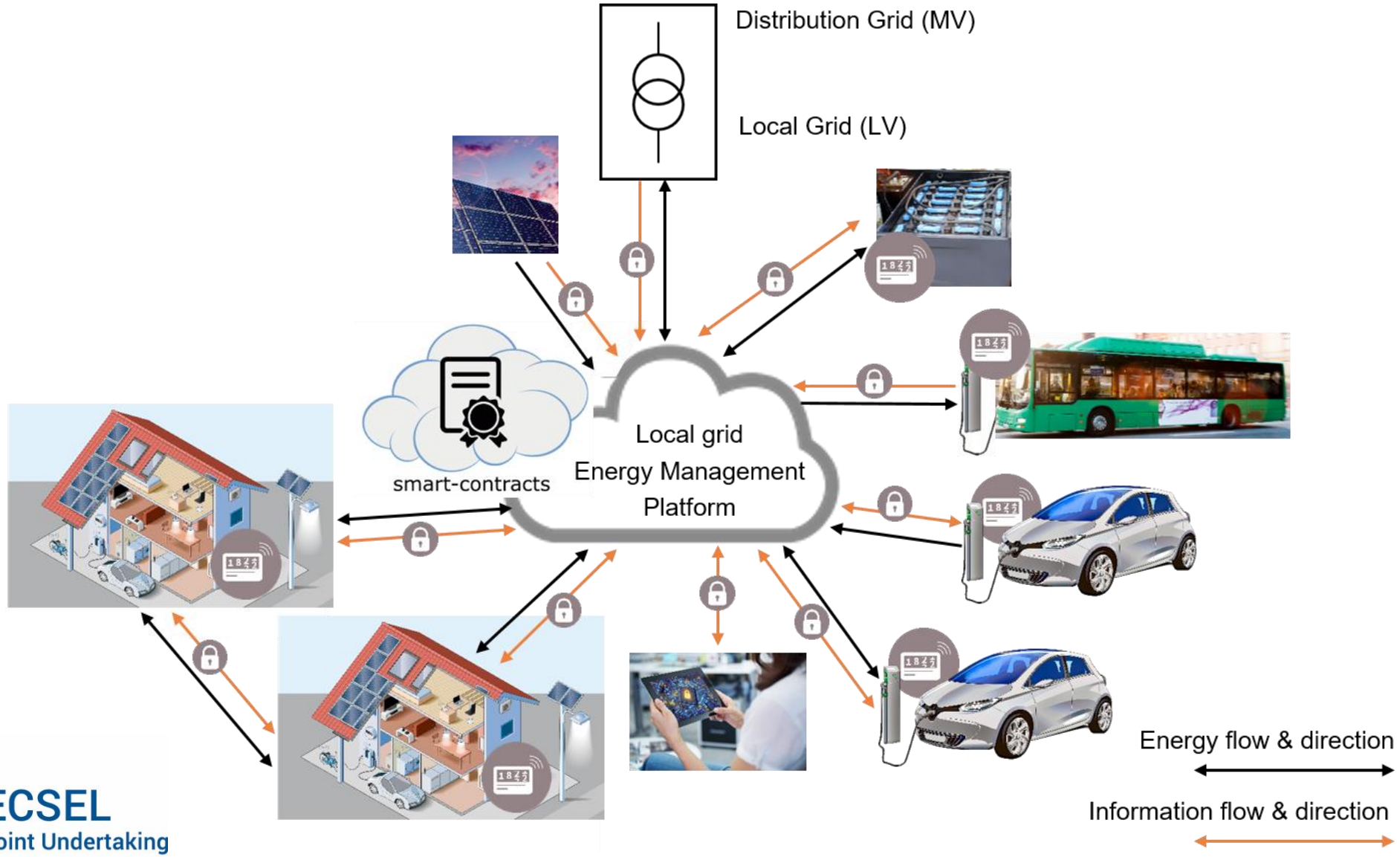
Key Figures

- Grant agreement no 876868
- Start: April 1st 2020; Duration 42 months
- Overall Budget: € 19 575 959,75
- EU contribution: € 5 785 389,68
- Coordinator: Infineon Technologies AG
- Web: www.progressus-ecsel.eu / https://cordis.europa.eu/project/id/876868

