Elsa

ENERGY LOCAL STORAGE ADVANCED SYSTEM

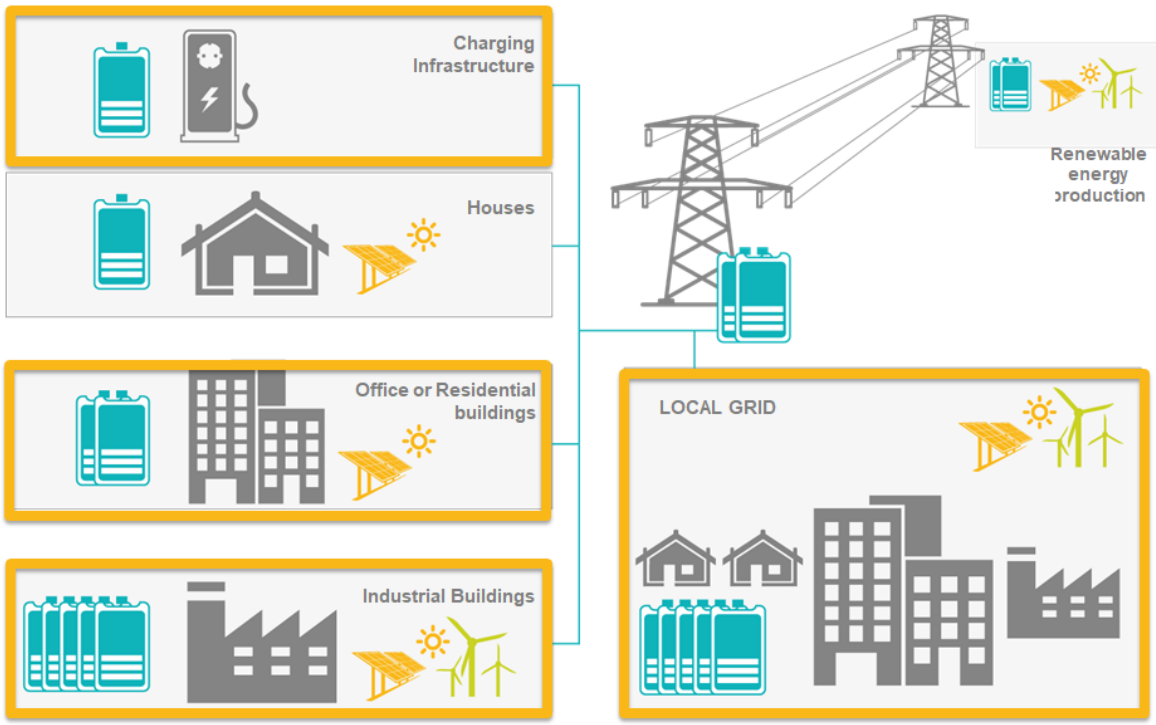
Energy Local Storage Advanced system

Store, Serve and Save with Energy Storage based on 2nd Life Batteries

ELSA Vision

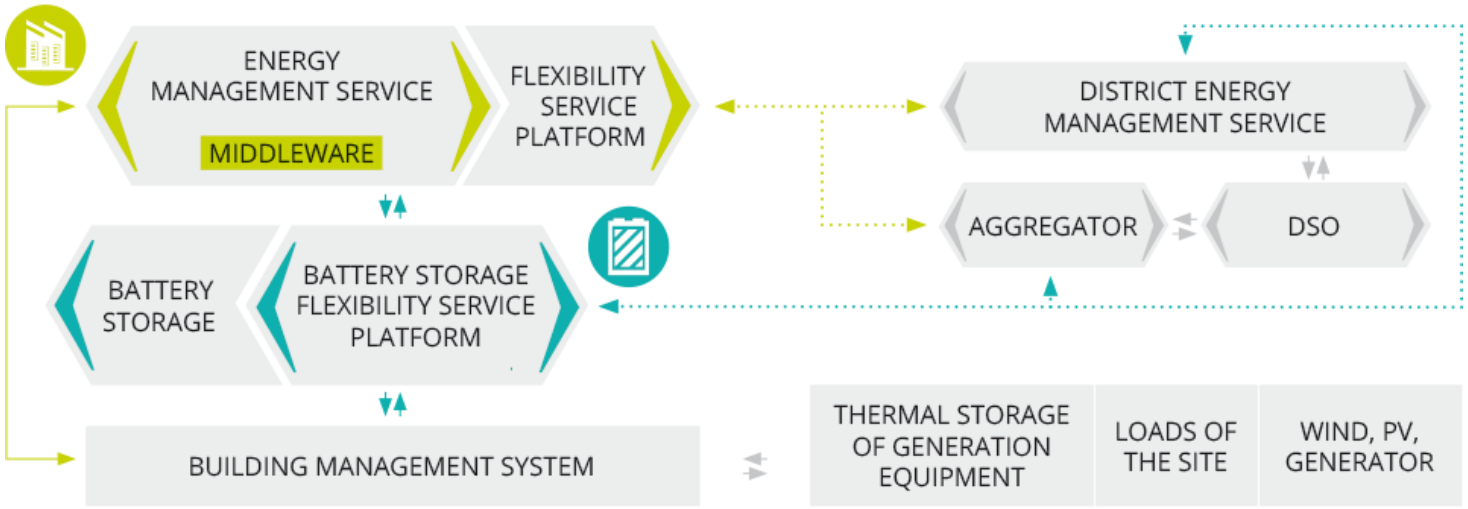
ELSA brings distributed storage solutions to maturity

