Best practices - Slovakia

13 April 2021

Project HUSKROUA/1702/6.1/0075
"Cross-border network of energy sustainable universities (NET4SENERGY)"

Lead Beneficiary: Ivano-Frankivsk National Technical University of Oil and Gas, project coordinator Prof.Maksym Karpash mkarpash@nung.edu.ua, +380342547430

Hungary Slovakia Romania Ukraine

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Implemented measures:

- thermal insulation
- roof / floor insulation on the attic
- basement ceiling insulation
- replacement of windows and doors
- reconstruction of the heat source, including thermostatization
- replacement of light sources, resp. lamps

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What data is available before the reconstruction:

- project documentation of the object - often missing or insufficient or out of date
- if necessary, data supplemented by measurement
- method and mode of operation of the object

What is monitored:

- gas consumption
- Heat
- electricity

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Why monitoring is important:

- verification of achieved energy savings
- if the planned savings are not achieved, an analysis of the reasons and proposals for solutions
- take further action

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Kindergarten in the village Cífer

Before reconstruction

After reconstruction

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Kindergarten in the village Cífer

Before Reconstruction:
Energy needs for central heating and lighting before reconstruction : 369.776 kWh
Energy consumption before reconstruction : 222.757 kWh

Savings – 30,4%

Energy consumption after reconstruction : 155.127 kWh
Real energy savings : 67.630 kWh

Investment cost for reconstruction: cca 191.000 EUR bez DPH
Investment cost for real savings kWh: 2,82 EUR/1kWh
Investment cost saved kWh*: 0,89 EUR/1kWh

* calculated from energy demand at central heating and lighting before and energy consumption after

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Kindergarten in the village Klasov

Before reconstruction

After reconstruction

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Kindergarten in the village Klasov

Before reconstruction

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Kindergarten in the village Klasov

Before Reconstruction:
Energy needs for central heating and lighting before reconstruction :274.553 kWh
Energy consumption before reconstruction : 186.192 kWh

Savings – 49,4%

Energy consumption after reconstruction : 94.121 kWh
Real energy savings: 92.071 kWh

Investment cost for reconstruction: cca 207.000 EUR bez DPH
Investment cost for real savings kWh: 2,25 EUR/1kWh
Investment cost saved kWh*: 1,15 EUR/1kWh

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Kindergarten in the village Bojná

Before reconstruction

After reconstruction

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Kindergarten in the village Bojná

Before Reconstruction:
Energy needs for central heating and lighting before reconstruction : 141.407 kWh
Energy consumption before reconstruction : 92.628 kWh

Savings – 45,3%

Energy consumption after reconstruction : 50.690 kWh
Real energy savings : 41.938 kWh

Investment cost for reconstruction: cca 67.000 EUR bez DPH
Investment cost for real savings kWh: 1,6 EUR/1kWh
Investment cost saved kWh*: 0,74 EUR/1kWh

* calculated from energy demand at central heating and lighting before and energy consumption after

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Základná škola v obci Cerová

Before reconstruction

After reconstruction

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Kindergarten in the village Cérová

Before Reconstruction:
Energy needs for central heating and lighting before reconstruction : 543.924 kWh
Energy consumption before reconstruction: 354.316 kWh

Savings – 29,3%

Energy consumption after reconstruction: 250.629 kWh
Real energy savings: 103.687 kWh

Investment cost for reconstruction: cca 249.000 EUR bez DPH
Investment cost for real savings kWh: 2,4 EUR/1kWh
Investment cost saved kWh*: 0,85 EUR/1kWh

* calculated from energy demand at central heating and lighting before and energy consumption after

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Intelligent management of consumption and generation from Renewable energy sources
Technical university of Košice

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- The system has installed power capacity of 3250 W. The 3 types of photovoltaic panels are used (monocrystalline, polycrystalline, amorphous). Panels are divided into 2 sections. The first section represents 1.5 kW rooftop stable construction. The second part is 1.5 kW of PV panels with trackers.
-
- The tracker automatically changes the angle and rotation of the panels along with the sun for higher efficiency of generation. By these two different installation system we can compare the effectiveness of generation on the basis of the type of installation.

- All the generated electricity is self-consumed by the university. The generated electricity is accumulated in batteries. No surplus electricity is generated to be fed into the power grid. The generated electricity is used for supply “green” electrical outlets located in the corridor of the department, which can be used by students and visitors to the university.
-
- At night, the electricity from the battery is used to illuminate the courtyard and parking lot of the department. The small power plant consisting of 12 Photovoltaic panels (4 Polycrystalline, 4 monocrystalline, 4 amorphous), half of them are installed on the roof of the building.

