Electronic Components and Systems for flexible, coordinated and resilient Distributed Renewable Energy Systems

Objective

ECS4DRES will strengthen the **long-term reliability, safety, and resilience of DRES** by developing **advanced monitoring and control technologies** including integrated sensors capable of different types of detection for safety purposes, and for monitoring of energy transfers.

Vision

Creating an **energy system** that is **sustainable, secure, and cost-effective, powered by distributed renewable energy sources.**

Mission

Deliver a set of **interoperable mature solutions centered around energy conversion and management for DRES.**

Challenges

Challenge 1: Highly efficient (> 97%) and high density (> 50 W/inch3) power converters.

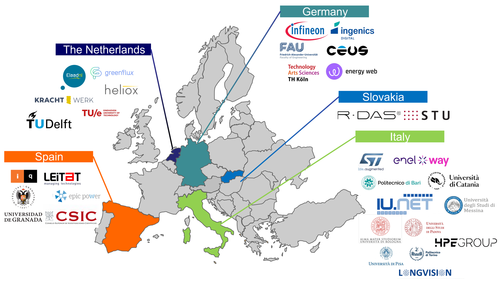
Challenge 2: Compensating local unbalances between energy consumption and generation.

Challenge 3: ECS4DRES will strengthen the long-term reliability, safety, and resilience of DRES.

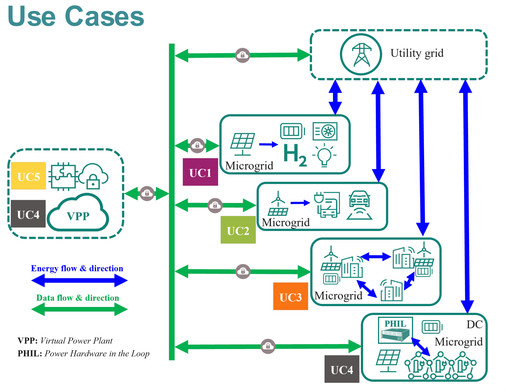
Challenge 4: Develop efficient and low-latency communication systems, capable of connecting multiple DRES.

Challenge 5: Validation of the above-mentioned developments in a series of relevant industrial use cases.

Involved partners



Use Cases



Use Case 1	Smart microgrid with **local green source, H2 generation** and **green certificates** for better **reliability**
Use Case 2	AC and DC **EV charging** grids with improved **power quality**
Use Case 3	Intelligent **cooperative buildings** in microgrids
Use Case 4	Microgrid in the framework of local energy community to increase **flexibility** and **coordination**
Use Case 5	**Monitoring, sensing** and **communication** to improve DRES

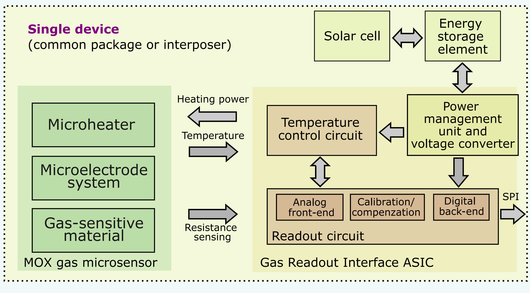
Project Information

Start date:	1st July 2024
Duration:	36 Months
Number of partners:	27
Number of countries:	5
Overall Budge	€ 27.930.499,07
EU Contribution:	€ 8.577.941,75
Project Coordinator:	Infineon Tenologies AG Germany

Main contribution of STU

- **Single device solution** (sensor and ASIC in one package)
- ASIC will be **supported by energy harvester** (ASIC power management)
- **Highly-sensitive H2 sensor** based on NiO
- **Improvement** of the **sensitivity** and **response time**
- **Increased life of energy storage element**

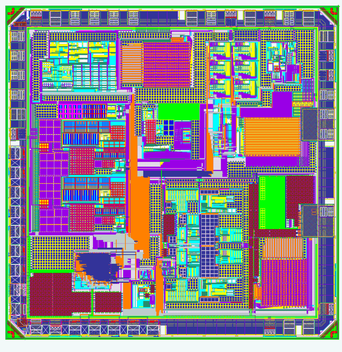
Proposed concept of H_2 monitoring device



Proposed RI ASIC

- **Low-power ASIC solution**
- **Novel** nW range **readout interface (RI)**
- **Temperature control** for MOX sensor
- **SPI** comunication **interface**
- Designed in 65 nm CMOS technology

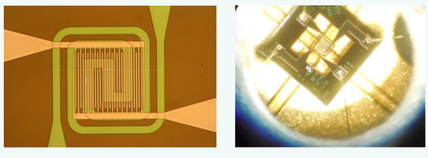
Layout of proposed ASIC



Proposed H_2 sensor

- **NiO gas-sensitive material** on etched Si substrate
- Metal-Oxid Semiconductor (MOX) sensor
- **Adventageous stability** of electrical resistance
- **Excelent repeatability** of electrical parameters

Microphotography of proposed H_2 sensor



H_2 ONTIO

Through ASIC solutions....

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