- a 2nd stationary life for electric vehicle batteries
- *smart storage systems for multi-energy integration in* business buildings and residential districts
- local ICT-based energy management systems
- commercially optimised use of storage for the transition towards renewable energies



ELSA Architecture Model

- Battery management linked to building or district management services
- Scalable storage solutions to adapt to local needs
- Aggregator module to optimize use of storage for grid balancing and energy self supply

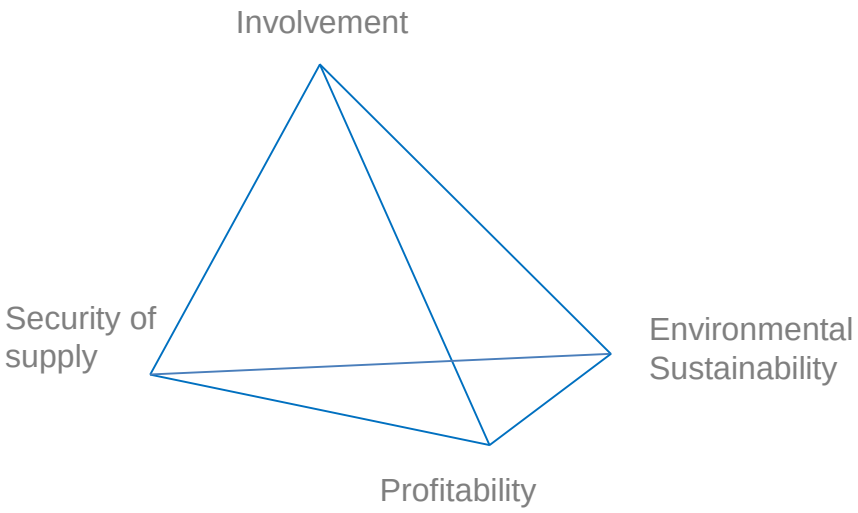


ELSA model meets needs of building, district and grid operators.

Holistic approach

- technically implementing low-cost, scalable and easy-to-deploy storage solutions
- developing innovative, service-oriented business models
- addressing legal and regulatory barriers
- pushing international standards
- ensuring sustainability through using 2nd life batteries and life-cycle assessment
- fostering social acceptance through socio-economic impact analysis
- involving a broad range of relevant stakeholders

ELSA looks for business with ecological and societal benefits.