Consortium

Partner	Power Conversion	Energy management	Metrology & Monitoring
IFAG	**LE**	**LE**	**LE**
DEVOLO		**SME**	**SME**
MM			**SME**
CEUS	**SME**		
FAU	**R**	**R**	
THK		**R**	
ELAAD	**SME**		
HELIOX	**SME**		
GREENFLUX	**SME**	**SME**	
TUE	**R**		
TUD	**R**	**R**	
IQU		**SME**	
HESS		**SME**	
CTTC		**R**	
LEITAT		**R**	**R**
ST-I	**LE**		**LE**
ENELX	**LE**	**LE**	
POLIBA		**R**	
IUNET	**R**	**R**	**R**
UNIME	**R**		
STUBA	**R**		**R**
RDAS			**SME**
EXW	**LE**	**LE**	

Scope



Objectives

- Support the European climate and energy framework key targets
- Facilitate the mass deployment of EVs and RESs
- Reduce the peak demand from the supply grid by at least 30%
- Increase efficiency / reduce losses
- Plug seamlessly into existing installations

Research Areas

- Power Conversion
- Bidirectional, Controllable
- Wide Bandgap Semiconductors
- Efficiency

- Advanced energy management of (micro)grids
- Renewable sources, storage
- Peak shaving
- Demand Supply Balancing

- Monitoring
- Sensing
- Communication
- Security

Power Conversion
Charging station with load buffering battery

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

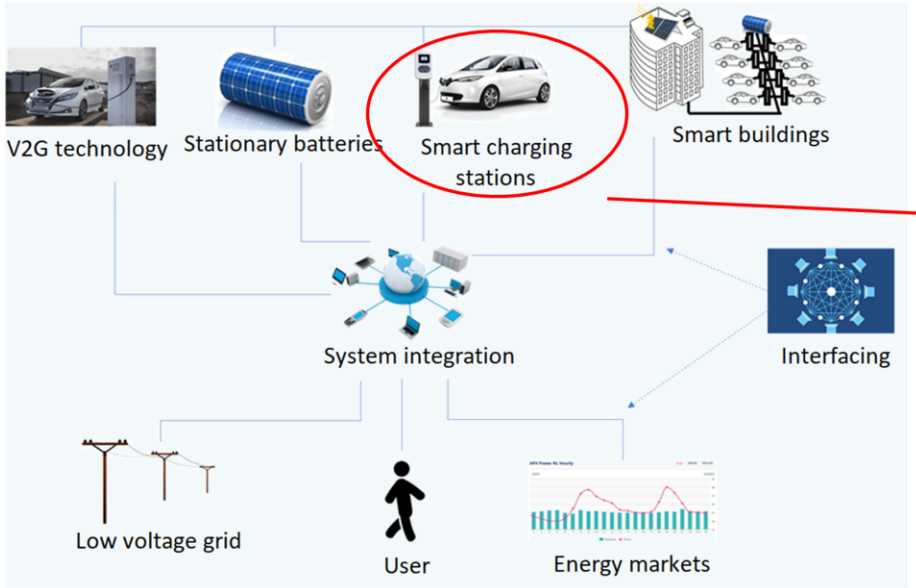
FAU – Power Electronics

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

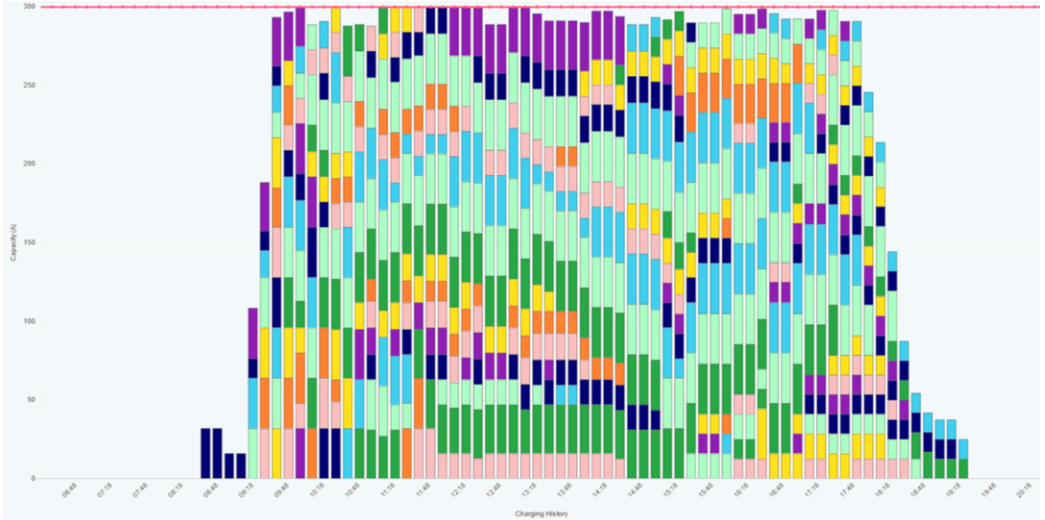
Innovative Technology
- Novel IFAG SMD power modules with high power density and low switching losses
- High bandwidth, high resolution inductor current sensing devices provided by Infineon
- Highly integrated planar power inductor

