



**The State of Israel,
Ministry of Energy and Infrastructure**

Date: 19/07/2026

RFI Number: 11/2026

Annex B- Previous relevant case-study- Stationary energy storage in a virtual microgrid

The research objectives were to establish a virtual microgrid in an industrial zone serving multiple facilities with diverse activity profiles, aiming to examine the technological, regulatory, and economic feasibility of the model.

The project was implemented at an Industrial Park across facilities housing multiple consumers.

The system integrates solar generation (PV), a Battery Energy Storage System (BESS) with an 800kW power output and 3,344kWh capacity, and EV charging stations. All components are orchestrated by a local Energy Management System (EMS) connected to a cloud-based Virtual Power Plant (VPP) utilizing Machine Learning (ML) algorithms. All project milestones were successfully completed, and the system entered commercial operation. The management system demonstrated the capability to perform comprehensive energy balancing for multiple plants, prioritizing discharge during peak hours and charging during off-peak hours, yielding tangible economic arbitrage profits. The project successfully proved the feasibility and economic viability of industrial microgrids. It is recommended to further pursue the commercial development of regional microgrids and to advance regulatory policies enabling their participation in providing ancillary services to the national grid.

Main Results (System Performance):

- **Simulation and Theoretical Balance:** The simulation showed a peak load of 15.9 MWh during summer days, with summer consumption accounting for 42% of the annual total. This data served as the basis for prioritizing discharge during peak hours and charging during off-peak hours in the EMS algorithm.
- **Controlled Operation (Commissioning):** Controlled charging and discharging tests were conducted in which the system met the technical specifications and its ability to perform full energy balancing (including weighting solar production and charging) was successfully demonstrated.
- **Commercial Performance:** For the reporting period (March-December), the system recorded a total import of 243.5 MWh and a total export of 205.9 MWh.



- Profitability (Arbitrage): From the Energy Flow analysis, during 2025 the system generated total revenues of 0.3 million NIS, against costs of 0.1 million NIS, leaving an operational profit of 0.2 million NIS from arbitrage operations and load shifting.

Table 1 - Virtual Microgrid Energy Flow in 2025

	Import	Export	Cost	Revenue	Profit
	MWh		ILS ₪		
March	0	0	0	0	0
April	0	0	0	0	0
May	4.9	7.2	1.4K	2K	596.40
June	51	45.6	17.7K	56.8K	39.1K
July	48.3	38.9	16.9K	49.6K	32.6K
August	69.2	58.7	24.1K	76.5K	52.4K
September	65.7	55.3	22.6K	71.8K	49.2K
October	4.9	0	1.4K	0	-1.4K
November	5.9	2.2	1.7K	1.7K	6.20
December	95.5	87.4	28.1K	76.9K	48.8K
Total	345.7	295.6	0.1M	0.3M	0.2M

Conclusions:

The project proved the feasibility of the distributed industrial microgrid model. The integration of EMS/VPP technology enables successful coordination between several small-medium consumers into a unified and smart entity, providing aggregate values that are not economically viable for each consumer separately. These capabilities include operational efficiency, cost savings in tariffs (peak/off-peak), and an economic solution for the growth in electric vehicle consumption without the need to increase grid connections to the electric company.

Problems Identified and Risk Management:

End Equipment and Islanding Capability: During the systems procurement and permits phase, a gap was discovered in the lack of available supply of inverters at the relevant power rating (800kW) that support islanding capability. Therefore, alternative inverters that do not support this feature were used.

Implementation Recommendations:

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The results unequivocally support continued commercial development of regional microgrids in industrial parks. Furthermore, the project opens a window for integrating these systems into the ancillary services market (Ancillary Services/ FFR) in accordance with the Israel Electric Authority and NOGA policies, thereby providing national frequency stabilization services. It is recommended to promote a 'network effect' model that enables national management of multiple complexes with future electricity trading capability between sites and with third parties.