



FFPLUS SUCCESS STORY: BUSINESS EXPERIMENTS

HPC-ENABLED DEEP LEARNING FOR REAL-TIME ENERGY FORECASTING IN BUILDINGS

ORGANISATIONS

Robotina d.o.o. is a Slovenian SME delivering IoT-enabled hardware and cloud software for smart buildings, automation and energy management. **Rudolfovo Science and Technology Centre** supported technological development of the HPC-enabled AI workflow. **The University of Ljubljana - Faculty of Mechanical Engineering** contributed engineering knowledge and model-development expertise.



THE CHALLENGE

Robotina wanted to extend its xEMS solution from monitoring and control into predictive optimisation for offices, hotels, public buildings and campuses. Customers need accurate 1-3 day energy forecasts at 15-minute resolution as dynamic tariffs renewables and storage make demand harder to plan. BiLSTM models could provide the accuracy but were too slow to train, tune and validate building by building on CPU infrastructure, making HPC necessary.



Technology used: HPC, AI, ML
Industry Sector: Energy

THE SOLUTION

The team built an HPC-enabled forecasting workflow connecting the xEMS data pipeline with the VEGA supercomputer. Building, weather, tariff and market data were prepared automatically for AI training, then used to compare forecasting models. Four GPU nodes ran model searches in parallel, with Python and TensorFlow packaged in Singularity containers. The result is a reproducible training pipeline, optimised 15-minute multi-step model and TensorFlow Lite edge version for xEMS devices.

THE IMPACT

The experiment gives Robotina a commercially deployable AI forecasting module for xEMS, strengthening its position in smart energy management and creating a subscription add-on for commercial and public buildings. HPC is central to the business case: model-search and training runs that previously took around a week now take less than one day, allowing Robotina to refine deep-learning models for multiple buildings and scenarios without the CPU bottleneck. This shortens release cycles and enables scalable onboarding rather than bespoke development.

Robotina estimates that forecasting subscriptions could create up to €800,000 annual revenue, based on around €80 per subscription per year. For customers, accurate 1-3 day forecasts at 15-minute resolution support better scheduling of energy-intensive operations and use of dynamic tariffs, renewables and storage, with potential energy-cost savings of up to 10%. Improved accuracy also opens routes to storage optimisation and flexibility-market services.

BENEFITS

- Forecasting error cut from 47.88% to 10.49%.
- HPC enabled a reduced model search from about one week to under one day.
- Up to €800,000 annual revenue opportunity from new xEMS subscriptions.
- Customers can reduce energy costs by up to 10%.
- VEGA-trained models deploy to TensorFlow Lite on xEMS edge devices.



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