Highly efficient DC/DC converter
for DC fast charging DC Microgrids

Energy Management
Charge station management system for EVs



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

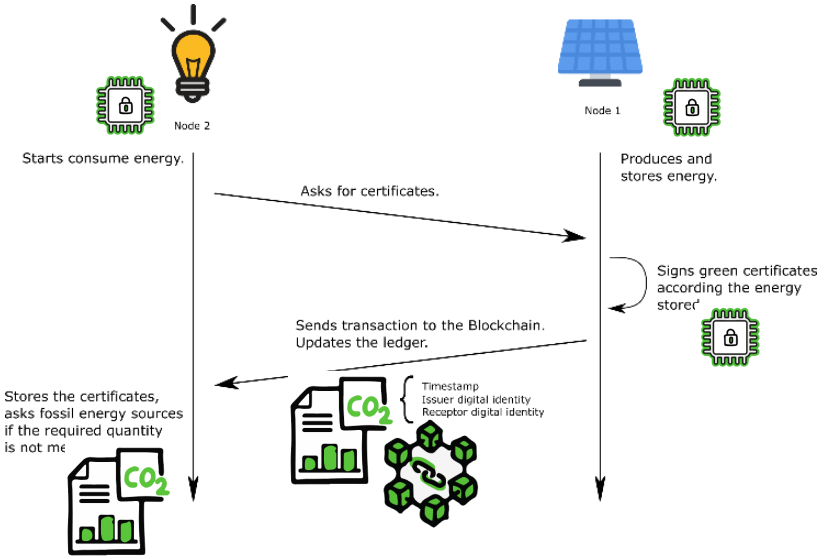
Security / Smart Contracts
Tradable green certificates

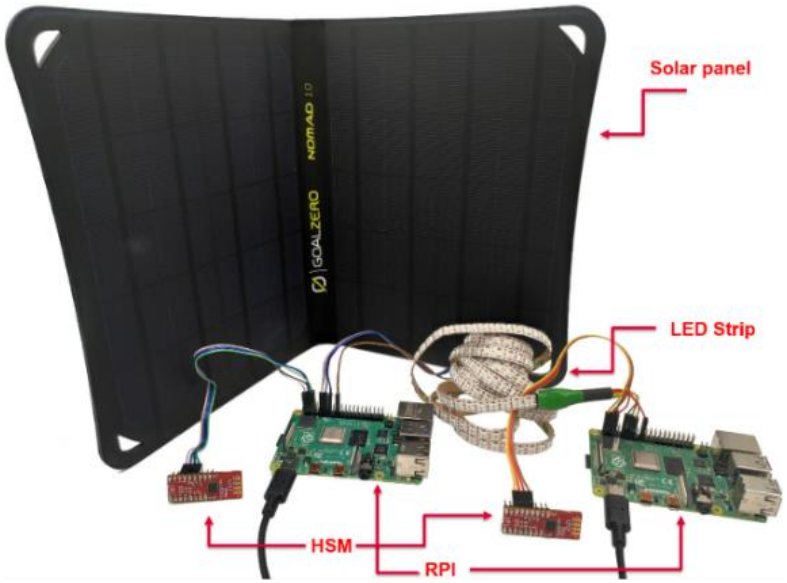
- Authenticity and
  Data Integrity across market players