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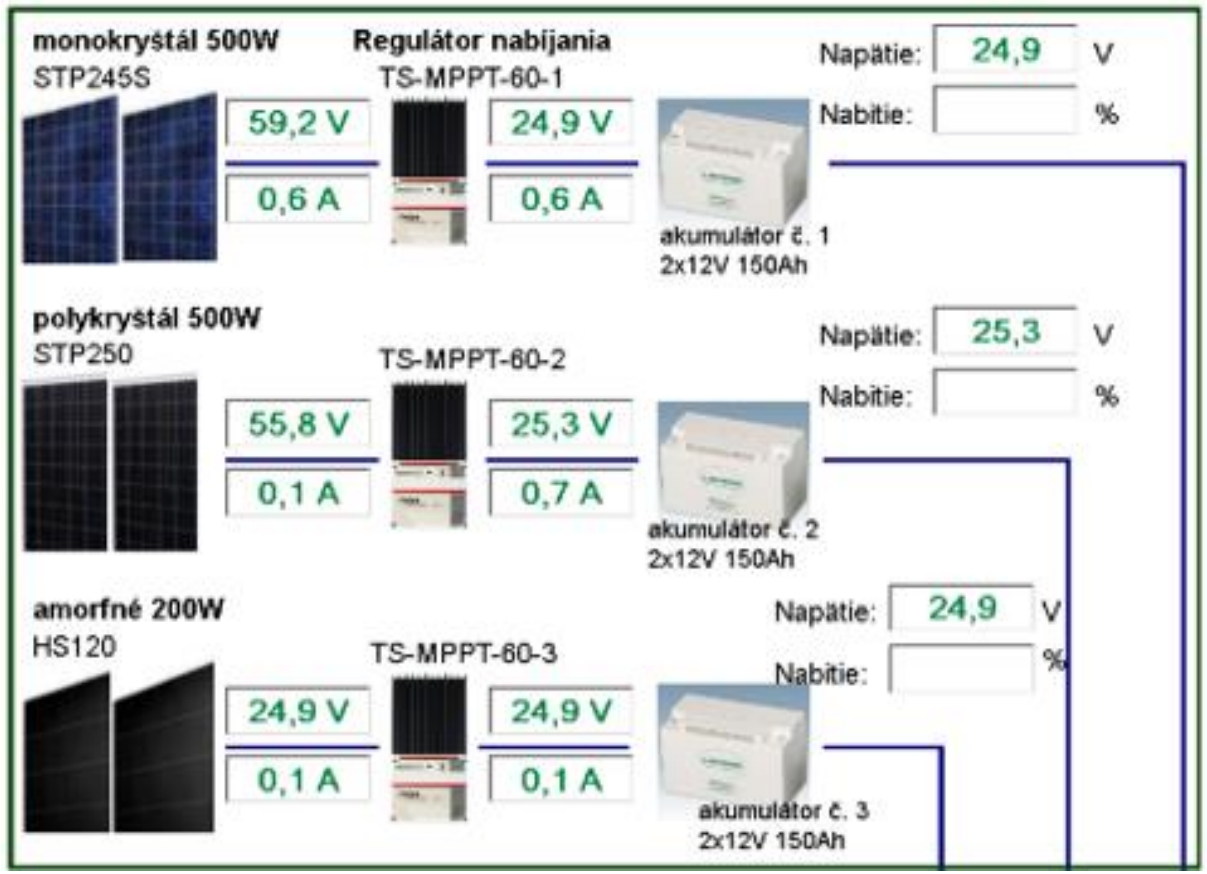
monokryštál 500W
STP245S
Regulátor nabíjania
TS-MPPT-60-1
59,2 V
0,6 A
24,9 V
0,6 A
Napätie: 24,9 V
Nabitie: %
akumulátor č. 1
2x12V 150Ah
polykryštál 500W
STP250
TS-MPPT-60-2
55,8 V
0,1 A
25,3 V
0,7 A
Napätie: 25,3 V
Nabitie: %
akumulátor č. 2
2x12V 150Ah
amorfné 200W
HS120
TS-MPPT-60-3
24,9 V
0,1 A
24,9 V
0,1 A
Napätie: 24,9 V
Nabitie: %
akumulátor č. 3
2x12V 150Ah

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- The system also includes a Hybrid solar-wind power plant. The Installed capacity of a wind power plant is 200W and PV panel of 50W. This small hybrid power source is also connected to this system.

- The static meteorological station provides a professional measurement of temperature, pressure, humidity, precipitation, wind speed, wind direction, wind gust, recording of max. and min. values and a number of other special meteorological variables.

- Measurement of solar radiation intensity is realized using CMP6 pyranometers that provides a measurement of global radiation, diffuse radiation, radiation incident on the tracker platform.

- Battery charging is controlled by the MPPT Tristar controller. Battery capacity is 125Ah, and its rated voltage is 24V. An inverter is COTEK 24V/230V.

- Evaluation of measured operating parameters of devices is provided by the measuring control panel on the C-RIO and C-DAQ platform using graphical programming in the SW LAB VIEW.

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Any Questions?

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