Well balanced and experienced consortium

Use cases: We need to Stack Services

Storage as a Service

Services for Building & District

+

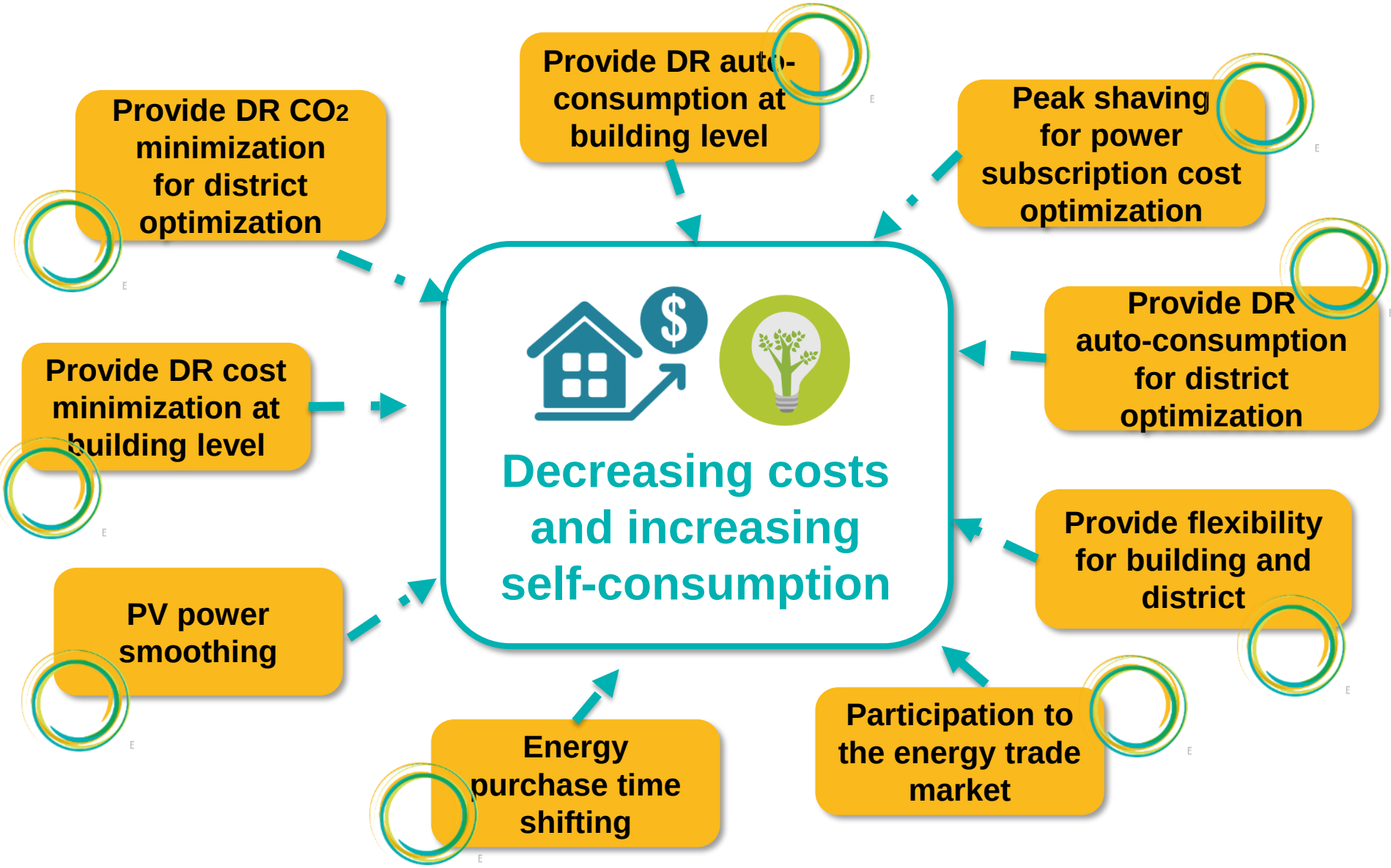
Services for The Grid

Decreasing costs and increasing self-consumption

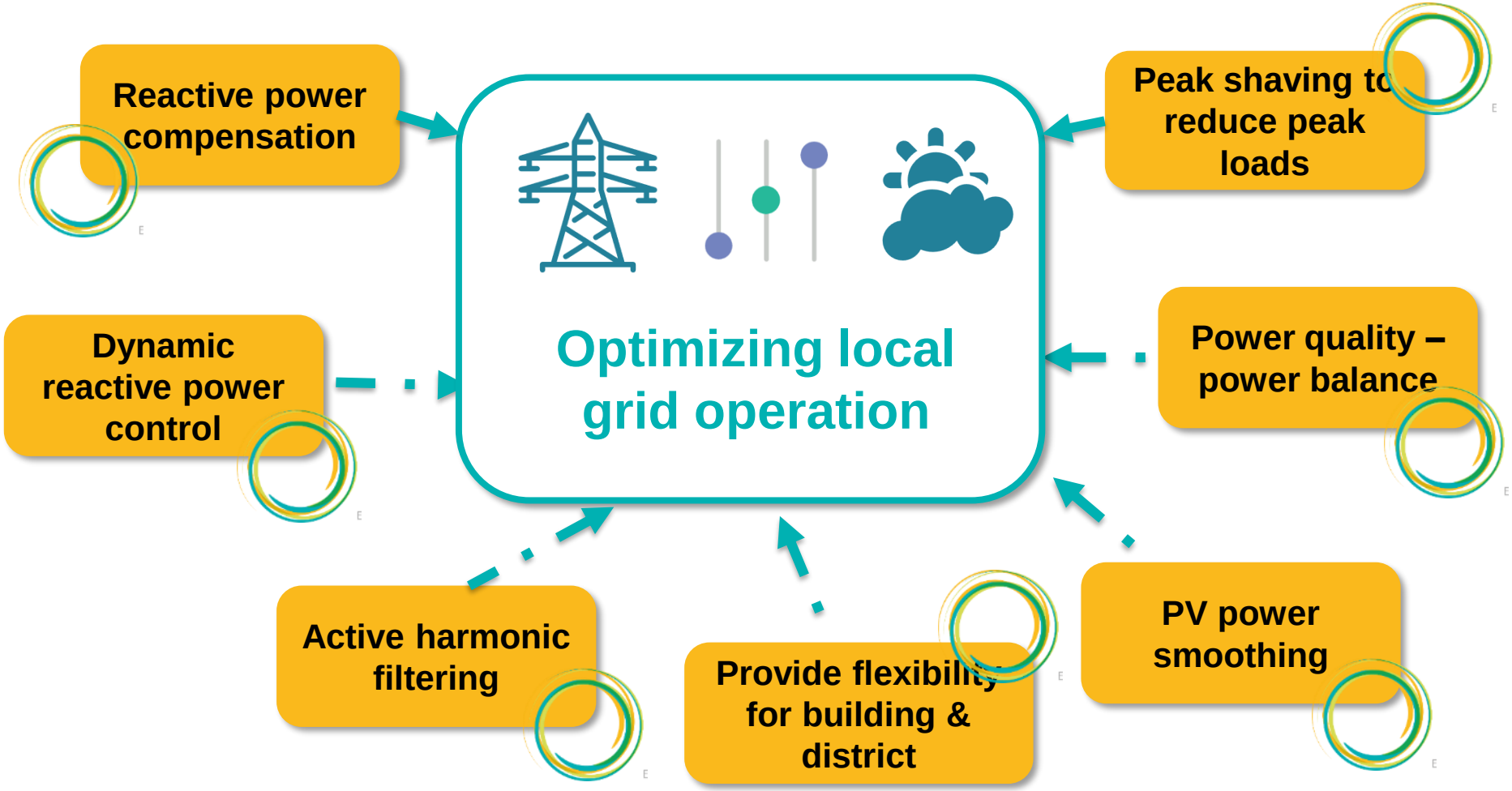
Optimizing local grid operation

Maintaining stability of electricity system

Use cases for Building and District Level



Use cases for Local Grid Level



ELSA 4 keys

Safe

- Security **EV Batteries**

Scalable

- Scalable architecture with **12 to 96 kWh modules**
- **1 controller per battery**, able to manage batteries of different age and quality

Affordable

- Direct Connection to Aggregator Platform for DSR revenues
- Using EV 2nd Life Batteries
- Power « on the shelf » Electronics Components