Secure Element protected digital ID of devices

Secure signature as proof of green energy origin

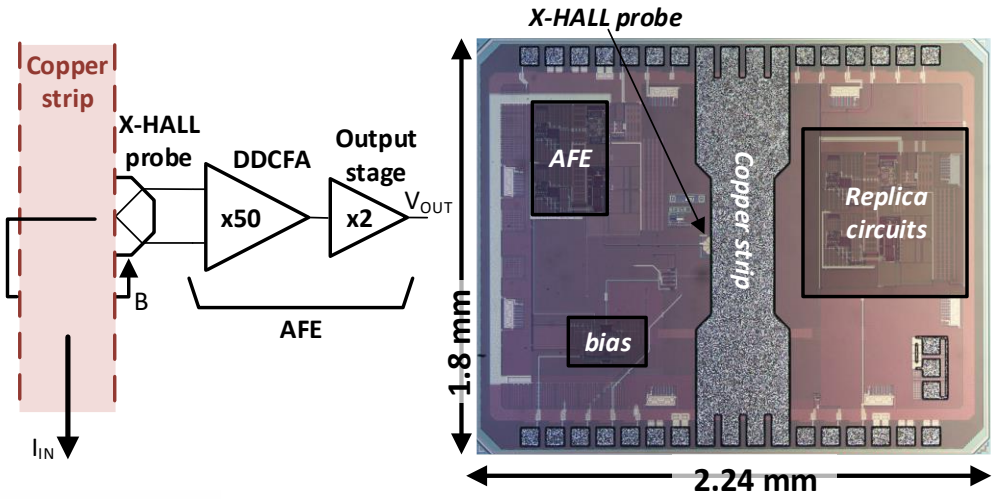
Secure transaction/NFT as vehicle of certificate trading

