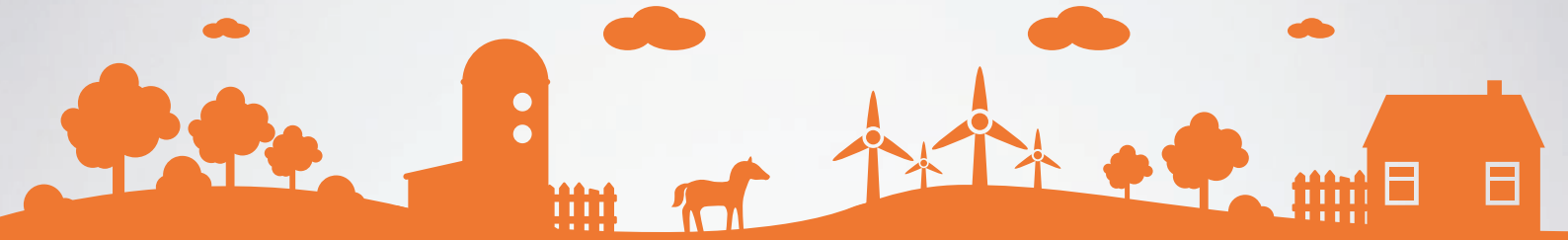
ASTRON
business upgraded

# SIMULATION OF A LOW VOLTAGE NETWORK
# IN A RENEWABLE ENERGY PARK



## ABOUT THE PROJECT

The unique Horse Therapy Centre situated in Fót, Hungary helps children with disabilities recover from both physical and mental illnesses. ELMŰ Nyrt., one of the biggest Hungarian electricity suppliers - and also a strategic partner of our company - supports the initiative by supplying a low voltage network based on renewable energy.

We are proud to have contributed to the project with the help of our Network Training Simulator which helps optimize energy consumption in the park.

## ASTRON'S CONTRIBUTION

### THE SIMULATOR

The network consists of a photo voltaic system, a wind turbine, a small water turbine, a battery system, and a biogas motor-generator unit. Astron's Network Training Simulator models the whole network and works with real, measured data.

## SYSTEM OPERATIONS AND FUNCTIONS

An external data set provides the electrical characteristics and power profiles of renewable generators and consumers to the simulator. Environmental data (solar radiation, wind speed, air temperature) can be used in the models, which can be changed within wide limits by the simulator user.

Power-time profiles, run-up and run-down curves of renewable energy producers and the consumers can be changed by the user too. The energy producers and consumers can be switched on or off on the GUI.

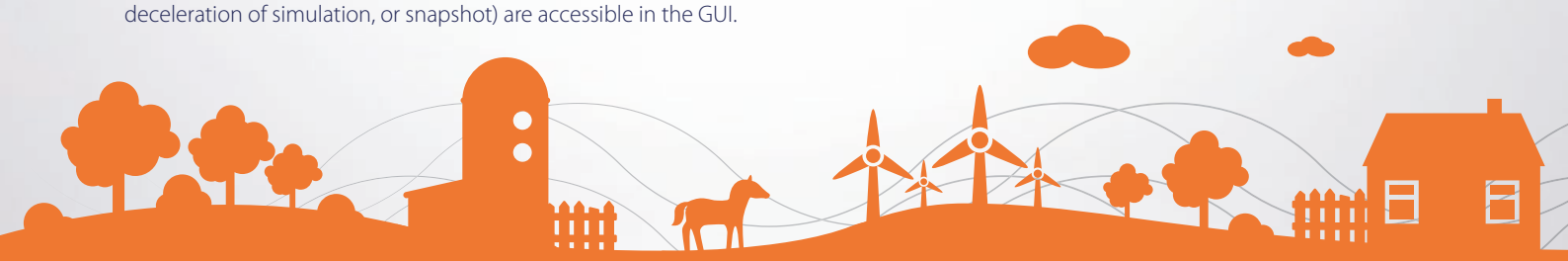
The inverter and charger units of the battery are modelled in a transparent way. User can define the run-up and run-down curves of the charging and discharging process.

The model of the biogas engine simulates the storage and production of biogas. The user can define the electrical time schedule, and the simulator calculates the gas consumption.

The simulator does not simulate the transient electrical phenomena, but run-up and run-down curves model the changes of electrical parameters.

Simulator has a regulator algorithm. The user can choose the regulation method to either keep the island network operation mode or to optimize the use of the renewable energy producers (maximum feedback to public electrical network). The regulator can be programmed to manage other regulation methods and models. E.g. cut of peek consumption, tariff optimization.

The usual didactic functions (start, stop, pause, acceleration, deceleration of simulation, or snapshot) are accessible in the GUI.



## RESULTS

**The simulator helped the Therapy Center in the following areas:**

- ✓ testing microgrid regulation strategies in order to optimize energy consumption
- ✓ research energy storage solutions to improve efficiency
- ✓ simulation of islanding
- ✓ preparation for various weather conditions
- ✓ academic purposes
- ✓ promotion of renewable energy