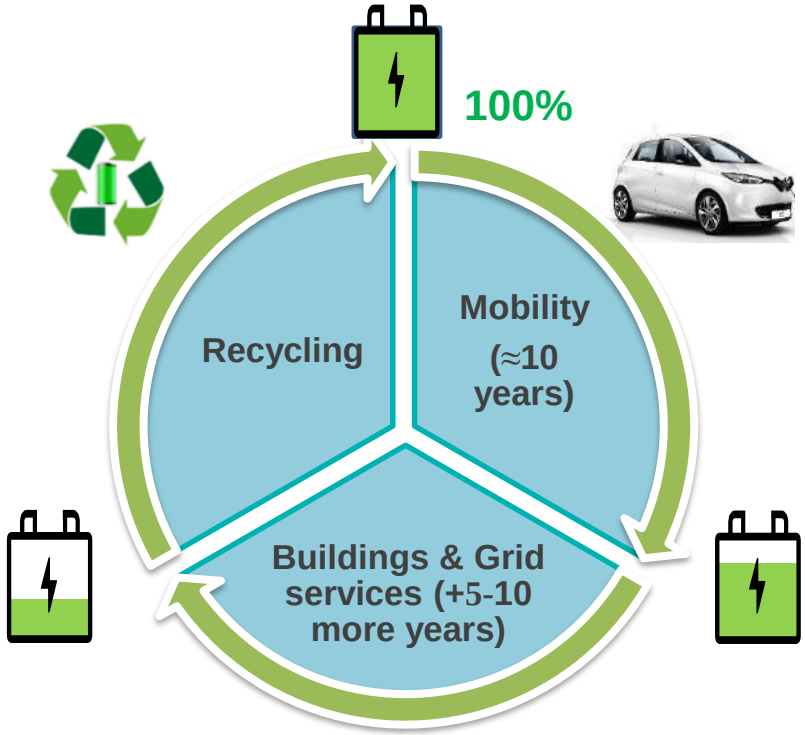
Sustainable

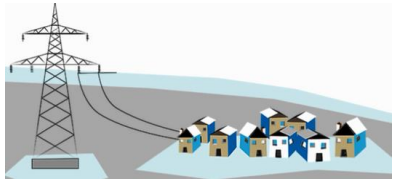
- Using EV 2nd Life Batteries

Using an EV 2nd Life Batteries

2nd Life = better environmental impact of the EV

- **Less use of limited resources**
- **Less emissions**



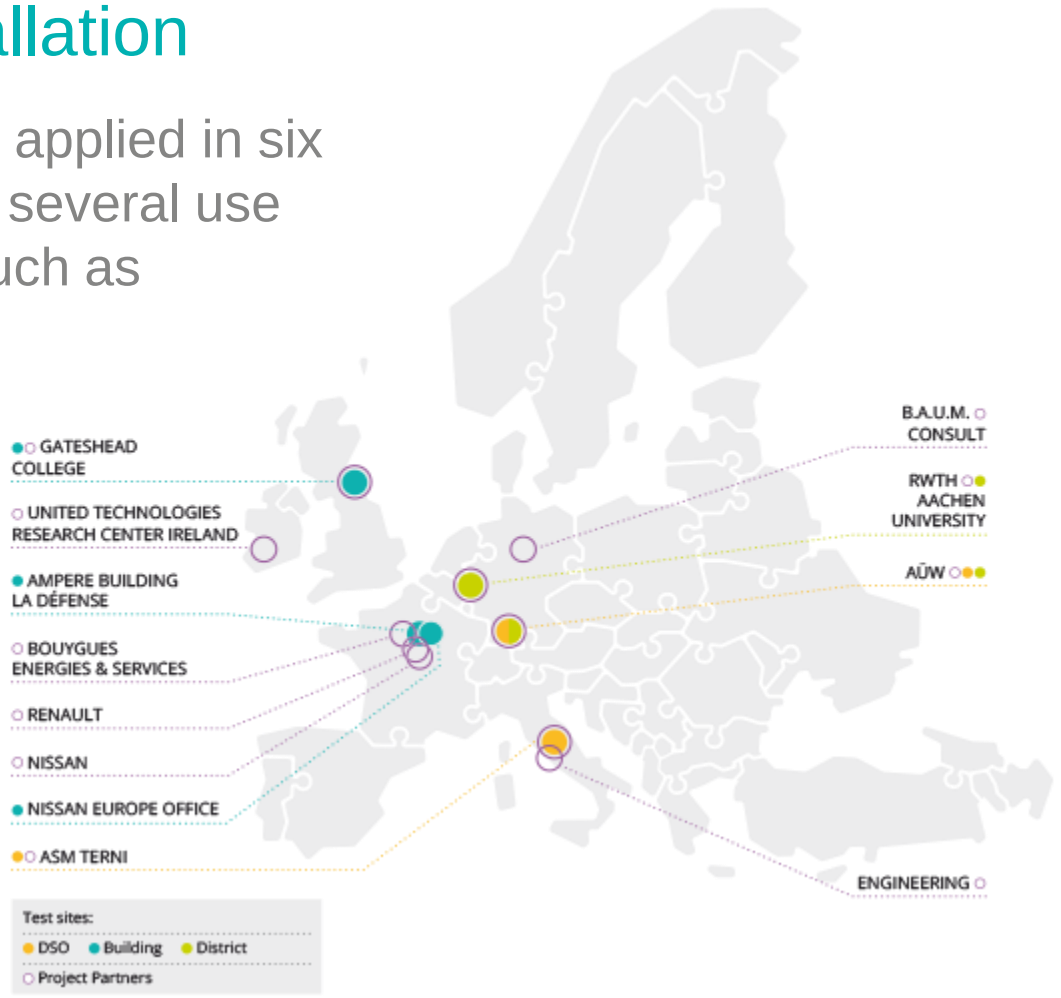


In some cases the environmental benefit can be higher if the car battery is not dismantled