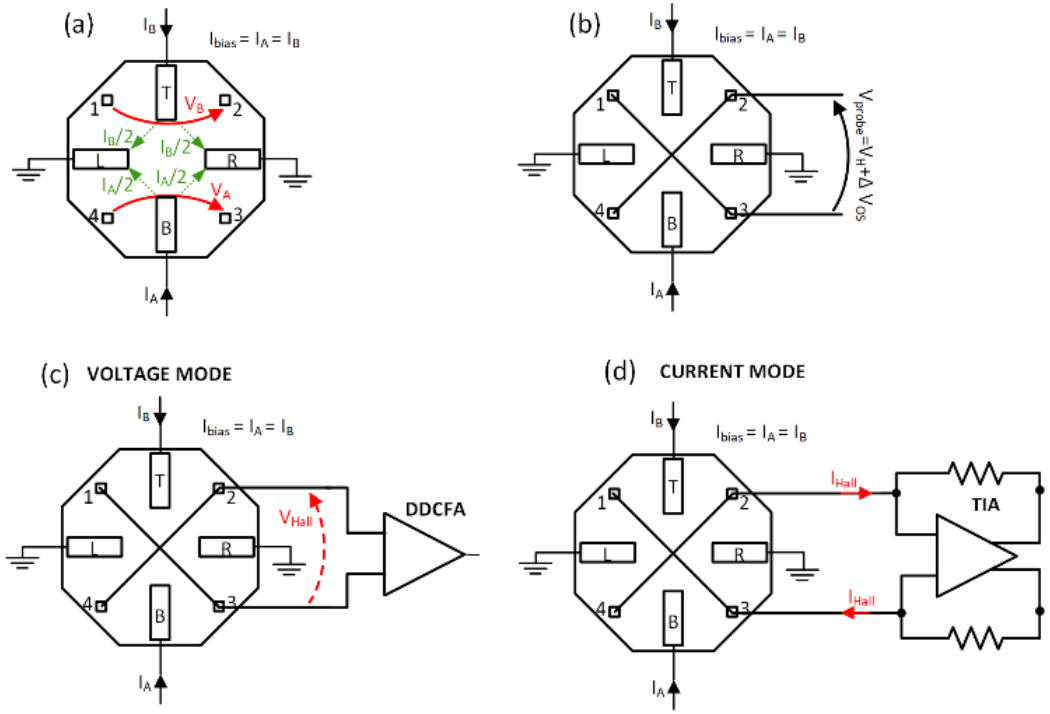




Sensing
Broadband hall sensor

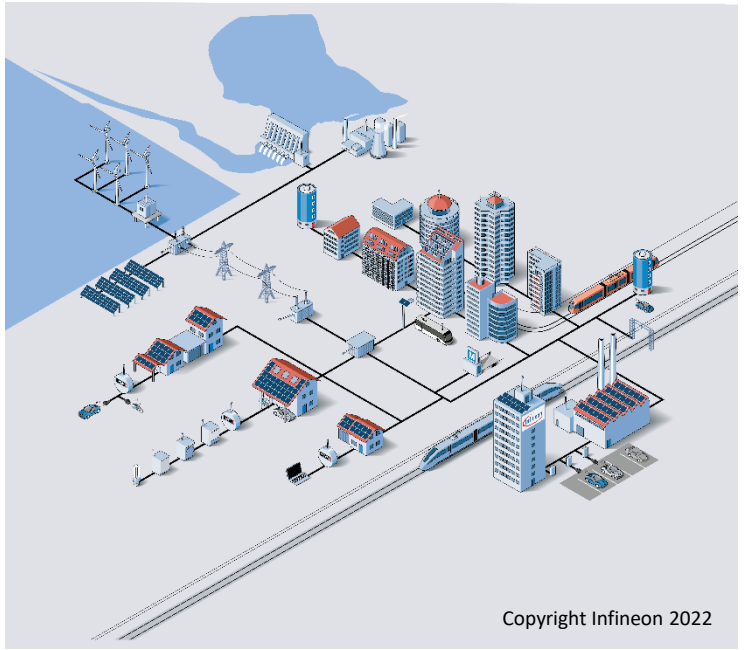
- Intrusion less
- Bandwidth ≥ 10 MHz (SotA is 3 MHz) -> 12 MHz ACHIEVED
- Power cons. < 12 mW (SotA is 19.5 mW) -> 11.6 mW ACHIEVED
- 569 MHz/A mW (SotA is 22.5)
- DC bias & Passive offset reduction





Challenges

- „Multi-modal“ supply
- Demand Supply Balancing
- Power quality
- Grid / Appliances Utilization
- Certification of energy
- Safety, Resilience, Security



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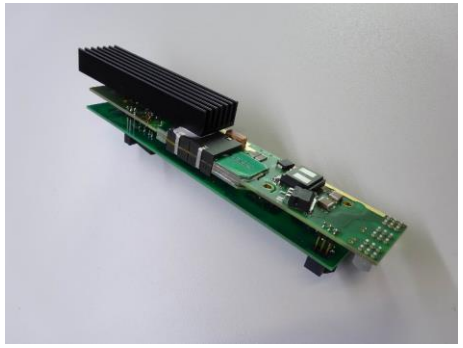
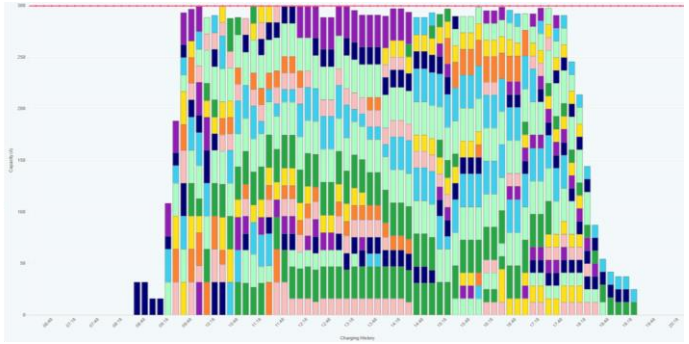
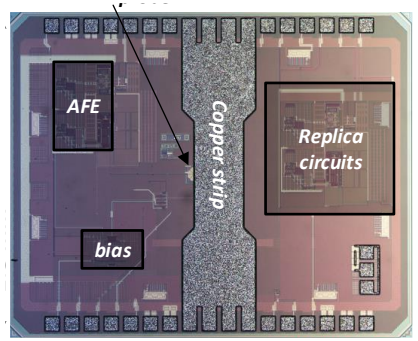
Summary

- Innovative solutions for low voltage microgrids
- Complementary solutions for







- Support of European climate and energy framework key targets

- Continued need for research

PROGRESSUS

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THANK YOU FOR YOUR ATTENTION

ECSEL Joint Undertaking