Case Study: Energy Storage System – Blăgești Farm, Bacău

Context and Objectives

Blăgești Farm operates a large agro-industrial complex including factories (asphalt, fish, feed), a fish farm, a hotel, and a restaurant.

Main objectives of the project:

• Reduce energy consumption from the national grid (SEN)

• Ensure continuity for critical consumers

• Maximize self-consumption from renewable sources

⚙️ Initial Energy Infrastructure

- Power supply network: 20 kV overhead line → PT1 (400 kVA), PT2 (400 kVA)
- Existing production:
  – Photovoltaic systems 410 kW
  – Cogeneration generator: 260 kW
  – 2 Diesel generators: 220 kVA and 185 kVA

Limitations:

- No backup for PT1
- Risk of overcurrent from improper switching
- Dependence on the grid during nighttime or low renewable availability

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✅ Implemented Solution

🔋 Energy Storage Systems – PT1 and PT2

Two identical BRES 300-645 systems (300 kW / 645 kWh) were installed, one for each transformer station.

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PT1 – Transformer Station 1 (400 kVA)

- Installed system: BRES 300-645
- Rated power: 300 kW
- Storage capacity: 645 kWh
- Main functions:
  – 2h autonomy for critical loads
  – Energy delivery in the absence of renewables
  – Automatic STS switching
  – Charging from renewable sources

PT2 – Transformer Station 2 (250 kVA)

- Installed system: BRES 300-645
- Rated power: 300 kW
- Storage capacity: 645 kWh
- Main functions:
  – 2h autonomy for vital loads
  – Stabilization of renewable flow (PV 260 kW)
  – Peak shaving and full backup
  – Operation in tandem with Diesel generators

Other Relevant Components

- 2 Diesel generators: 220 kVA and 185 kVA for PT2 backup
- 260 kW cogeneration generator (manually switchable between PT1/PT2)
- Installed photovoltaic systems: 410 kW
- 2 planned wind turbines: 250 kW each

Estimated Results

- Grid consumption reduction (sunny day): >80% of consumption covered
- Estimated monthly savings: >30% of electricity bill
- Autonomy without the grid: 2–4 hours per transformer, depending on battery charge and load
- Estimated ROI (with AFM subsidy): under 5 years

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🔄 Operating Mode – Automated System

The system operates under an automated logic that prioritizes renewable energy, cogeneration generator (G3), and BRES storage systems to cover consumption. Diesel groups (DG1, DG2) are only used when necessary.

🔋 Battery Charging Management – BRES

BRES 2 (PT2):

- When SOC reaches 30%, the system sends an automatic start command to G3.
- Charging continues until SOC reaches 95%, after which G3 is stopped and consumers are powered from battery storage.

BRES 1 (PT1):

- Discharges down to 30%, then switches to PT1 to supply loads + recharge if needed.
- Charges from renewable sources, then supplies loads from stored energy.

⚠️ The system analyzes active power to avoid redundant commands to G3 using real-time charge/discharge data.

⚠️ Off-grid Switching

- In case of grid failure (detected by storage systems), main breakers Q0 and Q2 are triggered to switch automatically to off-grid.
- Return to grid is also automatic, subject to multiple cumulative conditions being met (e.g. Diesel generator not connected).

⚙️ DG1 Diesel Generator Operation

- DG1 starts automatically only in complete absence of grid voltage and BRES PT2 SOC < 10%.

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Conclusion

The Blăgești Farm project stands as an efficient model of sustainable energy transition for the Romanian agro-industrial sector. The BRES 300-645 storage systems provide partial energy independence, operational resilience, and compliance with ANRE regulations. The implementation supports both economic efficiency and carbon footprint reduction.

Photo gallery – Field equipment









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