Representative Pilot Installation

The ELSA storage system will be applied in six demonstration sites representing several use cases for storage as a service, such as

- grid congestion relief
- local grid balancing
- peak shaving
- voltage support and regulation
- optimization of self-supply



Pilots resemble all important use cases for small and medium storage solutions.

Pilot Installation – E.ON Energy Research Center at RWTH Aachen University

Location: Aachen, Germany

Category: District

Storage capacity: 72 kW/ 96 kWh

Services:

- Provide DR auto-consumption for district optimization
- Provide DR cost minimization for district optimization
- Provide DR CO_2 minimization for district optimization

Pilot Installation – City of Terni

Location: Terni, Italy

Category: Distribution System

Storage capacity: 72 kW/ 96 kWh

Services:

- Ancillary services (primary reserve, dynamic reactive power control, reactive power compensation)
- Power quality
- PV power smoothing
- Peak shaving

Pilot Installation – Gateshead College

Location: Gateshead, United Kingdom

Category: Building

Storage capacity: 36 kW/ 48 kWh

Services:

- Increasing self-consumption
- Maximise usage from a fluctuating PV system
- Demonstrate the 'plug and play' capability of the design of the battery storage system
- Cost minimization
- Flexibility
- Peak shaving

Pilot Installation – Nissan Europe Office

Location: Paris, France

Category: Office Building

Storage capacity: 144 kW/ 192 kWh

Scalability of the ELSA system: Test the operation of number of systems in parallel

Services:

- Peak shaving
- Energy arbitrage

Pilot Installation – Ampere Building at la Défense

Location: Paris, France

Category: Building

Storage capacity: 24 kW/ 32 kWh

Services:

- Peak shaving
- Demand response
- Energy purchase time shifting

Pilot Installation – City of Kempten

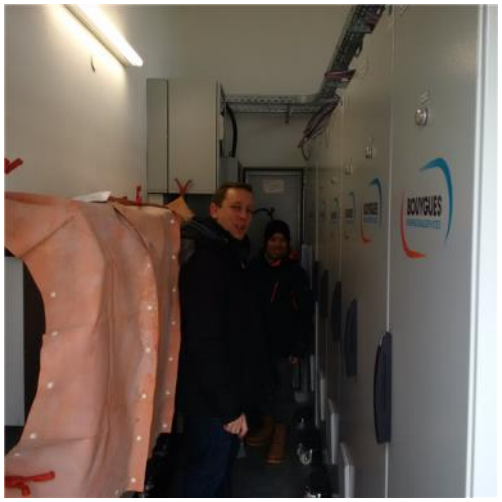
Location: Kempten, Germany

Category: Distribution System, District

Storage capacity: 72 kW/ 96 kWh

Services:

- Increasing self-consumption
- PV power smoothing
- Providing primary reserve (simulative)
- DSO manages the
- Reactive Power Compensation (simulative)
- Balance group optimization (simulative)
- Participation to energy trade market (simulative)



Conclusion

- 250,000 ELSA 2nd life batteries are sufficient to provide the entire primary operation reserve presently hold available in the UCTE grid network
- This number of batteries can serve up to primary reserve requests with the same direction (positive or negative) in succession for the maximum duration of 15 min before re-establishing the optimum readiness-SOC of 50 %

Conclusion

Scenario 2025

- Theoretically, 300,000 2nd-life batteries can provide most of the operating reserve (primary, secondary, minute reserve) actually needed.

Scenario 2035

- 9 million 2nd-life batteries can guarantee about 100% of the max. national power demand for 1.35 hours constantly.

Scenario 2050

- 43 million 2nd-life batteries can cover 100% of the max. national power demand for 5.15 hours constantly.
- 2nd-life batteries from fully electrified national vehicle fleet can match short-term storage need (at least up to one hour) for 100% PV-wind supplied economy (extreme case of highest flexibility need).

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The project Energy Local Storage Advanced system (ELSA) receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 646125.