



Deliverable Fact Sheet

D2.1 – Development Report on Energy Exchange Mechanisms

Objective



This deliverable defines the FlexBIT energy exchange mechanisms that enable renewable energy communities, industrial sites and tertiary buildings to exchange, optimize and exploit energy flexibility. It establishes the functional architecture, operational scenarios and coordination logic required for secure, interoperable and scalable flexibility services across heterogeneous demonstrators.

Methodology



The development followed a layered methodology:

- Analysis of flexibility services and energy exchange scenarios
- Definition of actors and responsibilities
- Design of the energy exchange architecture
- Development of forecasting and optimization workflows
- Mapping to seven FlexBIT demonstrators
- Validation against interoperability and scalability requirements



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Key Findings

The report defines a common energy exchange framework able to coordinate heterogeneous energy assets through standardized operational logic. The main achievements include:

- Common architecture for residential, tertiary and industrial demonstrators
- Multi-layer coordination between prosumers, communities, aggregators and DSOs
- Integration of multiple flexibility assets:
 - PV
 - batteries
 - EV/V2G
 - HVAC
 - hydrogen
 - compressed air
- AI-supported forecasting and optimization
- Advisory dispatch preserving local autonomy
- Interoperable interfaces enabling future scalability

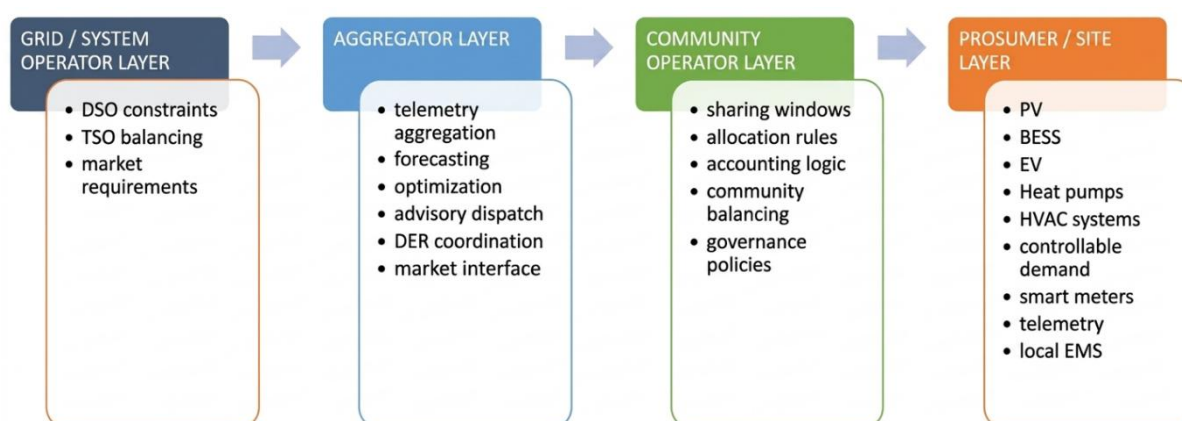


Figure 1 System Architecture Overview: Multi-Layer Energy Exchange Ecosystem



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Recommendations



- ✓ Adopt interoperable communication interfaces across all energy assets.
- ✓ Combine local EMS autonomy with centralized optimization.
- ✓ Integrate multiple flexibility resources rather than focusing on a single technology.
- ✓ Use AI-based forecasting to maximize renewable energy self-consumption.
- ✓ Design flexibility services considering local operational constraints.
- ✓ Ensure secure data exchange and cybersecurity by design.
- ✓ Develop scalable solutions applicable to different national regulatory frameworks.

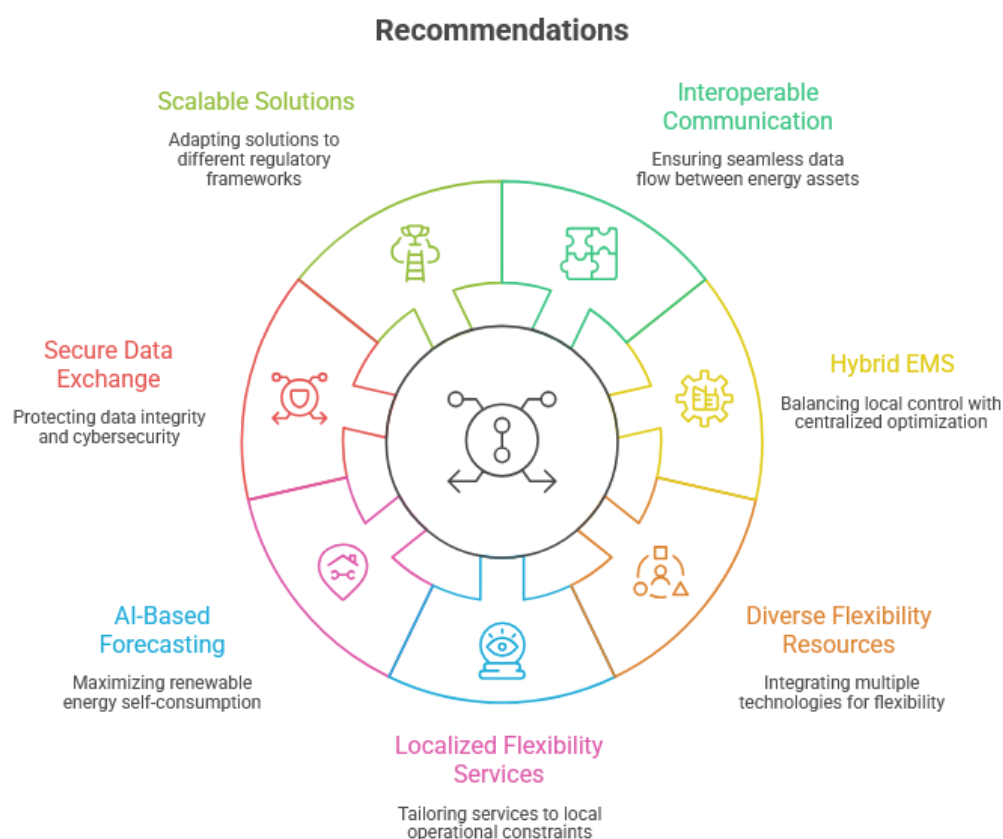


Figure 2 FlexBIT's recommendations



Flexibility Exploitation for residential, tertiary and industrial buildings

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