



Combined AI and Data solutions for AUTOMATION

Challenge 4.2

Automated energy management for
battery production

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4.2 Automated energy management for battery production

Challenge and Context: Automated prediction and optimization of electric energy consumption in energy-intensive production processes can have a significant positive impact. Based on factory daily production plans, the electric energy consumption time profile can be predicted. Subsequently, the time distribution of production steps can be optimized to keep the electric energy time profile within limits determined by the electric grid operator. This helps industries and grid operators balance their grids and maximally exploit the potential of renewable energy sources. AID4SME is flexible in implementing such automated energy management for different industrial use case owners both inside and outside the consortium. A partner is monitoring their energy-intensive battery production processes and attempts to model the consumption. Optimization remains a challenge, and this partner seeks an automated energy management solution on top of their energy and production models.

Use Case and Expected Solution: Energy consumption prediction models for production processes exist and are used in practice, but they are manually developed and tailored for specific production processes, considering particular energy consumers. Manual design of such models requires expert knowledge of process and energy modeling, is time-consuming and expensive, and limits transferability between different processes and reusability. A partner has technology blocks available at TRL 4 and a low-TRL playground for automatic determination of the relationship between energy consumption time profile and production plans, based on AI and machine learning methods using historical data about production plans and related energy consumption profiles. This automatic learning capability enables wide usage of the method across different production processes. The data-based approach also allows modeling the effects of external conditions (temperature, weather, season, etc.).

The solution enables to balance energy consumption and optimize renewable energy consumption. This will result in more efficient energy management, reduced operational costs, and enhanced overall sustainability.

Specifications for Use Case: The consortium partners will guide and mentor SMEs to use existing building blocks for automated energy management of production processes and further develop and implement these technologies in real production environments of use-case owners. The partner use case and use cases outside the consortium, automated energy management and optimization demonstrated at TRL 7) will enable the partner and other use-case owners to balance their energy consumption.

The selected third party is expected to contribute with the following:

- Provide an Energy Management System, based on energy consumption models and machine models.
- Provide a monitoring and management module for the most energy intensive machines
- Be able to demonstrate the prototype at pilot scale.

Key Performance Indicators:

- % increase in renewable energy integration
- % reduction in energy cost per unit
- % reduction in peak energy demand

The list of KPIs provided in this section is not exhaustive but rather indicative. Additional KPIs will be studied and can be integrated to ensure quality outcomes.